

DECCAN COLLEGE OF MEDICAL SCIENCES

(Affiliated to KNRUHS, Warangal Recognised by: National Medical Commission, New Delhi)
P.O. Kanchan Bagh, DMRL X Road, Santosh Nagar, Hyderabad – 500 058. T.S. INDIA
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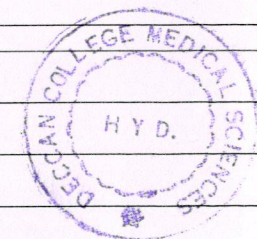
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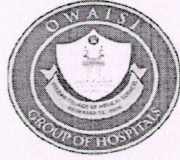
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MBBS Integrated Teaching Topics & Competencies

S No	Department	Competency No	Topic	Competency	Vertical Intefgration	Horizontal Integration
1	ANATOMY	AN5.6	General Features Of The Cardiovascular System	Describe the concept of anastomoses and collateral circulation with significance of end-arteries	General Medicine	Physiology
2	ANATOMY	AN5.8	General Features Of The Cardiovascular System	Define thrombosis, infarction & aneurysm	Pathology	Physiology
3	ANATOMY	AN7.5	Introduction To The Nervous System	Describe principles of sensory and motor innervation of muscles	General Medicine	Physiology
4	ANATOMY	AN22.4	Heart & Pericardium	Describe anatomical basis of ischaemic heart disease	General Medicine	Physiology
5	ANATOMY	AN22.7	Heart & Pericardium	Mention the parts, position and arterial supply of the conducting system of heart	General Medicine	Physiology
6	ANATOMY	AN24.1	Lungs & Trachea	Mention the blood supply, lymphatic drainage and nerve supply of pleura, extent of pleura and describe the pleural recesses and their applied anatomy	General Medicine	Physiology
7	ANATOMY	AN24.2	Lungs & Trachea	Identify side, external features and relations of structures which form root of lung & bronchial tree and their clinical correlate	General Medicine	Physiology
8	ANATOMY	AN24.3	Lungs & Trachea	Describe a bronchopulmonary segment	General Medicine	Physiology
9	ANATOMY	AN25.3	Thorax	Describe fetal circulation and changes occurring at birth	General Medicine	Physiology
10	ANATOMY	AN25.4	Thorax	Describe embryological basis of: 1) atrial septal defect, 2) ventricular septal defect, 3) Fallot's tetralogy & 4) tracheo-oesophageal fistula	General Medicine, Pediatrics	Physiology
11	ANATOMY	AN25.5	Thorax	Describe developmental basis of congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta	General Medicine, Pediatrics	Physiology
12	ANATOMY	AN25.9	Thorax	Demonstrate surface marking of lines of pleural reflection, lung borders and fissures, trachea, heart borders, apex beat & surface projection of valves of heart	General Medicine, Pediatrics	Physiology
13	ANATOMY	AN56.2	Meninges & Csf	Describe circulation of CSF with its applied anatomy	General Medicine	Physiology
14	ANATOMY	AN57.4	Spinal Cord	Enumerate ascending & descending tracts at mid thoracic level of spinal cord	General Medicine	Physiology
15	ANATOMY	AN57.5	Spinal Cord	Describe anatomical basis of syringomyelia	General Medicine	Physiology
16	ANATOMY	AN58.4	Medulla Oblongata	Describe anatomical basis & effects of medial & lateral medullary syndrome	General Medicine	Physiology
17	ANATOMY	AN60.3	Cerebellum	Describe anatomical basis of cerebellar dysfunction	General Medicine	Physiology
18	ANATOMY	AN61.3	Midbrain	Describe anatomical basis & effects of Benedikt's and Weber's syndrome	General Medicine	Physiology
19	ANATOMY	AN62.2	Cranial Nerve Nuclei & Cerebral Hemispheres	Describe & demonstrate surfaces, sulci, gyri, poles, & functional areas of cerebral hemisphere	General Medicine	Physiology
20	ANATOMY	AN62.3	Cranial Nerve Nuclei & Cerebral Hemispheres	Describe the white matter of cerebrum	General Medicine	Physiology





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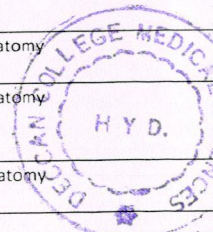
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21	ANATOMY	AN62.4	Cranial Nerve Nuclei & Cerebral Hemispheres	Enumerate parts & major connections of basal ganglia & limbic lobe	General Medicine	Physiology
22	ANATOMY	AN62.5	Cranial Nerve Nuclei & Cerebral Hemispheres	Describe boundaries, parts, gross relations, major nuclei and connections of dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus	General Medicine	Physiology
23	ANATOMY	AN62.6	Cranial Nerve Nuclei & Cerebral Hemispheres	Describe & identify formation, branches & major areas of distribution of circle of Willis	General Medicine	Physiology
24	ANATOMY	AN63.2	Ventricular System	Describe anatomical basis of congenital hydrocephalus	Pediatrics	Physiology
25	ANESTHESIOLOGY	AS7.3	Intensive Care Management	Observe and describe the management of an unconscious patient	Physiology	General Medicine
26	ANESTHESIOLOGY	AS7.4	Intensive Care Management	Observe and describe the basic setup process of a ventilator	Physiology	General Medicine
27	ANESTHESIOLOGY	AS8.4	Pain And Its Management	Describe the principles of pain management in palliative care	Pharmacology	General Medicine
28	ANESTHESIOLOGY	AS8.5	Pain And Its Management	Describe the principles of pain management in the terminally ill	Pharmacology	General Medicine
29	ANESTHESIOLOGY	AS9.4	Fluids	Enumerate blood products and describe the use of blood products in the preoperative period	Pathology	General Surgery
30	ANESTHESIOLOGY	AS10.4	Patient Safety	Define and describe common medical and medication errors in anaesthesia	Pharmacology	General Medicine
31	BIOCHEMISTRY	BI5.2	Chemistry And Metabolism Of Proteins	Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies	Pathology, General Medicine	Physiology
32	BIOCHEMISTRY	BI6.7	Metabolism And Homeostasis	Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these.	General Medicine	Physiology
33	BIOCHEMISTRY	BI6.9	Metabolism And Homeostasis	Describe the functions of various minerals in the body, their metabolism and homeostasis	General Medicine	Physiology
34	BIOCHEMISTRY	BI6.11	Metabolism And Homeostasis	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism	Pathology, General Medicine	Physiology
35	BIOCHEMISTRY	BI6.12	Metabolism And Homeostasis	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance	Pathology, General Medicine	Physiology
36	BIOCHEMISTRY	BI6.13	Metabolism And Homeostasis	Describe the functions of the kidney, liver, thyroid and adrenal glands.	Pathology, General Medicine	Physiology, Human Anatomy
37	BIOCHEMISTRY	BI6.14	Metabolism And Homeostasis	Describe the tests that are commonly done in clinical practice to assess the functions of kidney, liver, thyroid and adrenal glands	Pathology, General Medicine	Physiology, Human Anatomy
38	BIOCHEMISTRY	BI6.15	Metabolism And Homeostasis	Describe the abnormalities of kidney, liver, thyroid and adrenal glands	Pathology, General Medicine	Physiology, Human Anatomy





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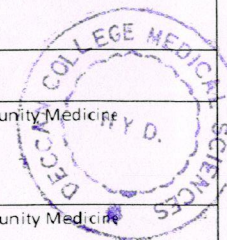
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39	BIOCHEMISTRY	BI10.4	Oncogenesis And Immunity	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses	Pathology, General Medicine	Physiology
40	BIOCHEMISTRY	BI11.4	Biochemical Laboratory Tests	Perform urine analysis to estimate and determine normal and abnormal constituents	General Medicine	Physiology
41	COMMUNITY MEDICINE	CM7.7	Epidemiology	Describe and demonstrate the steps in the Investigation of an epidemic of communicable disease and describe the principles of control measures	General Medicine	Microbiology
42	COMMUNITY MEDICINE	CM8.1	Epidemiology Of Communicable And Non-Communicable Diseases	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for communicable diseases	General Medicine, Pediatrics	Microbiology, Pathology
43	DENTISTRY	DE4.1	Oral Cancer	Discuss the prevalence of oral cancer and enumerate the common types of cancer that can affect tissues of the oral cavity	Pathology	ENT
44	DENTISTRY	DE4.2	Oral Cancer	Discuss the role of etiological factors in the formation of precancerous /cancerous lesions	Pathology	ENT
45	DENTISTRY	DE4.3	Oral Cancer	Identify potential pre-cancerous / cancerous lesions	Pathology	ENT
46	DENTISTRY	DE4.4	Oral Cancer	Counsel patients to risks of oral cancer with respect to tobacco, smoking, alcohol and other causative factors.	Pathology	ENT
47	DERMATOLOGY	DR5.3	Scabies	Enumerate and describe the pharmacology, administration and adverse reaction of pharmacotherapies for scabies	Pediatrics	Pharmacology
48	DERMATOLOGY	DR6.1	Pediculosis	Describe the etiology pathogenesis and diagnostic features of pediculosis	Pediatrics	Microbiology
49	DERMATOLOGY	DR7.1	Fungal Infections	Describe the etiology microbiology pathogenesis and clinical presentations and diagnostic features of dermatophytes	Pediatrics	Microbiology
50	DERMATOLOGY	DR8.1	Viral Infections	Describe the etiology microbiology pathogenesis and clinical presentations and diagnostic features of common viral infections of the skin	Pediatrics	Microbiology
51	DERMATOLOGY	DR9.1	Leprosy	Classify, describe the epidemiology, etiology, microbiology, pathogenesis and clinical presentations and diagnostic features of Leprosy	General Medicine	Microbiology, Community Medicine
52	DERMATOLOGY	DR9.4	Leprosy	Enumerate, describe and identify lepra reactions and supportive measures and therapy of lepra reactions	General Medicine	Pharmacology
53	DERMATOLOGY	DR9.5	Leprosy	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for various classes of leprosy based on National Guidelines	General Medicine	Pharmacology, Community Medicine
54	DERMATOLOGY	DR9.6	Leprosy	Describe the treatment of Leprosy based on WHO guidelines	General Medicine	Pharmacology, Community Medicine





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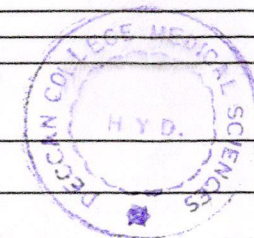
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55	DERMATOLOGY	DR9.7	Leprosy	Enumerate and describe the complications of leprosy and its management, including understanding disability and stigma	General Medicine	Pharmacology, Psychiatry
56	DERMATOLOGY	DR10.1	Sexually Transmitted Diseases	Identify and classify syphilis based on the presentation and clinical manifestations	General Medicine	Microbiology
57	DERMATOLOGY	DR10.3	Sexually Transmitted Diseases	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for syphilis	General Medicine	Microbiology, Pharmacology
58	DERMATOLOGY	DR10.6	Sexually Transmitted Diseases	Describe the etiology, diagnostic and clinical features of non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	General Medicine	Microbiology
59	DERMATOLOGY	DR10.7	Sexually Transmitted Diseases	Identify and differentiate based on the clinical features non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	General Medicine	Microbiology
60	DERMATOLOGY	DR10.8	Sexually Transmitted Diseases	Enumerate the indications and describe the pharmacology, indications and adverse reactions of drugs used in the non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	General Medicine	Microbiology, Pharmacology
61	DERMATOLOGY	DR11.1	Hiv	Describe the etiology, pathogenesis and clinical features of the dermatologic manifestations of HIV and its complications including opportunistic infections	General Medicine	Microbiology
62	DERMATOLOGY	DR11.2	Hiv	Identify and distinguish the dermatologic manifestations of HIV its complications, opportunistic infections and adverse reactions	General Medicine	Microbiology
63	DERMATOLOGY	DR11.3	Hiv	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for dermatologic lesions in HIV	General Medicine	Microbiology, Pharmacology
64	DERMATOLOGY	DR12.7	Dermatitis And Eczema	Identify and distinguish fixed drug eruptions and Steven Johnson syndrome from other skin lesions	General Medicine	Microbiology, Pathology
65	DERMATOLOGY	DR15.3	Pyoderma	Enumerate the indications and describe the pharmacology, indications and adverse reactions of topical and systemic drugs used in treatment of pyoderma	General Surgery	Microbiology, Pharmacology
66	DERMATOLOGY	DR16.1	Cooagen Vascular Disease	Identify and distinguish skin lesions of SLE	General Medicine	Pathology
67	DERMATOLOGY	DR16.2	Cooagen Vascular Disease	Identify and distinguish Raynaud's phenomenon	General Medicine	Pathology
68	GENERAL MEDICINE	IMS.16	Liver Disease	Describe and discuss the management of hepatitis, cirrhosis, portal hypertension, ascites spontaneous, bacterial peritonitis and hepatic encephalopathy	Pharmacology	General Surgery
69	GENERAL MEDICINE	IM7.21	Rheumatologic Problems	Select, prescribe and communicate appropriate medications for relief of joint pain	Pharmacology	Orthopedics





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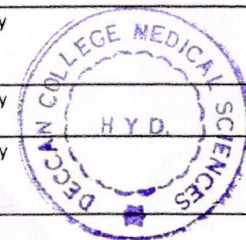
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70	GENERAL MEDICINE	IM12.13	Thyroid Dysfunction	Describe the pharmacology, indications, adverse reaction, interactions of thyroxine and antithyroid drugs	Pharmacology	General Surgery
71	GENERAL MEDICINE	IM12.15	Thyroid Dysfunction	Describe and discuss the indications of thionamide therapy, radio iodine therapy and General Surgery in the management of thyrotoxicosis	Pharmacology	General Surgery
72	GENERAL MEDICINE	IM13.3	Common Malignancies	Describe the relationship between infection and cancers	Pathology, Microbiology	General Surgery
73	GENERAL MEDICINE	IM13.9	Common Malignancies	Demonstrate in a mannequin the correct technique for performing breast exam, rectal examination and cervical examination and pap smear	Human Anatomy	General Surgery
74	GENERAL MEDICINE	IM13.13	Common Malignancies	Describe and assess pain and suffering objectively in a patient with cancer	Pharmacology	General Surgery
75	GENERAL MEDICINE	IM13.14	Common Malignancies	Describe the indications for General Surgery, radiation and chemotherapy for common malignancies	Pharmacology	General Surgery
76	GENERAL MEDICINE	IM13.17	Common Malignancies	Describe and enumerate the indications, use, side effects of narcotics in pain alleviation in patients with cancer	Pharmacology	Anesthesiology
77	GENERAL MEDICINE	IM15.1	Gi Bleeding	Enumerate, describe and discuss the aetiology of upper and lower Gi bleeding	Pathology	General Surgery
78	GENERAL MEDICINE	IM15.2	Gi Bleeding	Enumerate, describe and discuss the evaluation and steps involved in stabilizing a patient who presents with acute volume loss and Gi bleed	Pathology	General Surgery
79	GENERAL MEDICINE	IM15.3	Gi Bleeding	Describe and discuss the physiologic effects of acute blood and volume loss	Pathology, Physiology	General Surgery
80	GENERAL MEDICINE	IM15.9	Gi Bleeding	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, PT and PTT, stool examination, occult blood, liver function tests, H.pylori test	Pathology	General Surgery
81	GENERAL MEDICINE	IM15.11	Gi Bleeding	Develop document and present a treatment plan that includes fluid resuscitation, blood and blood component transfusion and specific therapy for arresting blood loss	Pathology	General Surgery
82	GENERAL MEDICINE	IM15.12	Gi Bleeding	Enumerate the indications for whole blood, component and platelet transfusion and describe the clinical features and management of a mismatched transfusion	Pathology	General Surgery
83	GENERAL MEDICINE	IM15.13	Gi Bleeding	Observe cross matching and blood / blood component transfusion	Pathology	General Surgery
84	GENERAL MEDICINE	IM15.14	Gi Bleeding	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of pressors used in the treatment of Upper Gi bleed	Pharmacology	General Surgery





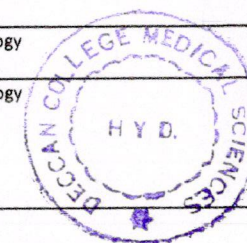
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85	GENERAL MEDICINE	IM15.15	Gi Bleeding	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of acid peptic disease including <i>Helicobacter pylori</i>	Pharmacology, Microbiology	General Surgery
86	GENERAL MEDICINE	IM16.12	Diarrheal Disorder	Enumerate and discuss the indications for further investigations including antibodies, colonoscopy, diagnostic imaging and biopsy in the diagnosis of chronic diarrhea	Pathology	General Surgery
87	GENERAL MEDICINE	IM16.15	Diarrheal Disorder	Distinguish, based on the clinical presentation, Crohn's disease from ulcerative colitis	Pathology	General Surgery
88	GENERAL MEDICINE	IM19.9	Movement Disorders	Enumerate the indications for use of surgery and botulinum toxin in the treatment of movement disorders	Pharmacology	General Surgery
89	GENERAL MEDICINE	IM22.2	Mineral Fluid Electrolyte And Acid Base Disorder	Describe the aetiology, clinical manifestations, diagnosis and clinical approach to primary hyperparathyroidism	Pathology	General Surgery
90	GENERAL MEDICINE	IM23.1	Nutritional And Vitamin Deficiencies	Discuss and describe the methods of nutritional assessment in an adult and calculation of caloric requirements during illnesses	Physiology, Biochemistry	Pediatrics
91	GENERAL MEDICINE	IM23.2	Nutritional And Vitamin Deficiencies	Discuss and describe the causes and consequences of protein caloric malnutrition in the hospital	Physiology, Biochemistry	Pediatrics
92	GENERAL MEDICINE	IM23.3	Nutritional And Vitamin Deficiencies	Discuss and describe the aetiology, causes, clinical manifestations, complications, diagnosis and management of common vitamin deficiencies	Physiology, Biochemistry	Pediatrics
93	GENERAL MEDICINE	IM23.4	Nutritional And Vitamin Deficiencies	Enumerate the indications for enteral and parenteral nutrition in critically ill patients	Physiology, Biochemistry	Pediatrics
94	MICROBIOLOGY	M1.8	General Microbiology And Immunity	Describe the mechanisms of immunity and response of the host immune system to infections	Pediatrics	Pathology
95	MICROBIOLOGY	M12.1	Cvs And Blood	Describe the etiologic agents in rheumatic fever and their diagnosis	General Medicine	Pathology
96	MICROBIOLOGY	M12.2	Cvs And Blood	Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	General Medicine	Pathology
97	MICROBIOLOGY	M12.3	Cvs And Blood	Identify the microbial agents causing Rheumatic Heart Disease & infective Endocarditis	General Medicine	Pathology
98	MICROBIOLOGY	M12.4	Cvs And Blood	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia	General Medicine	Pathology





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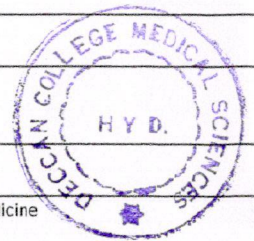
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99	MICROBIOLOGY	MI2.5	Cvs And Blood	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kala azar, malaria, filariasis and other common parasites prevalent in India	General Medicine	Pathology
100	MICROBIOLOGY	MI2.7	Cvs And Blood	Describe the epidemiology, the etio-pathogenesis, evolution, complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV	General Medicine	Pathology
101	MICROBIOLOGY	MI3.1	Gastrointestinal And Hepatobiliary System	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents	General Medicine, Pediatrics	Pathology
102	MICROBIOLOGY	MI3.3	Gastrointestinal And Hepatobiliary System	Describe the enteric fever pathogens and discuss the evolution of the clinical course and the laboratory diagnosis of the diseases caused by them	General Medicine	Pharmacology, Pathology
103	MICROBIOLOGY	MI3.4	Gastrointestinal And Hepatobiliary System	Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness	General Medicine	Pathology
104	MICROBIOLOGY	MI3.5	Gastrointestinal And Hepatobiliary System	Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis	General Medicine	Pharmacology
105	MICROBIOLOGY	MI3.6	Gastrointestinal And Hepatobiliary System	Describe the etio-pathogenesis of Acid Peptic Disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD	General Medicine	Pharmacology, Pathology
106	MICROBIOLOGY	MI3.7	Gastrointestinal And Hepatobiliary System	Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis	General Medicine	Pathology
107	MICROBIOLOGY	MI3.8	Gastrointestinal And Hepatobiliary System	Choose the appropriate laboratory test in the diagnosis of viral hepatitis with emphasis on viral markers	General Medicine	Pathology
108	MICROBIOLOGY	MI5.1	Central Nervous System Infections	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	General Medicine, Pediatrics	Pathology
109	MICROBIOLOGY	MI5.2	Central Nervous System Infections	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis.	General Medicine, Pediatrics	Pathology
110	MICROBIOLOGY	MI8.2	Zoonotic Disease And Miscellaneous	Describe the etio-pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis	General Medicine	Pathology
111	MICROBIOLOGY	MI8.3	Zoonotic Disease And Miscellaneous	Describe the role of oncogenic viruses in the evolution of virus associated malignancy	General Medicine	Pathology
112	MICROBIOLOGY	MI8.7	Zoonotic Diseases And Miscellaneous	Demonstrate Infection control practices and use of Personal Protective Equipments (PPE)	General Surgery	Community Medicine





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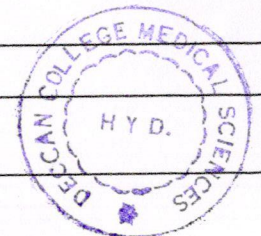
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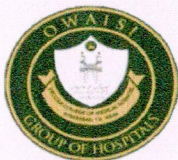
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113	ORTHOPEDECS	OR3.1	Musculoskeletal Infection	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	Pathology, Microbiology	General Surgery
114	ORTHOPEDECS	OR4.1	Skeletal Tuberculosis	Describe and discuss the clinical features, investigation and principles of management of Tuberculosis affecting major joints (Hip, Knee) including cold abscess and caries spine	Pathology	General Surgery
115	ORTHOPEDECS	OR10.1	Bone Tumors	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of benign and malignant bone tumours and pathological fractures	Pathology	General surgery, Radiotherapy
116	ORTHOPEDECS	OR11.1	Peripheral Nerve Injuries	Describe and discuss the aetiopathogenesis, Clinical features, Investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	Human Anatomy	General Medicine, General surgery
117	PATHOLOGY	PA9.1	Lmmunopathology And Aids	Describe the principles and mechanisms involved in immunity	Pediatrics	Microbiology
118	PATHOLOGY	PA9.6	Lmmunopathology And Aids	Define and describe the pathogenesis and pathology of HIV and AIDS	General Medicine	Microbiology
119	PATHOLOGY	PA10.1	Infections And Infestations	Define and describe the pathogenesis and pathology of malaria	General Medicine	Microbiology
120	PATHOLOGY	PA10.2	Infections And Infestations	Define and describe the pathogenesis and pathology of cysticercosis	General Medicine	Microbiology
121	PATHOLOGY	PA10.3	Infections And Infestations	Define and describe the pathogenesis and pathology of leprosy	General Medicine	Microbiology
122	PATHOLOGY	PA10.4	Infections And Infestations	Define and describe the pathogenesis and pathology of common bacterial, viral, protozoal and helminthic diseases	General Medicine	Microbiology
123	PATHOLOGY	PA26.1	Respiratory System	Define and describe the etiology, types, pathogenesis, stages, morphology and complications of pneumonia	General Medicine	Microbiology
124	PATHOLOGY	PA26.2	Respiratory System	Describe the etiology, gross and microscopic appearance and complications of lung abscess	General Medicine	Microbiology
125	PATHOLOGY	PA26.3	Respiratory System	Define and describe the etiology, types, pathogenesis, stages, morphology and complications and evaluation of Obstructive airway disease (OAD) and bronchiectasis	General Medicine, Physiology	Microbiology





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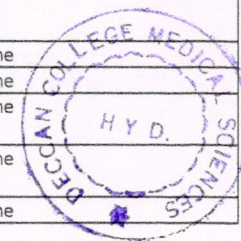
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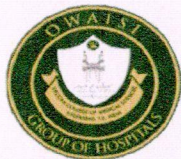
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MBBS Integrated Teaching Topics & Competencies

S No	Department	Competency No	Topic	Competency	Vertical Intefgration	Horizontal Integration
126	PATHOLOGY	PA26.4	Respiratory System	Define and describe the etiology, types, pathogenesis, stages, morphology microscopic appearance and complications of tuberculosis	General Medicine	Microbiology
127	PATHOLOGY	PA27.4	Cardiovascular System	Describe the etiology, pathophysiology, pathology, gross and microscopic features, criteria and complications of rheumatic fever	General Medicine	Microbiology
128	PATHOLOGY	PA27.6	Cardiovascular System	Describe the etiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of infective endocarditis	General Medicine	Microbiology
129	PATHOLOGY	PA27.10	Cardiovascular System	Describe the etiology, pathophysiology, pathology features and complications of syphilis on the cardiovascular system	General Medicine	Microbiology
130	PATHOLOGY	PA33.1	Bone And Soft Tissue	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	Human Anatomy, Orthopedics	Microbiology
131	PATHOLOGY	PA35.1	Central Nervous System	Describe the etiology, types and pathogenesis, differentiating factors, CSF findings in meningitis	General Medicine	Microbiology
132	PATHOLOGY	PA35.3	Central Nervous System	Identify the etiology of meningitis based on given CSF parameters	General Medicine	Microbiology
133	PEDIATRICS	PE14.3	Toxic Elements And Free Radicals And Oxygen Toxicity	Discuss the risk factors, clinical features, diagnosis and management of Organo phosphorous poisoning	Pharmacology	General Medicine
134	PEDIATRICS	PE30.21	System Pediatrics-Central Nervous System	Interpret and explain the findings in a CSF analysis	Microbiology	Respiratory Medicine
135	PEDIATRICS	PE34.1	Vaccine Preventable Diseases	Discuss the epidemiology, clinical features, clinical types, complications of Tuberculosis in Children and Adolescents	Microbiology	Respiratory Medicine
136	PEDIATRICS	PE34.2	Vaccine Preventable Diseases	Discuss the various diagnostic tools for childhood tuberculosis	Microbiology	Respiratory Medicine
137	PEDIATRICS	PE34.3	Vaccine Preventable Diseases	Discuss the various regimens for management of Tuberculosis as per National Guidelines	Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
138	PEDIATRICS	PE34.4	Vaccine Preventable Diseases	Discuss the preventive strategies adopted and the objectives and outcome of the National Tuberculosis Control Program	Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
139	PEDIATRICS	PE34.6	Vaccine Preventable Diseases	Identify a BCG scar	Microbiology	Respiratory Medicine
140	PEDIATRICS	PE34.7	Vaccine Preventable Diseases	Interpret a Mantoux test	Microbiology	Respiratory Medicine
141	PEDIATRICS	PE34.9	Vaccine Preventable Diseases	Interpret blood tests in the context of laboratory evidence for tuberculosis	Microbiology	Respiratory Medicine
142	PEDIATRICS	PE34.10	Vaccine Preventable Diseases	Discuss the various samples for demonstrating the organism eg Gastric Aspirate, Sputum, CSF, FNAC	Microbiology	Respiratory Medicine
143	PEDIATRICS	PE34.11	Vaccine Preventable Diseases	Perform AFB staining	Microbiology	Respiratory Medicine





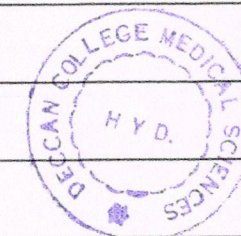
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144	PHARMACOLOGY	PH1.22	Pharmacology	Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences)	Psychiatry	Forensic Medicine
145	PHARMACOLOGY	PH1.35	Pharmacology	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in hematological disorders like: 1. Drugs used in anemias 2. Colony Stimulating factors	General Medicine, Physiology	Pharmacology
146	PHARMACOLOGY	PH1.43	Pharmacology	Describe and discuss the rational use of antimicrobials including antibiotic stewardship program	General Medicine, Pediatrics	Microbiology
147	PHARMACOLOGY	PH1.45	Pharmacology	Describe the dugs used in MDR and XDR Tuberculosis	Respiratory Medicine	Microbiology
148	PHARMACOLOGY	PH1.46	Pharmacology	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs	Dermatology, Venereology & Leprosy	Microbiology
149	PHARMACOLOGY	PH1.47	Pharmacology	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA-AZAR, amebiasis and intestinal helminthiasis	General Medicine	Microbiology
150	PHYSICAL MEDICINE & REHABILITATION	PM2.1	Cerebrovascular Accident	Describe the causes of disability in the patient with a cerebrovascular accident	Human Anatomy	General Medicine
151	PHYSICAL MEDICINE & REHABILITATION	PM3.1	Cerebral Palsy	Describe and discuss the clinical features, types, evaluation, diagnosis and management of cerebral palsy	Human Anatomy	Pediatrics
152	PHYSICAL MEDICINE & REHABILITATION	PM3.5	Cerebral Palsy	Enumerate the indications and describe the therapies for spasticity including medications, serial casts, nerve blocks, botulinum toxin injections	Pharmacology	Pediatrics, Orthopedics
153	PHYSICAL MEDICINE & REHABILITATION	PM7.6	Cerebral Palsy	Enumerate the indications and describe the pharmacology and side effects of commonly used drugs in neuropathic bladder	Pharmacology	General Medicine
154	PSYCHIATRY	PS4.4	Psychotic Disorders	Describe the treatment of alcohol and substance abuse disorders including behavioural and pharmacologic therapy	Pharmacology	General Medicine
155	PSYCHIATRY	PS4.6	Psychotic Disorders	Enumerate and describe the pharmacologic basis and side effects of drugs used in alcohol and substance abuse	Pharmacology	General Medicine
156	PSYCHIATRY	PS10.4	Somatoform Disorders	Describe the treatment of somatoform disorders including behavioural, psychosocial and pharmacologic therapy	Pharmacology	General Medicine
157	PSYCHIATRY	PS10.6	Somatoform Disorders	Enumerate and describe the pharmacologic basis and side effects of drugs used in somatoform, dissociative and conversion disorders	Pharmacology	General Medicine





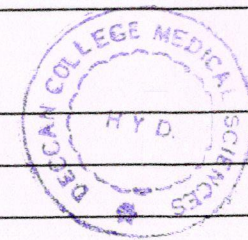
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158	PSYCHIATRY	PS12.4	Psychosomatic Disorders	Describe the treatment of psychosomatic disorders including behavioural, psychosocial and pharmacologic therapy	Pharmacology	General Medicine
159	PHYSIOLOGY	PY2.5	Physiology	Describe different types of anemia & Jaundice	Pathology	Biochemistry
160	PHYSIOLOGY	PY3.13	Nerve And Muscle Physiology	Describe muscular dystrophy: myopathies	General Medicine	Human Anatomy
161	PHYSIOLOGY	PY4.9	Gastro-Intestinal Physiology	Discuss the physiology aspects of: peptic ulcer, gastro-oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	General Medicine	Biochemistry
162	PHYSIOLOGY	PY5.6	Cardiovascular Physiology	Describe abnormal ECG, arrhythmias, heart block and myocardial infarction	General Medicine	Human Anatomy
163	PHYSIOLOGY	PY10.7	Neurophysiology	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities	Psychiatry	Human Anatomy
164	RADIOTHERAPY	RT1.3	Principles Of Radiation Oncology	Enumerate, describe and discuss classification and staging of cancer (AJCC, FIGO etc.)	Pathology	General Medicine, General surgery
165	RADIOTHERAPY	RT4.5	Radiation Treatment Delivey And Outcome	Describe and discuss role of radiation in management of common malignancies in India (region specific)	Pathology	General Surgery, Obstetrics & Gynaecology
166	RADIOTHERAPY	RT4.6	Radiation Treatment Delivey And Outcome	Describe and discuss radiotherapy for benign disease	Pathology	General Surgery, Obstetrics & Gynaecology
167	RADIOTHERAPY	RT4.7	Radiation Treatment Delivey And Outcome	Counsel patients regarding acute and late effects of radiation and supportive care	Pathology	General Surgery, Obstetrics & Gynaecology
168	RADIOTHERAPY	RT5.1	Cancer Prevention And Registries	Describe and discuss cancer prevention, screening, vaccination, cancer registry	Pathology	General Surgery, Obstetrics & Gynaecology
169	ANATOMY	AN24.2	Lungs And Trachea	Identify side, external features and relations of structures which form root of lung & bronchial tree and their clinical correlate	General Medicine	Physiology
170	ANATOMY	AN25.4	Thorax	Describe embryological basis of: 1) atrial septal defect, 2)ventricular septal defect, 3) Fallot's tetralogy & 4) tracheo-oesophageal fistula	General Medicine, Pediatrics	Physiology
171	ANATOMY	AN25.5	Thorax	Describe developmental basis of congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta	General Medicine, Pediatrics	Physiology
172	ANATOMY	AN25.9	Thorax	Demonstrate surface marking of lines of pleural reflection, Lung borders and fissures, Trachea, Heart borders, Apex beat & surface projection of valves of heart	General Medicine, Pediatrics	Physiology
173	ANATOMY	AN61.3	Midbrain	Describe anatomical basis & effects of Benedict's and Weber's syndrome	General Medicine	Physiology
174	ANATOMY	AN62.2	Cranial Nerve Nucle And Cerebral Hemispheres	Describe & demonstrate surfaces, sulci, gyri, poles, & functional areas of cerebral hemisphere	General Medicine	Physiology





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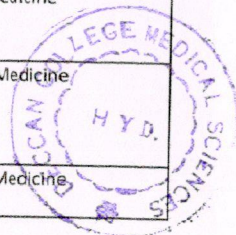
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175	ANATOMY	AN62.6	Cranial Nerve Nucle And Cerebral Hemispheres	Describe & identify formation, branches & major areas of distribution of circle of Willis	General Medicine	Physiology
176	BIOCHEMISTRY	BI5.2	Chemistry And Metabolism Of Proteins	Describe and discuss functions of proteins and structure-function relationships in relevant areas e.g., hemoglobin and selected hemoglobinopathies	Pathology, General Medicine	Physiology
177	BIOCHEMISTRY	BI6.7	Metabolism And Homeostasis	Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these	General Medicine	Physiology
178	BIOCHEMISTRY	BI6.13	Metabolism And Homeostasis	Describe the functions of the kidney, liver, thyroid and adrenal glands	Pathology, General Medicine	Physiology, Human Anatomy
179	BIOCHEMISTRY	BI6.14	Metabolism And Homeostasis	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands)	Pathology, General Medicine	Physiology, Human Anatomy
180	BIOCHEMISTRY	BI6.15	Metabolism And Homeostasis	Describe the abnormalities of kidney, liver, thyroid and adrenal glands.	Pathology, General Medicine	Physiology, Human Anatomy
181	BIOCHEMISTRY	BI10.4	Oncogenesis And Immunity	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses	Pathology, General Medicine	Physiology
182	COMMUNITY MEDICINE	CM7.7	Epidemiology	Describe and demonstrate the steps in the investigation of an epidemic of communicable disease and describe the principles of control measures.	General Medicine	Microbiology
183	DERMATOLOGY	DR6.1	Pediculosis	Describe the etiology, pathogenesis and diagnostic features of pediculosis in adults and children	Pediatrics	Microbiology
184	DERMATOLOGY	DR7.1	Fungal Infections	Describe the etiology, microbiology, pathogenesis and clinical presentations and diagnostic features of dermatophytes in adults and children	Pediatrics	Microbiology
185	DERMATOLOGY	DR8.1	Viral Infections	Describe the etiology, microbiology, pathogenesis and clinical presentations and diagnostic features of common viral infections of the skin in adults and children	Pediatrics	Microbiology
186	DERMATOLOGY	DR9.1	Leprosy	Classify, describe the epidemiology, etiology, microbiology, pathogenesis, clinical presentations and diagnostic features of Leprosy	General Medicine	Microbiology,Community Medicine
187	DERMATOLOGY	DR9.5	Leprosy	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for various classes of leprosy based on national guidelines	General Medicine	Pharmoology,Community Medicine
188	DERMATOLOGY	DR9.6	Leprosy	Describe the treatment of Leprosy based on the WHO guidelines	General Medicine	Pharmoology,Community Medicine





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189	DERMATOLOGY	DR9.7	Leprosy	Enumerate and describe the complications of leprosy and its management, including understanding disability and stigma.	General Medicine	Pharmacology, Psychiatry
190	DERMATOLOGY	DR10.7	Sexually Transmitted Diseases	Identify and differentiate based on the clinical features non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	General Medicine	Microbiology
191	FORENSIC MEDICINE	FM2.5	Forensic Pathology	Discuss moment of death, modes of death- coma, asphyxia and syncope	Psychiatry	Pathology
192	GENERAL MEDICINE	IM5.13	Liver Disease	Enumerate the indications for ultrasound and other imaging studies including MRCP and ERCP and describe the findings in liver disease	Radiodiagnosis	General Surgery
193	GENERAL MEDICINE	IM7.17	Rheumatologic Problems	Enumerate the indications and interpret plain radiographs of joints	Radiodiagnosis	Orthopedics
194	GENERAL MEDICINE	IM12.15	Thyroid Dysfunction	Describe and discuss the indications of thionamide therapy, radio iodine therapy and surgery in the management of thyrotoxicosis	Pharmacology	General Surgery
195	GENERAL MEDICINE	IM13.14	Common Malignancies	Describe the indications for surgery, radiation and chemotherapy for common malignancies	Pharmacology	General Surgery
196	GENERAL MEDICINE	IM15.9	Gi Bleeding	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, PT and PTT, stool examination, occult blood, liver function tests, H.pylori test.	Pathology	General Surgery
197	GENERAL MEDICINE	IM15.11	Gi Bleeding	Develop, document and present a treatment plan that includes fluid resuscitation, blood and blood component transfusion, and specific therapy for arresting blood loss	Pathology	General Surgery
198	GENERAL MEDICINE	IM16.15	Diarrheal Disorder	Distinguish based on the clinical presentation Crohn's disease from Ulcerative Colitis	Pathology	General Surgery
199	GENERAL MEDICINE	IM17.14	Headache	Counsel patients with migraine and tension headache on lifestyle changes and need for prophylactic therapy	Pharmacology	Psychiatry
200	MICROBIOLOGY	MI1.8	General Microbiology And Immunity	Describe the mechanisms of immunity and response of the host immune system to infections	Pediatrics	Pathology
201	MICROBIOLOGY	MI2.2	Cvs And Blood	Describe the classification, etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	General Medicine	Pathology
202	MICROBIOLOGY	MI2.3	Cvs And Blood	Identify the microbial agents causing Rheumatic heart disease & infective Endocarditis	General Medicine	Pathology





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203	MICROBIOLOGY	MI2.4	Cvs And Blood	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia	General Medicine	Pathology
204	MICROBIOLOGY	MI2.5	Cvs And Blood	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kalazaar, malaria, filariasis and other common parasites prevalent in India	General Medicine	Pathology
205	MICROBIOLOGY	MI3.1	Gastrointestinal And Hepatobiliary System	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features, and diagnostic modalities of these agents	General Medicine, Pediatrics	Pathology
206	MICROBIOLOGY	MI3.3	Gastrointestinal And Hepatobiliary System	Describe the enteric fever pathogens and discuss the evolution of the clinical course, the laboratory diagnosis of the diseases caused by them	General Medicine	Pharmacology, Pathology
207	MICROBIOLOGY	MI3.6	Gastrointestinal And Hepatobiliary System	Describe the etio-pathogenesis of Acid peptic disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD	General Medicine	Pharmacology, Pathology
208	MICROBIOLOGY	MI3.7	Gastrointestinal And Hepatobiliary System	Describe the epidemiology, the etio- pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis, and prevention of viral hepatitis	General Medicine	Pathology
209	MICROBIOLOGY	MI3.8	Gastrointestinal And Hepatobiliary System	Choose the appropriate laboratory test in the diagnosis of viral hepatitis	General Medicine	Pathology
210	MICROBIOLOGY	MI5.1	Central Vervous System Infections	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	General Medicine, Pediatrics	Pathology
211	MICROBIOLOGY	MI5.2	Central Vervous System Infections	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	General Medicine, Pediatrics	Pathology
212	MICROBIOLOGY	MI8.4	Zoonotic Diseases And Miiscellaneous	Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis	General Medicine, Community Medicine	Community Medicine
213	MICROBIOLOGY	MI8.7	Zoonotic Diseases And Miiscellaneous	Demonstrate Infection control practices and use of Personal Protective Equipments (PPE)	General Surgery	Community Medicine
214	OBGYN	OG1.2	Demographic And Vital Statistics	Define and discuss perinatal mortality and morbidity including perinatal and neonatal mortality and morbidity audit	Community Medicine	Pediatrics





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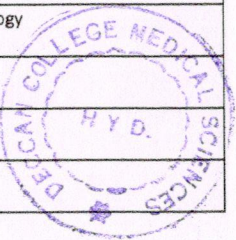
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215	OPHTHALMOLOGY	OP9.4	Miscellaneous	Enumerate, describe and discuss the causes of avoidable blindness and the National Programs for Control of Blindness (including vision 2020)	Community Medicine	Community Medicine
216	ORTHOPEDECS	OR11.1	Peripheral Nerve Injuries	Describe and discuss the aetiopathogenesis, Clinical features, Investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	Human Anatomy	General Surgery, General Medicine
217	PATHOLOGY	PA27.4	Cardiovascular System	Describe the etiology, pathophysiology, pathology, gross and microscopic, features, criteria and complications of rheumatic fever	General Medicine	Microbiology
218	PATHOLOGY	PA27.6	Cardiovascular System	Describe the etiology, pathophysiology, pathology, gross and microscopic, features diagnosis and complications of infective endocarditis	General Medicine	Microbiology
219	PEDIATRICS	PE14.3	Toxic Element And Free Radicals And Oxygen Toxicity	Discuss the risk factors, clinical features, diagnosis and management of Organophosphorous poisoning	Pharmacology	General Medicine
220	PEDIATRICS	PE18.1	The National Health Programs-Rch	List and explain the components, plan, outcome of Reproductive Child Health (RCH) program and appraise its monitoring and evaluation	Community Medicine	Obstetrics & Gynaecology
221	PEDIATRICS	PE18.2	The National Health Programs-Rch	Explain preventive interventions for Child survival and safe motherhood	Community Medicine	Obstetrics & Gynaecology
222	PEDIATRICS	PE18.3	The National Health Programs-Rch	Conduct Antenatal examination of women independently, and apply at-risk approach in antenatal care	Community Medicine	Obstetrics & Gynaecology
223	PEDIATRICS	PE18.4	The National Health Programs-Rch	Provide intra-natal care and conduct a normal Delivery in a simulated environment	Community Medicine	Obstetrics & Gynaecology
224	PEDIATRICS	PE18.6	The National Health Programs-Rch	Perform Postnatal assessment of newborn and mother, provide advice on breast feeding, weaning and on family planning	Community Medicine	Obstetrics & Gynaecology
225	PEDIATRICS	PE18.8	The National Health Programs-Rch	Observe the implementation of the program by Visiting the Rural Health Centre	Community Medicine	Obstetrics & Gynaecology
226	PEDIATRICS	PE34.8	Vaccine Preventable Diseases-Tuberculosis	Interpret a Chest Radiograph	Radiodiagnosis	Respiratory Medicine
227	PEDIATRICS	PE34.10	Vaccine Preventable Diseases-Tuberculosis	Discuss the various samples for demonstraing the organism eg Gastric Aspirate, Sputum , CSF, FNAC	Microbiology	Respiratory Medicine
228	PEDIATRICS	PE34.12	Vaccine Preventable Diseases-Tuberculosis	Enumerate the indications and discuss the limitations of methods of culturing M.Tuberculli	Microbiology	Respiratory Medicine





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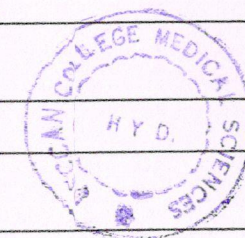
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229	PHARMACOLOGY	PH1.28	Pharmacology	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease	General Medicine	Pathology
230	PHARMACOLOGY	PH1.29	Pharmacology	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure	General Medicine	Pathology
231	PHARMACOLOGY	PH1.35	Pharmacology	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in hematological disorders like: 1. Drugs used in anemias 2. Colony Stimulating factors	General Medicine, Physiology	Pharmacology
232	PHARMACOLOGY	PH1.47	Pharmacology	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA AZAR, amebiasis and intestinal helminthiasis	General Medicine	Microbiology
233	PSYCHIATRY	PS12.4	Psychosomatic Disorders	Describe the treatment of psychosomatic disorders including behavioural psychosocial and pharmacologic therapy	Pharmacology	General Medicine
234	PHYSIOLOGY	PY4.9	Gasto-Intestinal Physiology	Discuss the physiology aspects of: peptic ulcer, gastro-oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	General Medicine	Biochemistry
235	ANESTHESIOLOGY	AS10.3	Patient Safety	Describe the role of communication in patient safety	AETCOM	General Surgery
236	DENTISTRY	DE4.1	Oral Cancer	Discuss the prevalence of oral cancer and enumerate the common types of cancer that can affect tissues of the oral cavity	Pathology	ENT
237	DENTISTRY	DE4.3	Oral Cancer	Identify potential pre-cancerous /cancerous lesions	Pathology	ENT
238	DENTISTRY	DE4.4	Oral Cancer	Counsel patients to risks of oral cancer with respect to tobacco, smoking, alcohol and other causative factors	Pathology	ENT
239	GENERAL MEDICINE	IM5.16	Liver Disease	Describe and discuss the management of hepatitis, cirrhosis, portal hypertension, ascites, spontaneous, bacterial peritonitis and hepatic encephalopathy	Pharmacology	General Surgery
240	GENERAL MEDICINE	IM12.15	Thyroid Dysfunction	Describe and discuss the indications of thionamide therapy, radio iodine therapy and Surgery in the management of thyrotoxicosis	Pharmacology	General Surgery
241	GENERAL MEDICINE	IM15.1	GI Bleeding	Enumerate, describe and discuss the aetiology of upper and lower GI bleeding	Pathology	General Surgery
242	GENERAL MEDICINE	IM15.2	GI Bleeding	Enumerate describe and discuss the evaluation and steps involved in stabilizing a patient who presents with acute volume loss and GI bleed	Pathology	General Surgery





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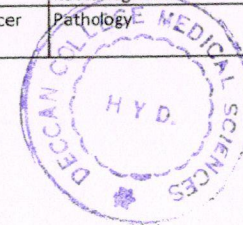
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MBBS Integrated Teaching Topics & Competencies

S No	Department	Competency No	Topic	Competency	Vertical Intefgration	Horizontal Integration
243	GENERAL MEDICINE	IM19.9	Movement Disorders	Enumerate the indications for use of Surgery and botulinum toxin in the treatment of movement disorders	Pharmacology	General Surgery
244	ORTHOPEDECS	OR3.1	Musuloskeletal Infection	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	Pathology, Microbiology	General surgery
245	ORTHOPEDECS	OR4.1	Skeletal Tuberculosis	Describe and discuss the clinical features, Investigation and principles of management of Tuberculosis affecting major joints (Hip, Knee) including cold abcess and caries spine	Pathology	General surgery
246	ORTHOPEDECS	OR10.1	Bone Tumors	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of benign and malignant bone tumours and pathological fractures	Pathology	General surgery, Radiotherapy
247	ORTHOPEDECS	OR11.1	Peripheral Nerve Injuries	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	Human Anatomy	General Medicine, General surgery
248	PATHOLOGY	PA33.1	Bone And Soft Tissue	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	Human Anatomy, Orthopedics	Microbiology
249	PEDIATRICS	PE18.1	The National Health Programs	List and explain the components, plans, outcomes of Reproductive Child Health (RCH) program and appraise the monitoring and evaluation	Community Medicine	Obstetrics & Gynaecology
250	PEDIATRICS	PE18.2	The National Health Programs	Explain preventive interventions for Child survival and safe motherhood	Community Medicine	Obstetrics & Gynaecology
251	PEDIATRICS	PE18.4	The National Health Programs	Provide intra-natal care and conduct a normal Delivery in a simulated environment	Community Medicine	Obstetrics & Gynaecology
252	PEDIATRICS	PE18.8	The National Health Programs	Observe the implementation of the program by visiting the Rural Health Centre	Community Medicine	Obstetrics & Gynaecology
253	PEDIATRICS	PE34.8	Vaccine Preventable Diseases	Interpret a Chest radiograph	Radiodiagnosis	Respiratory Medicine
254	RADIOTHERAPY	RT1.3	Principle Of Radiation Oncology	Enumerate, describe and discuss and classify staging of cancer (AJCC, FIGO etc.)	Pathology	General Medicine, General surgery



M. S. S.
Principal
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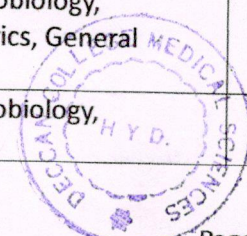
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PG Integrated Teaching

S No	Course	Integrated Teaching Departments	No. of Depts.
1	(PG Diploma) – Psychological Medicine	Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Neurology, Emergency Medicine, General Medicine	9
2	MD Anatomy	Surgery, Radiology, Pathology, ENT, Ophthalmology, Obstetrics & Gynaecology, Paediatrics	7
3	MD Pathology	Biochemistry, Microbiology, Forensic Medicine, Transfusion Medicine	4
4	MD Paediatrics	Anatomy, Biochemistry, Microbiology, Pathology, Pharmacology, Neurology, Emergency Medicine, General Medicine, Obstetrics & Gynaecology, Orthopaedics, Forensic Medicine, Dermatology, ENT, Radiology, Gastroenterology, Ophthalmology, Respiratory Medicine, Cardiology, Urology, Nephrology	20
5	MD Physiology	Biochemistry, Pharmacology, Pathology, Microbiology, Ophthalmology, Respiratory Medicine, ENT, General Medicine, Psychiatry, Emergency Medicine	10
6	MD Psychiatry	Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Neurology, Emergency Medicine, General Medicine	9
7	MD Anaesthesiology	Anatomy, Physiology, Pathology, Microbiology, Pharmacology, Biochemistry, General Surgery, Urology, Ophthalmology, ENT, Dental, Orthopaedics, Obstetrics & Gynaecology, Paediatrics, Plastic Surgery, Neurosurgery, Radiology, Gastroenterology	18
8	MD Biochemistry	General Medicine, Paediatrics, Transfusion Medicine, Microbiology	4
9	MD Community Medicine	General Medicine, Paediatrics, Obstetrics & Gynaecology	3
10	MD Dermatology, Venereology & Leprosy	Pathology, Radiology, General Medicine, Emergency Medicine	4
11	MD General Medicine	Anatomy, Physiology, Biochemistry, Pathology, Microbiology, Pharmacology, Neurology, Emergency Medicine, Psychiatry, Dermatology, Radiology, Gastroenterology, Respiratory Medicine, Cardiology, Urology, Nephrology	16
12	MD Pharmacology	General Medicine, Anaesthesia, Dermatology, Microbiology, Biochemistry	5
13	MD Microbiology	Pathology, Clinical Biochemistry, Respiratory Medicine, General Medicine, Dermatology, Paediatrics, General Surgery, Orthopaedics, Obstetrics & Gynaecology, Cardiology, Plastic Surgery	11
14	MD Respiratory Medicine	Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology	6
15	MD Radiodiagnosis	Anatomy, Pathology	2
16	MS Orthopaedics	Anatomy, Physiology, Pathology, Microbiology, Pharmacology, Radiology	6
17	MS Otorhinolaryngology	Anatomy, Physiology, Radiology, Microbiology, Pharmacology, Radiology	6
18	MS Obstetrics and Gynaecology	Anatomy, Physiology, Pathology, Biochemistry, Microbiology, Pharmacology, Radiology, Anaesthesiology, Paediatrics, General Surgery	10
19	MS Ophthalmology	Anatomy, Physiology, Pathology, Biochemistry, Microbiology, Pharmacology	6





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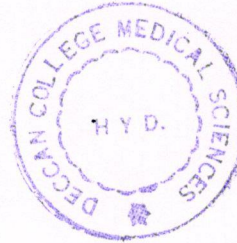
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S No	Course	Integrated Teaching Departments	No. of Depts.
20	MS General Surgery	Anatomy, Physiology, Pathology, Biochemistry, Microbiology, Pharmacology, Radiology	7
21	DM Neurology	Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology, Radiology, Psychiatry, Paediatrics, Anaesthesia	9
22	DM Cardiology	Anatomy, Physiology, Biochemistry, Pharmacology, Radiology, Paediatrics	6
23	MCh Plastic Surgery	Anaesthesia, Orthopaedics, Radiology	3
24	MCh Urology	Anatomy, Physiology, Biochemistry, Pathology, Microbiology, Pharmacology, Radiology, Paediatrics, Neurology, Nephrology	10




PRINCIPAL

Principal
Deccan College of Medical Science

DIPLOMA Courses

**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/23

Date: 14-11-2022

National Medical Commission

**GUIDELINES FOR COMPETENCY
BASED**

**POSTGRADUATE TRAINING
PROGRAMME FOR
POSTGRADUATE DIPLOMA IN
PSYCHIATRY (PSYCHOLOGICAL
MEDICINE) - DPM**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR POSTGRADUATE DIPLOMA IN PSYCHIATRY (PSYCHOLOGICAL MEDICINE) - DPM

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle medical problems effectively and should be aware of the recent advances pertaining to his specialty. The post graduate student should acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Expert Group of National Medical Commission has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The primary **goal** of the **POSTGRADUATE DIPLOMA IN PSYCHIATRY (PSYCHOLOGICAL MEDICINE) - DPM** is to produce a post graduate clinician able to provide health care in the field of Psychiatry. A physician qualified in Psychiatry, at the end of the course, should be able to diagnose and treat psychiatric disorders, take preventive and curative steps for the disease in the community at all levels of health care and qualify as a consultant and teacher in the subject.

At the end of the DPM course in Psychiatry, the student should have able to:

- Understand the relevance of mental health in relation to the health needs of the country,
- Ethical considerations in the teaching and practice of Psychiatry,
- Identify the social, economic, biological and emotional determinants of mental health,
- Identify the environmental causes as determinants of mental health,
- institute appropriate diagnostic, therapeutic and rehabilitative procedures to the mentally ill patient,
- Take detailed history, conduct appropriate ethically valid physical examination and institute appropriate evaluation procedures to make a correct clinical diagnosis,
- Perform relevant investigative and therapeutic procedures for the psychiatric patient,
- Recommend appropriate laboratory and imaging examinations and interpret the results correctly,
- Plan and deliver comprehensive treatment of a psychiatric patient using principles of rational drug therapy,
- Plan rehabilitation of psychiatric patient suffering from chronic illness,
- Clinically manage psychiatric emergencies efficiently,
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities,
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counselling and giving health education messages to patients, families and communities,
- Develop appropriate skills to practice evidence-based psychiatry,
- Demonstrate competence in basic concepts of research methodology and epidemiology,
- Be aware of and take appropriate steps in the implementation of national mental health programs, effectively and responsibly,
- Be aware of the concept of essential drugs and rational use of drugs,
- Be aware of the legal issues in the practise of Psychiatry,
- Be aware of the special requirements in the practice of Child and adolescent Psychiatry and Geriatric Psychiatry.

- Be aware of the role of sex and gender in the practice of psychiatry
- Be able to determine the capacity and capability of the individual (especially children and adolescents) to identify and articulate a gender identity
- **Research:** The student should be able to interpret research findings and apply these in clinical practice. The student should know how to access and utilize information resources and should have basic knowledge of statistics. The student may learn basics of research methodology.
- **Teaching:** The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students, health professionals, members of allied disciplines (e.g. behavioural sciences), law enforcement agencies, families and consumers and members of the public.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

By the end of the course, the student should demonstrate knowledge in the following:

1. General topics:

1. The student should be able to demonstrate knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to Psychiatry.
2. The student should be able to explain aetiology, assessment, classification and management and prognosis of various psychiatric disorders (including psychiatric sub-specialities including Neuroanatomy, Neurophysiology, Neurochemistry, Neuroimaging, Electrophysiology, Psychoneuroendocrinology, Psychoneuroimmunology, Chronobiology and Neurogenetics).
3. Acquire knowledge of delirium, dementia, and amnesic and other cognitive disorders and mental disorders due to a general medical condition.
4. The student should be able to discuss long term care of persons with chronic mental

health problems

5. The student should acquire knowledge of emergency measures in acute crisis arising out of various psychiatric illnesses including drug detoxification and withdrawal.
6. The student should acquire knowledge of pharmacokinetics & pharmacodynamics of drugs involved in psychiatric management of patients.
7. The student should acquire knowledge of (a) normal child development and adolescence (b) neurodevelopmental disorders, intellectual disability and specific learning disability and their management
8. The student should acquire knowledge and be able to explain mechanisms for rehabilitation of psychiatric patients.
9. The student should acquire knowledge of substance related disorders and their management.
10. The student should acquire knowledge of psychotic disorders, mood disorders, and anxiety disorders and their management
11. The student should understand difference between sex and gender/ biological and social construction of personhood; sexual/gender identity; transgender, gender non-conformity, and other gender diverse identities, sexual/sexuality identity, sexual orientation, sexual desire; the wide variety, and cultural presence of various sexual orientations and desires; gender dysphoria and its management.
12. The student should acquire knowledge of eating disorders and sleep disorders and their management
13. The student should be conversant with recent advances in Psychiatry.
14. The student should be conversant with routine bedside diagnostic and therapeutic procedures and acquire knowledge of latest diagnostics and therapeutics procedures available.
15. The student should be conversant with various policy related aspects of Psychiatric practice in India (e.g. Mental Health Act, National Mental Health Programmes etc.).
16. The student should be conversant with research methodologies.
17. Student should be conversant with the role of Yoga and Meditation in the management of psychiatric disorders.

B. Affective Domain:

1. The student should be able to function as a part of a multidisciplinary team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. The student should always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information, confidentiality and second opinion.
3. The student should develop communication skills to prepare reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire the following clinical skills and be able to:

1. Obtain a proper relevant history and perform thorough clinical examination including detailed mental state examinations using proper communication skills.
2. Able to do risk assessment and mental capacity assessment.
2. Provide a clinical formulation, arrive at a logical working diagnosis and differential diagnosis after clinical examination.
3. Order appropriate investigations keeping in mind their relevance and cost effectiveness and obtain additional relevant information from family members to help in diagnosis and management.
4. Identify psychiatric situations calling for urgent or early intervention and refer at the optimum time to appropriate centres.
5. Write a complete case record with all necessary details.
6. Write a proper discharge summary with all relevant information.
7. Obtain informed consent for any examination/procedure.
8. Perform clinical audit.
9. Must be able to perform modified Electroconvulsive therapy (ECT).
10. Should have the following skills in relation to gender related issues:

- Demonstrate the ability to assess the gender identity of an individual and distress caused (if any) due to the individual's own gender identity in simulated environment.
- Describe and understand how to discuss sexual orientation, sexuality identity, gender identity, as well as intersex identity (differences in sex development) as part of routine history taking.
- Demonstrate the ability to educate and counsel individuals or family members about intersex variations, sexual orientations, sexuality identities, gender incongruence, gender dysphoria, and gender identities. Demonstrate ability to identify when a mental health referral is needed for the above.
- Demonstrate knowledge that conversion therapy practices for sexual orientation or gender identity or on people with intersex variations is unethical.
- Describe differences between Gender Incongruence and Gender Dysphoria.
- Describe and understand gender identity, the biological and gender binaries, rejection of gender binary, gender non-conforming, gender non-binary, androgynous, and other identities.
- Demonstrate the ability to educate an individual and family members that Gender Incongruence by itself is not a disorder and does not require clinical intervention. Any form of conversion therapy is unethical.
- Discuss situations where there is a role for mental health support in Gender Dysphoria i.e., discussing with family, deciding on hormonal treatments or Sex Reassignment Surgery (Gender Affirming Care or Gender Affirmative Therapies or Gender Confirmation Surgery).

The student, at the end of the course should be able to perform independently, the following:

1. Conduct psychiatric assessment (history and mental status examination), reach a diagnosis and develop management plan.
2. Able to manage common psychiatric emergencies including delirium and emergencies related to psychotropic drugs like acute dystonia, lithium toxicity and neuroleptic malignant syndrome.
3. Management of patients with substance use disorders.
4. Common mental disorders in specific age groups like children and adolescents, and the elderly.
5. Psychological treatments like supportive psychotherapy, psychoeducation and crisis intervention.
6. Modified ECT and non-invasive neuromodulation.
7. Clinical IQ assessment.

The student must be able to assess a patient with following symptoms:

1. Psychotic symptoms
2. Seizures, true and pseudo seizure
3. Anxiety symptoms
4. Affective symptoms
5. Cognitive symptoms
6. Catatonia
7. Delirium
8. Malingering
9. Behavioral symptoms of developmental disorders

The student, at the end of the course should be able to perform under supervision, the following:

1. Behaviour therapy
2. Family therapy
3. Interpersonal therapy
4. Cognitive behaviour therapy and other newer therapies
5. First level psychological intervention for sexual abuse, sexual assault and domestic violence
6. Genetic counselling

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know the subject in depth; however emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in managing behavioural problems commensurate with the specialty must be ensured.

The student must acquire knowledge in the following:

Theoretical concepts:

1. History of Psychiatry
2. Epidemiology of mental disorders

3. Neurophysiology and Neuro-chemistry
4. Functional and behavioural neuroanatomy
5. Genetics
6. Psychoneuroendocrinology
7. Psychoneuroimmunology
8. Electrophysiology and cognitive neuroscience
9. Neuro-imaging
10. Memory
11. Sleep and circadian rhythm
12. Learning – Theories
13. Theory of personality
14. Clinical Psychology including Psychometry and Psychodiagnostics
15. Transcultural Psychiatry
16. Research Methodology and Statistics
17. Psychodynamics
18. Psychiatric assessment (including History Taking, Neurological Examination, Mental Status Examination, Investigations, Use of rating scales, etc.).
19. Classification in Psychiatry
20. Organic Psychiatry (including Psychological Features and Clinical Assessment of Cerebrovascular Disorders, Delirium, Epilepsy, Head Injury, Headache, HIV – AIDS, Infections, etc.)
21. Movement Disorders (including Medication-Induced Movement Disorders, etc)
22. Substance Related Disorders (including Alcohol-Related Disorders, Amphetamine-Related Disorders, Caffeine-Related Disorders, Cannabis-Related Disorders, Cocaine-Related Disorders, Hallucinogen-Related Disorders, Inhalant-Related Disorders, Nicotine-Related Disorders, Opioid-Related Disorders, Phencyclidine-Related Disorders, Sedative-, Hypnotic-, or Anxiolytic-Related Disorders, etc.)
23. Psychosis (including Schizophrenia, Schizophreniform Disorder, Schizoaffective Disorder, Delusional Disorder, Brief Psychotic Disorder, Shared Psychotic Disorder, etc).
24. Mood Disorders (including Depressive Disorders, Bipolar Disorders, Cyclothymic Disorder, etc.)
25. Anxiety Disorders (including Panic Disorder, Agoraphobia, Phobias, Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, etc).
26. Stress and related disorders (Posttraumatic Stress Disorder, Acute Stress Disorder Adjustment Disorder etc.)

27. Somatoform Disorders (including Somatization Disorder, Undifferentiated Somatoform Disorder, Conversion Disorder, Pain Disorder, Hypochondriasis, Body Dysmorphic Disorder, etc.)
28. Factitious Disorders
29. Dissociative Disorders (including Dissociative Amnesia, Dissociative Fugue, Dissociative Identity Disorder, Depersonalization Disorder, etc.)
30. Personality disorders
31. Gender issues in psychiatry, Sexual disorders, gender dysphoria and psychological issues among LGBTQIA+ groups (including Sexual Desire Disorders, Sexual arousal Disorders, Orgasmic Disorders, Sexual Pain Disorders, Vaginismus, Paraphilias, etc)
32. Eating Disorders (including Anorexia Nervosa, Bulimia Nervosa, etc.)
33. Sleep Disorders (including Insomnia, Narcolepsy, Breathing-Related Sleep Disorders, Circadian Rhythm Sleep Disorders, Parasomnias, Nightmare Disorder, Sleep Terror Disorder, Sleepwalking Disorder, etc.)
34. Impulse-Control Disorders (including Intermittent Explosive Disorder, Kleptomania, Pyromania, Pathological Gambling, Trichotillomania, etc
35. Psychosomatic Disorders including Consultation Liaison psychiatry
36. Miscellaneous: Non-compliance, Malingering, Antisocial Behaviour, Borderline Intellectual Functioning, Age-Related Cognitive Decline, Bereavement [including Death], Academic Problems, Occupational Problems, Identity Problems, Religious or Spiritual Problems, Acculturation Problems, Phase of Life Problems, Chronic Fatigue Syndrome, etc.)
37. Abuse (Physical / Sexual) or Neglect of Child /Adult
38. Culture Bound Syndromes
39. Pre-Menstrual Dysphoric Disorder
40. Perinatal Psychiatry
41. Emergencies In Psychiatry including suicide, its management and medico-legal aspect
42. Psychotherapy
43. Psychopharmacology
44. Electro-Convulsive Therapy, Other brain stimulation methods (rTMS, DBS, tDCS and others) and Neurosurgery
45. Child and Adolescent Psychiatry (including Learning Disorders, Motor Skills Disorder, Communication Disorders, Pervasive Developmental Disorders (Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder), Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, Pica, Tic Disorders, Elimination Disorders, Separation Anxiety Disorder, Selective Mutism,

Reactive Attachment Disorder of Infancy or Early Childhood, Stereotypic Movement Disorder, etc.)

46. Intellectual disability
47. Geriatric Psychiatry (including dementia, legal and ethical issues, positive psychiatry in aging, psychiatric aspects of long term care)
48. Community psychiatry
49. Rehabilitation of psychiatric patients
50. Ethics In Psychiatry
51. Forensic and Legal Psychiatry (including Mental Health Care Act, Persons with Disability Act, Narcotic Drugs and Psychotropic Substance Act etc.)

TEACHING AND LEARNING METHODS

Teaching methodology

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated. Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lecturers should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. The student should have hands-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning the subject should be given. Self learning tools like assignments and case base learning may be promoted.

The post graduate student should have knowledge of:

- Psycho-pharmacology and broadening the treatment options using medicines.
- Neuro-imaging techniques to understand behaviour and psychiatric illness.
- Community-Psychiatry.
- Functioning of psychiatric hospital.

Community Psychiatry should go beyond familiarization with the National Mental Health Programme. The post graduate student should have hands on experience with:

- Training programmes for primary care physicians
- Organizing Mental Health Camps
- Carrying out Health Education Activities
- Forensic /Legal Psychiatry
- Integration of Mental Health Care with General Health Care

2. **Teaching skills:** The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
3. **Continuing Medical Education Programmes (CME):** Each student should attend at least two CME programmes, in 2 years.
4. **Conferences:** The student should attend courses, conferences and seminars relevant to the specialty, and encouraged to make presentation in conferences.
5. **Seminars:** There should be a weekly seminar in which the PG students present material on assigned topics in rotation. It should be followed by discussion in which all trainees are supposed to participate. Generally, the topics covered should be those that supplement the formal teaching programme.
6. **Case Conference:** A case conference should be held every week where a PG student prepares and presents a case of academic interest by rotation and it is attended by all the members of the Department.
7. **Psychosomatic Rounds:** This is a presentation of a case of psychosomatic illness, or a medical illness with pronounced psychiatric problems. It should be held weekly in collaboration with various departments and attended by the faculty and the PG students of psychiatry and the concerned Department.
8. **Journal Club:** A monthly meeting of Journal club should be held in which a senior PG student presents a critical evaluation of a research paper from a journal. All PG students are expected to attend.
9. **Case presentations:** All new in-patient and outpatient cases should be routinely reviewed with one of the Consultants. In addition, the PG student is required to

present case material at routine rounds and other case conferences. Senior PG students will conduct evening classes on clinical topics.

10. **Extra-mural activities:** The post graduate students are encouraged to attend certain academic activities in allied subjects held outside parent department e.g. seminars/lectures held at Departments of Clinical Psychology, (Psychiatric) Social Work, Medicine, Neurology etc.
11. **Psychotherapy tutorials:** These should be held in small groups supervised by a consultant, in which a case is presented by a PG student and psychotherapeutic management discussed.

12. **Rotation:**

Clinical Postings

- A major tenure of posting should be in General Psychiatry. It should include care of in-patients, out-patients, special clinics and maintenance of case records for both in and out patients.
- Exposure to the following areas should be given :-

Schedule of clinical postings for Diploma in Psychiatry (DPM) *(24 months)

Area/ Specialty

Ward and OPD (concurrent)	- 15 months
Neurology	- 1 months
Emergency Medicine/ Internal Medicine	- 1 month
Consultation Liaison Psychiatry	- 2 months
Psychiatric hospital and Forensic Psychiatry	- 1 month
Clinical Psychology	- 1 month
Addiction Psychiatry	- 1 month
Child and Adolescent Psychiatry	- 1 month
Community psychiatry	- 1 month#

* The stated duration can be subjected to minor modifications depending on available resources

Exposure to community-based services should be integral to various postings.

Applicable only for trainees in General Hospital Psychiatric units: Facilities for these need to be arranged.

Exposure to community based services should be integral part of various postings. The post graduate student shall be given full responsibility for patient care and record keeping under the supervision of the senior PG students and consultants. The post graduate student shall also take patients for psychological interventions in an individual as well as group setting. The student must complete a minimum of 100 hours of supervised psychological interventions.

Sub- speciality postings: The peripheral postings should be kept in 2nd-3rd semester.

13. Clinical meetings:

There should be intra - and inter - departmental meetings for discussing the uncommon / interesting medical problems.

14. Log book:

Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book and signed by the authorized teacher and Head of Department.

15. The Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of clinical skills laboratories in medical colleges is mandatory. Objective structured clinical examination (OSCE) modules may be developed and used in teaching.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

Quarterly assessment during the DPM training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self-directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs
6. Professionalism and teamwork

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in two parts:

1. Theory Examination:

There shall be three papers each of three hours duration.

Paper I: Basic Sciences as related to Psychiatry

Paper II: Clinical Psychiatry

Paper III: Psychiatric Specialties

2. Clinical/Practical and Oral/viva voce examination should consist of:

- Presentation of long case of Psychiatry
- Neurology short case
- A short case Psychiatry
- Viva –voce

Due importance should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading

Books (latest edition)

1. Textbook of Psychiatry Publisher: Lippincott Williams and Wilkins, Editors: Benjamin James Sadock, Virginia Alcott Sadock, Pedro Ruiz
2. Kaplan and Sadock's Synopsis of Psychiatry, Editor: RJ Boland, ML Verduin, P Ruiz; Publisher: Wolters Kluwer India
3. Introduction to Psychology by Clifford T. Morgan Editors: Clifford T Morgan, Richard A King, John R Weiss, John Schopler, Publisher: MC Graw Hill
4. New Oxford Textbook of Psychiatry Edited by: John R. Geddes, Nancy C. Andreas and Guy M. Goodwin, Publisher: Oxford
5. Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications, Editor: Stephen M Stahl, Publisher: Cambridge
6. Forensic Psychiatry: RC Jiloha, D Kataria, P Kukreti (Jaypee)
7. ECT administration manual, NIMHANS Editors: Bangalore N Gangadhar, A Shyam Sundar, Jagadisha Thirthalli, Shivarama Varambally, Kesavan Muralidharan, C Naveen Kumar, Preeti Sinha, Biju Viswanath, Publisher: NIMHANS
8. Community Psychiatry in India (Eds Chavan, Gupta, Arun, Sidana, Jadav) Jaypee.
9. Fish's Clinical Psychopathology – Signs and Symptoms In Psychiatry By Patricia Casey, Editor: Patricia Casey, Brendan Kelly, Publisher: Tree Life Media
10. Sims Symptoms in the Mind: Textbook of Descriptive psychopathology, Editor: Femi Oyebode, Publisher: Elsevier
11. Bickerstaff's Neurological Examination in Clinical practice, Editor: Kameshwar Prasad, Ravi Yadav, John Spillane, Publisher: Wiley
12. Maudsley's Prescribing Guidelines in Psychiatry, Editors: Author: David M. Taylor, Thomas R. E. Barnes, Allen Young, Publisher: Wiley
13. Lishman's Organic Psychiatry Editor: Anthony S. David, Simon Fleminger, Michael D. Kopelman, Publisher: Wiley Blackwell
14. Kaufman's Clinical Neurology for Psychiatrists, Elsevier.

Journals

03-05 international Journals and 02 national (all indexed) journals.

Student appraisal form for Diploma in Psychiatry (Psychological Medicine)- DPM											
	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g. Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										

3.3	Conduct that is ethically appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										
	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

National Medical Commission

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for Diploma in Psychiatry (Psychological Medicine) - DPM

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MD Courses

NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/Human Anatomy

Date: 05-08-2022

**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR MD IN
HUMAN ANATOMY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN HUMAN ANATOMY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

These guidelines would help to achieve a uniform level of training of postgraduates in MD Anatomy throughout the country. The student, after undergoing the training, should be able to deal effectively with the needs of the medical community and should be competent to handle all problems related to the specialty of Anatomy and recent advances in the subject. The postgraduate student should also acquire skills in teaching anatomy to medical and para-medical students and be able to integrate teaching of Anatomy with other relevant subjects, while being aware of her/his limitations.

The purpose of this document is to provide teachers and learners comprehensive guidelines to achieve defined outcomes through learning and assessment. This document has been prepared by subject-content specialists of the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The **Goal** of MD Anatomy is to train a doctor to become a competent teacher and researcher in Anatomy who has acquired competence / skills in:

1. *contemporary advances and developments* in the field of Anatomy.
2. *competencies* pertaining to the subject of Anatomy that are required to be practiced at all levels of the health system.
3. *educating* medical and paramedical professionals.
4. *effectively communicating* with the students and colleagues from various medical and paramedical fields.
5. *integrating anatomy with other disciplines* as and when needed.

6. being good teacher capable of innovations in teaching methodology.
7. being effective leader of the team engaged in teaching and research.

After completing the three year course in MD in Human Anatomy, the student should have achieved competence in the following:

1. Knowledge of Anatomy

1.1 Acquire competencies in gross anatomy, surface anatomy, neuroanatomy, embryology, genetics, histology, radiological anatomy, applied aspects and recent advances of the above mentioned branches of anatomy to clinical practice. These are given in detail in subsequent sections.

2. Practical and Procedural skills

2.1 Acquire mastery in dissection skills, embalming, tissue processing, staining and museum preparation / techniques, bone procurement and its tissue preparation.

3. Acquire training skills in Research Methodology

3.1 Acquire skills in teaching, research methodology, epidemiology & basic information technology.

3.2 Acquire knowledge in the basic aspects of Biostatistics and research methodology.

3.3 Has knowledge to plan the protocol of a thesis, carry out review of literature, execution of research projects and preparation of reports.

3.4 Has ability to use computer applications, Microsoft office (Microsoft word, excel, power point), Internet, Searching scientific databases (e.g. PubMed, Medline, Cochrane reviews).

3.5 Acquire skills in paper & poster preparation, writing research papers and thesis.

4. Professionalism, attitude and communication skills:

4.1 Develop work ethics and empathetic behavior with students and colleagues.

4.2 Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way of duty.

4.3 Acquire attitude and communication skills to interact with colleagues, teachers, and students, body donors and family members of the donors

5. Teaching Anatomy

5.1 Acquire skills in teaching undergraduate students, (Lecture, Small Group Discussion, SDL, assessment and feedback.

5.2 Making power point presentation of subject topics.

6. Problem solving: The post graduate students should be able to demonstrate the ability to:

6.1 Identify applied implications of the knowledge of anatomy and discuss information relevant to the problem, using consultation, texts, archival literature and electronic media.

6.2 Correlate the clinical conditions to the anatomical / embryological / hereditary factors and explain anatomical basis of diseases.

6.3 Evaluate scientific/ clinical information and critically analyze conflicting data and hypotheses.

6.4 Prepare Scenario-based MCQs.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course, the student should have acquired competencies with following predominant domains:

A. Predominant in Cognitive domain:

1. Describe gross anatomy of the entire body (including upper limb, lower limb, thorax, abdomen, head & neck and brain).
2. Explain the normal disposition of gross structure, and their interrelationship in the human body. She / He should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficits encountered.
3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and applied anatomy.
4. Demonstrate knowledge about the sequential development of organs and systems along with their clinical anatomy, recognize critical stages of development and effects of common teratogens, genetic mutations and environmental hazards. She / He should be able to explain developmental basis of variations and congenital anomalies.
5. Explain the principles of light, transmission and scanning, compound, electron, fluorescent and virtual microscopy.

6. Describe the microscopic structure of various tissues & organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.
7. Demonstrate knowledge about cell and its components, cell cycle, cellular differentiation and proliferation.
8. Describe structure, number, classification, abnormalities and syndromes related to human chromosomes.
9. Describe important procedures in cytogenetics and molecular genetics with its application.
10. Demonstrate knowledge about single gene pattern inheritance, intermediate pattern and multiple alleles, mutations, non-Mendelian inheritance, mitochondrial inheritance, genome imprinting and parental disomy.
11. Describe multifactorial pattern of inheritance, teratology, structure gene, molecular screening, cancer genetics and pharmacogenetics.
12. Explain the concept of reproduction genetics, infertility, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.
13. Explain principles of gene therapy and its applied knowledge.
14. Describe the immune system and cell types involved in defense mechanisms of the body. Explain the gross features, cytoarchitecture, function, development and histogenesis of various primary and secondary lymphoid organs in the body.
15. Demonstrate knowledge about common techniques employed in cellular immunology and histocompatibility testing.
16. Demonstrate application of knowledge of structure & development of tissue-organ system to comprehend deviations from normal.
17. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
18. Explain collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently dead bodies.
19. Demonstrate knowledge about surface marking of all regions of the body.
20. Able to interpret various radiographs of the body, normal CT scan, ultrasound and MRI.
21. Demonstrate knowledge about different anthropological traits and use of related instruments.

22. Demonstrate knowledge about outline of comparative anatomy of whole body and basic human evolution.
23. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application of anatomy.

B. Predominant in Affective domain

1. Demonstrate self-awareness and personal development in routine conduct (*Self-awareness*).
2. Communicate effectively with peers, students and teachers in various teaching-learning activities (*Communication*).
3. Demonstrate -
 - a. Due respect in handling human body parts & cadavers during dissection (*Ethics & Professionalism*)
 - b. Humane touch while demonstrating living surface marking in subject/patient (*Ethics & Professionalism*).
4. Acquire the capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (*Equity and social accountability*).
6. Ability to communicate with the registered body donors and family of donors.

C. Predominant in Psychomotor domain

1. Identify, dissect, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy.
2. Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.
3. Locate and identify clinically relevant structures in dissected cadavers.
4. Locate and identify cells and tissues under the microscope.
5. Identify the anatomical structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography in normal individuals.
6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.

7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.
8. Demonstrate different methods of teaching-learning and make presentations of the subject topics and research outputs.

Specific practice based competencies:

Name/Description of practice based competencies
<p>1. Gross anatomy:</p> <p>1.1 Procurement, Embalming and Preservation of human cadavers</p> <p>1.2 Preparation of tanks for preserving bodies</p> <p>1.3 Dissection of cadaver</p> <p>1.4 Window dissection of important regions</p> <p>1.5 Preparation of specimens for museum with display</p> <ol style="list-style-type: none"> a) soft parts b) Hard Parts c) models d) charts <p>1.6 Preparation and preservation of human bones / skeleton as assigned by the faculty</p> <p>1.7 Gross anatomy file in which labelled diagrams of important structures of upper limb, lower limb, thorax, abdomen, head & neck and brain should be drawn.</p>
<p>2. Histology</p> <p>2.1 Preparation of common fixatives for embalming fluid, 10% formalin, Bouin's fluid etc.</p> <p>2.2 Making paraffin blocks and section cutting and mounting.</p> <p>2.3 Preparation of staining set for H and E staining and staining paraffin sections with the stain.</p> <p>2.4 Making celloidin, araldite, gelatin blocks and their section cutting.</p> <p>2.5 Processing hard tissues, decalcification of bones, block making and sectioning, preparation of ground sections of calcified bones.</p>

<p>2.6 Frozen section cutting on freezing microtome and cryostat.</p> <p>2.7 Honing and stropping of microtome knives, including sharpening by automatic knife sharpener.</p> <p>2.8 Histology file in which LM pictures of all the organs and tissues of the body should be drawn and a small description of salient features written.</p>
<p>3. Histochemical Methods</p> <p>Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase, acid phosphatase and calcium</p>
<p>4. Cytogenetics</p> <p>4.1 Preparation of media, different solutions, stains etc.</p> <p>4.2 Preparation of buccal smear for sex chromatin</p> <p>4.3 Human chromosome preparation from peripheral blood and karyotyping.</p> <p>4.4 Banding techniques (G and C)</p> <p>4.5 Making of Pedigree charts for study of patterns of inheritance.</p> <p>4.6 Chromosomal analysis.</p>
<p>5. Neuroanatomy</p> <p>5.1 Dissection of brain and spinal cord for teaching and learning purpose</p> <p>5.2 Preparation of brain and spinal cord macroscopic and microscopic sections and identification of different parts in them.</p> <p>5.3 Discussions on clinical problems related to neurological disorders and anatomical explanation for the same.</p>

SYLLABUS

A postgraduate student, after three years of training in M.D. (Human Anatomy) should have acquired knowledge in the following aspects of anatomy:

A: Cognitive domain:

Section – 1

Gross anatomy

Gross Anatomy of the entire body including general anatomy, upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord and osteology, cross sectional anatomy and embalming procedures.

Section - 2

Developmental anatomy/embryology

- General embryology: gametogenesis, fertilization, implantation and placenta, early human embryonic development.
- Systemic embryology: development of organ systems and associated common congenital abnormalities with teratogenesis.
- Anatomical basis of congenital anomalies.

Section - 3

Histology and histochemistry

Cell Biology

- Cytoplasm - cytoplasmic matrix, cell membrane, cell organelles, cytoskeleton, cell inclusions, cilia and flagella.
- Nucleus - nuclear envelope, nuclear matrix, DNA and other components of chromatin, protein synthesis, nucleolus, nuclear changes indicating cell death.
- Cell cycle - mitosis, meiosis, cell renewal.
- Cellular differentiation and proliferation.

Microscopic structure of the body

- Principles of light, transmission and scanning, electron, fluorescent, confocal and virtual microscopy.
- The systems/organs of the body - Cellular organization, light and electron microscopic features, structure - function correlations, and cellular organization.
- Various histo-techniques and museum preparation techniques.

Section - 4

Neuroanatomy

- Brain and its environment, Development of the nervous system, Neuron and Neuroglia, Somatic sensory system, Olfactory and optic pathways, Cochleo-vestibular and gustatory pathways, Motor pathways, Central autonomic pathways, Hypothalamo-hypophyseal system, Limbic system, Basal ganglia, Reticular system, Ventricular

system of brain, study of cross sectional anatomy of the brain and spinal cord and its applied_anatomy.

Section - 5

Genetics

- Human Chromosomes - Structure, number and classification, methods of chromosome preparation and banding patterns. Chromosome abnormalities, Autosomal and Sex chromosomal abnormalities syndromes, Molecular and Cytogenetics.
- Single gene pattern inheritance: Autosomal and Sex chromosomal pattern of inheritance, Intermediate pattern and multiple alleles, Mutations, Non-Mendelian inheritance, Mitochondrial inheritance, Genome imprinting, parental disomy.
- Multifactorial pattern of inheritance: Criteria for multifactorial inheritance, Teratology, Structure gene, Molecular Screening, Cancer Genetics - Haematological malignancies, Pharmacogenetics.
- Reproduction Genetics - Male and Female Infertility, Abortuses, Assisted reproduction, Preimplantation genetics, Prenatal diagnosis, Genetic Counseling and Ethics of Genetics.
- Principles of Gene therapy and its applied knowledge.

Section - 6

Immunology

- Immune system and the cell types involved in defense mechanisms of the body. Gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
- Biological and clinical significance of the major histocompatibility complex of man including its role in transplantation, disease susceptibility/resistance and genetic control of the immune response.
- Various techniques employed in cellular immunology and histocompatibility testing.
- Principles of Molecular hybridization and PCR technology in immunology research particularly mechanism of antigen presentation, structural and functional relevance of the T cell receptor, genetic control of the immune response, molecular basis of susceptibility to disease.

Section - 7

Applied anatomy and recent advances

- Clinical correlations of structure and functions of the human body. Anatomical basis and explanations for clinical problems.
- Applications of knowledge of development, structural (microscopy), neuro-anatomy to comprehend deviations from normal.
- Recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
- Collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently procured.

Section – 8

Surface Marking and Radiology

- Surface marking of all regions of the body. Interpretation of normal radiographs of the body including special contrast procedures including barium studies, cholecystography, pyelography, and salpingography. Normal CT Scan, MRI and ultrasonography.

Section – 9

Anthropology and Comparative Anatomy

- Different anthropological traits, Identification and use of Anthropological instruments.
- Outline of comparative anatomy of the whole body and basic human evolution.

Section – 10

Forensic Medicine

- Identification of human bones from their remains and determination of sex, age, and height. for medico legal application of Anatomy.

B - PSYCHOMOTOR DOMAIN:

Demonstrate following predominant Psychomotor domain competencies		
Sr. No	Competency	Perform under supervision / perform Independently/ Observation only
1.	Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy	Independently
2.	Acquire mastery in dissection skills including window dissection of important regions	Independently
3.	Acquire mastery in embalming the human body	Independently
4.	Prepare tanks for preserving bodies	Observation
5.	Tissue preparation for histology and staining techniques	Independently
6.	Honing and Stropping of microtome knives, including sharpening by automatic knife sharpener	Independently
7.	Preparation of common fixatives embalming fluid 10% formalin, Bouin's fluid etc.	Independently
8.	Demonstrate the mounting of specimen in the museum	Independently
9.	Locate and identify clinically relevant structures in dissected cadavers.	Independently
10.	Locate, identify and demonstrate cells & tissues under the microscope.	Independently
11.	Identify the anatomical structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography in normal individuals	Independently
12.	Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.	Independently
13.	Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.	Under supervision
14.	Demonstrate different methods of teaching-learning and assessments. Independently	Independently
15.	Make presentations of the subject topics for teaching and research outputs. independently	Independently
16.	Prepare buccal smear for sex chromatin. independently	Independently
17.	Prepare Human chromosome from peripheral blood and karyotyping. Under supervision	Under supervision
18.	Demonstrate Banding techniques (G and C) and Chromosomal Analysis Under supervision	Under supervision
19.	Demonstrate use of different anthropological instruments	Under supervision

Departmental Resources:

It is mandatory for the Department of Anatomy to develop at least three of the following laboratories, in addition to the other facilities. The laboratory should be involved in active research in at least one well defined field.

1. Histology
2. Immunology
3. Electron microscopy / Fluorescence microscopy / confocal and other forms of microscopy laboratories
4. Developmental anatomy
5. Anthropometry
6. Neuroanatomy
7. Cytogenetics
8. Imaging technique for Radiological Anatomy

TEACHING AND LEARNING METHODS:

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations of dissections, symposia, journal clubs, seminars, small group discussion, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year is suggested. All postgraduate trainees will be required to attend these lectures. Some examples of topics which can be covered in lecture are:

1. Topics in gross, surface and cross sectional anatomy, microanatomy, embryology, neuroanatomy, histochemistry, and genetics.
2. Recent advances in microanatomy, embryology, neuroanatomy, histochemistry, and genetics.
3. Research methodology and biostatistics.
4. **Salient features of Undergraduate/Postgraduate medical curriculum.**
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work: Minimum - once every 1-2 weeks.

Laboratory work/ Skills lab teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions. Hands-on experience on various techniques and procedures in microanatomy, histochemistry, genetics, embalming & preparation of museum specimens should be acquired.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines.

The postings schedule with duration is given below:

- Surgery -2 weeks
- Radiology -2 weeks
- Pathology -2 weeks
- ENT -1 week
- Ophthalmology -1 week
- Obstetrics & Gynecology -1 week
- Pediatrics -1week
- Medical Education Unit -1 week (Optional & can be done in common with other department PGs)

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

G b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MS/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis (if so mandated) under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in labs, dissection hall, skill labs and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

- a) help maintain a record of the work done during training,
- b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
- c) provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination.

It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects:

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

During the three-year training period,

- A record of all theoretical, practical and experimental work done by the post graduate student and its assessment will be kept and shall be available for examiners at the time of the final practical and viva voce examination.
- There will be periodical examinations during the course of training. The pre-final theory and practical examination will be conducted by the faculty of the concerned college.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Dissection presentation : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

The student to be assessed periodically as per categories listed in the preclinical postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. **Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory examination**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Gross Anatomy, Embryology, Microscopic Anatomy of human body above the diaphragm with Radiological Anatomy & Body Preservation

- a) Gross Anatomy of human body above the diaphragm i.e. upper limb, thorax, head and neck.
- b) Embryology & Microscopic anatomy of tissues and organs above the diaphragm.
- c) Methods of preservation of human body and its parts, radiological anatomy, sectional anatomy

Paper II: Gross Anatomy, Embryology, Microscopic Anatomy of human body below the diaphragm with General (Embryology & Microscopic) Anatomy

- a) Gross Anatomy of human body below the diaphragm i.e. lower limb, abdomen, pelvis.
- b) Embryology & Microscopic anatomy of tissues and organs below the diaphragm.
- c) General Histology, General Embryology
- d) Principles of light, transmission and scanning electron microscopy, confocal, virtual microscopy.

Paper III: Neuroanatomy & Genetics

- a) Neuroanatomy - gross and applied aspects.
- b) General principles of genetics, cytogenetics as applicable to medicine and different genetic disorders, gene therapy.

Paper IV: Recent advances and applied Anatomy in medical sciences

- a) Comparative and evolutionary anatomy
- b) Clinical and applied aspect of Anatomy
- c) Recent advances in the application of knowledge of anatomy on human body
- d) Basics of principles of organ donation from recently dead bodies.

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

- **First Day Practical:** To submit the duly signed gross anatomy file, histology file & the log book and thesis
 - a) **Gross Anatomy**

Dissection and related viva voce, Major and minor dissections to be included.
 - b) **Histology**

Spotting (10 spots) and viva voce
Techniques of tissue processing, paraffin block making, section cutting and staining (H and E stain) with related viva
- **Second Day Practical:**
 - a) Microteaching of a short topic to assess teaching skills
 - b) A short synopsis of the thesis work should be presented by the post graduate student
 - c) Grand viva including Gross anatomy, cross sectional anatomy, radiological Anatomy, Surface Anatomy, Embryology.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

Practical Examination to be organized as per details given below:

- Dissection on cadaver
- Histology spotting
- Histological techniques
- Surface Marking
- Radiology
- Teaching ability
- Thesis presentation

Oral / Viva-voce Examination

Grand viva

On dissected parts of the whole human body including nervous system, and Embryology models, teratology, skeletal system including short bones, embalming techniques and genetics, radiographs, MRI, CT & ultrasonography.

Recommended reading:

Books (latest edition)

Gross Anatomy:

- Susan Strandring: Gray's Anatomy: The anatomical basis of clinical practice, Churchill Livingstone Elsevier.
- Keith and Moore Clinically Oriented Anatomy. Lippincot Williams and Wilkins.
- R.J. Last. Anatomy Regional and Applied. Churchill Livingston.
- Frank H. Netter. Atlas of Human Anatomy. Saunders Elsevier.
- ML Ajmani. Embalming: Principles and Legal Aspects. Jaypee Brothers.

Histology

- Young B. and Heath J. Wheater's Functional Histology. Churchill Livingstone.
- M.H. E Ross. Histology: A textbook and atlas. Williams and Wilkins.
- Harold A Davenport. Histological and Histochemical Techniques. W.B Saunders Company.

Genetics

- J.S Thompson and Thompson. Genetics in medicine. W.B. Saunders and Co. Philadelphia, London.

Embryology

- TW Sadler. Langman's Medical Embryology. Lippincotts, Williams and Wilkins
- Keith L Moore and T.V.N. Persaud. The Developing Human. Saunders.

Neuroanatomy

- Richard S. Snell. Clinical Neuroanatomy for Medical Students. Williams and Wilkins.

Statistics

- David E. Matthews and Vernon T. Farewell. Using and Understanding Medical Statistics. Karger.

Radiology

- J.B. Walter et.al. Basic Atlas of Sectional Anatomy with correlated imaging. Saunders Elsevier.

Surface anatomy

- SP John, Lumley editors. Surface Anatomy, The Anatomical basis of clinical examination. London: Churchill Livingstone.

Journals

03-05 international Journals and 02 national (all indexed) journals

Student appraisal form for MD in Human Anatomy											
	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic aptitude and learning										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	Work related to training										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work environment										

2.5	Ability to record and document work accurately and appropriate for level of training										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment pattern been discussed with the trainee?	Yes	No								
	If not explain.										
	Name and Signature of the assessee										
	Name and Signature of the assessor										
	Date										

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Human Anatomy

- | | |
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**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/22

Date: 02-11-2022

**GUIDELINES FOR COMPETENCY BASED
POSTGRADUATE TRAINING
PROGRAMME
FOR
M.D. IN PATHOLOGY**

National Medical Commission

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PATHOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

This programme is meant to standardize Pathology teaching at postgraduate level throughout the country in order to achieve uniformity in teaching and create suitable manpower with appropriate expertise. The postgraduate student in pathology should be sufficiently trained, professionally competent and confident in handling, and processing, and diagnosis related to histopathology (surgical pathology), cytopathology, and hematology with reasonable working knowledge in blood banking, laboratory medicine, medical statistics, and ancillary techniques with understanding of general principles and methodology.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board cum Expert group of NMC has attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

At the end of the MD training programme in Pathology, the student should achieve the following goals:

1. Knowledge of Pathology

1.1. Make a diagnosis based on histopathology (surgical pathology) and cytopathology specimens, blood and bone marrow examination and various tests of Laboratory Medicine (clinical pathology, clinical biochemistry) as well as Blood Banking (Transfusion Medicine).

- 1.2. Interpret clinical and laboratory data with reasonable accuracy and prepare a succinct and lucid report
- 1.3. Compose reports following standard protocols including synoptic reporting
- 1.4. Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.
- 1.5. Advise on the selection of appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case including molecular tests.
- 1.6. Correlate clinical and laboratory findings with pathology findings at autopsy, identify miscorrelations and the causes of death due to diseases (apart from purely metabolic causes).
- 1.7. Maintain quality control of all tests by being part of Internal Quality Control Monitoring program.
- 1.8. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.
- 1.9. Should be aware of safe and effective disposal of laboratory waste and ensure minimization risk of exposure to infection and accidents to laboratory personnel.

2. Teaching and training

- 2.1. Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.
- 2.2. The postgraduate student should be able to teach effectively and assess undergraduate medical and allied health science students so that they become competent healthcare professionals.

3. Research

- 3.1. Plan, execute, analyze, and present research work independently or as part of a team.
- 3.2. The postgraduate student in Pathology should acquire knowledge and skills to be able to conduct a research project from the planning to the publication stage and become a life-long learner.

4. Professionalism, Ethics and Communication skills

- 4.1. The postgraduate student should learn and apply principles of professionalism, ethics, and effective communication in conduct of routine pathology services, research, and routine work.

SUBJECT SPECIFIC COMPETENCIES

A. COGNITIVE DOMAIN

A postgraduate student upon successfully qualifying the MD (Pathology) examination should have acquired the following BROAD theoretical competencies and should be:

- Capable of offering an accurate diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis.
- Conversant with the standard operating procedures of various laboratories including histopathology, cytopathology, hematology and laboratory medicine
- Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
- Capable of pursuing clinical and laboratory-based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.

At the end of the course, **the student should have acquired the following competencies as a diagnostician:**

Surgical pathology

- Be conversant in the histogenesis and pathophysiological processes associated with various diseases.
- Should be able to identify problems in the histopathology laboratory and offer viable solutions.
- Possess the background knowledge necessary for the evaluation and reporting of Surgical Pathology.
- Conversant with the various equipment used in the histopathology laboratory.
- Should have knowledge of automation and quality assurance in histopathology.

Cytopathology

- Possess the background knowledge necessary for the evaluation and reporting of Cytopathology.

- Demonstrate familiarity with, and guide clinical/radiology residents in keeping with the clinical information on the choice of site, collection, preservation, transport, type of preparation and method of obtaining various cytological specimens.
- Conversant with the various equipment used in the cytopathology laboratory.
- Should have knowledge of automation and quality assurance in cytopathology.

Hematology

- Demonstrate ability to utilize the principles of the practice of Hematology for the planning of tests, interpretation, and diagnosis of diseases of the blood and bone marrow.
- Conversant with the various equipment used in the hematology laboratory.
- Should have knowledge of automation and quality assurance in hematology.

Laboratory medicine

- Demonstrate familiarity with the normal range of values of the chemical content of body fluids, significance of altered values, and interpretation thereof.
- Possess knowledge of the following specialized organ function tests and relative utility and limitations of each and significance of altered values:
 - (i) Renal function test
 - (ii) Liver function test
 - (iii) Endocrine function test
 - (iv) Tests for malabsorption
- Principles, advantage and disadvantages, scope, and limitation of automation in laboratory.
- Learn the principle and methodology of quality control in the laboratory.

Transfusion medicine

- Possess knowledge of basic immunology, ABO and Rh groups, minor blood groups and their clinical significance, transfusion therapy, pre-transfusion testing, transfusion related infections, transfusion reactions and quality control in blood bank.

Autopsy pathology

- Conversant with the technique of autopsy.
- Possess sufficient understanding of the various disease processes so that meaningful clinico-pathological correlation can be made.

Immunopathology

- Demonstrate familiarity with current concepts of structure and function of the immune system, its aberrations, and mechanisms thereof.
- Demonstrate familiarity with the scope, principles, limitations, and interpretations of the results of ELISA techniques, HLA typing, immunofluorescence, and immunoelectrophoresis.

Immunohistochemistry and flow cytometry

- Demonstrate familiarity with the principles and procedures of performing immunohistochemistry including automation in procedure and interpretation.
- Demonstrate familiarity with the principles and procedures of performing flow cytometry.

Cytogenetics and Molecular biology

- Demonstrate familiarity with the principles of molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests at least including but not limited to in-situ hybridization, polymerase chain reaction, Sanger Sequencing and Next generation sequencing.

Electron microscopy

- Demonstrate familiarity with the principles and techniques of electron microscopy and the working of the electron microscope.
- Demonstrate familiarity with the tissue processing and staining methods for electron microscopy, including immune-labelling techniques and use of semi-thin sections.

Enzyme histochemistry

- Demonstrate familiarity with the principles, use and interpretations of common enzyme histochemical procedures.

Quality Control

- Demonstrate familiarity with various quality control programmes running in the department, both internal and external quality.
- Demonstrate familiarity with inter and intra assay variations, batch variations, validation of chemicals and instruments.

Laboratory Safety and Good clinical lab practices

- Demonstrate familiarity with good lab practices and safety, record maintenance of capital equipment and consumables, purchase specifications, approximate costs of reagents and equipment, maintenance of store logbooks, etc.

Biomedical Waste Management

- Demonstrate familiarity with disposal methods for each specimen, reagents, instruments, autoclaving techniques, recycling of products and e-waste.

At the end of the course, **the student should have acquired the following competencies as a teacher:**

- Demonstrate familiarity with different modes, methods, and principles of teaching including microteaching.

At the end of the course, **the student should have acquired the following competencies as a researcher:**

- Conversant with the principles of basic and applied research methodology, literature search, study design, sample size estimation, selection of controls, and appropriate application of medical statistics.
- Possess knowledge about the methods of writing thesis and/or a research paper with the prescribed instructions, as expected of international standards.
- Conversant with the use of digital slide imaging, algorithms to evaluate findings in imaging, morphometry, and application of artificial intelligence.

B. AFFECTIVE DOMAIN

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
4. The student should demonstrate a commitment to ethical principles relating to research conduct and research publication.

C. PSYCHOMOTOR DOMAIN

1. Able to perform grossing of biopsy and surgical specimens including gross diagnosis and taking appropriate sections/ samples necessary for diagnosis, comprehensive staging, and ancillary testing.
2. Conversant in histopathology tissue processing techniques and troubleshooting, cutting of paraffin and frozen sections, making imprint smears, and staining, and immunohistochemistry.
3. Able to collect specimens by routinely performing non-invasive out-patient procedures such as venipuncture, finger-prick, fine needle aspiration of superficial lumps and bone-marrow aspirates, making smears and staining, and provide appropriate guidance to colleagues performing procedure such as a biopsy or an imaging guided biopsy including on-site microscopic assessment of specimen adequacy.
4. Perform an autopsy, dissect various organ complexes and display the gross findings.
5. Conversant with the function, handling, and routine care of equipment in the laboratory and quality assurance.
6. Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
7. Able to pursue clinical and laboratory-based research. He/she should be introduced to basic research methodology so that he/she can independently conduct fundamental and applied research.

Syllabus

Course contents:

It is difficult to give a precise outline of the Course Contents for post graduate training. A postgraduate is supposed to acquire not only the professional competence of a well-trained specialist but also academic maturity, a capacity to reason and critically analyze scientific data as well as to keep himself abreast of the latest developments in the field of Pathology and related sciences. The study of Anatomic Pathology includes all aspects of Pathology as encompassed in the branches of General and Systemic Pathology. Only the broad outlines are provided.

A. COGNITIVE DOMAIN

A) General Pathology:

Normal cell and tissue structure and function:

- The changes in cellular structure and function in diseases.
- Causes of disease, its pathogenesis, reaction of cells, tissues, organ systems, and the body to various sub lethal and lethal injuries.
- Cellular adaptation, cell injury, and cell death.
- Mechanism, morphology and examples of cell injury, necrosis, apoptosis, autophagy, and newer forms of cell death including necroptosis and pyroptosis.
- Sub cellular and cellular responses and adaptation to injury.
- Intracellular and intercellular accumulations, pathological calcification, and cell aging.

Acute and chronic inflammation:

- Vascular and cellular events in acute inflammation, chemical mediators, outcome, and morphological patterns of acute inflammation.
- Chronic inflammation with special reference to granulomatous inflammation.
- Systemic effects and effects of deranged inflammation.
- Tissue renewal and repair: Regeneration healing and fibrosis.
- Control of normal cell proliferation and tissue growth, mechanism of tissue regeneration, repair by healing and fibrosis.
- Extracellular matrix and cell matrix interactions.

Hemodynamic disorders, thromboembolic disease, and shock:

- Edema, hyperemia, congestion, and hemorrhage.
- Normal Hemostasis, thrombosis, DIC, embolism, infarction, and shock.

Genetic Disorders

- Principles of genetics, normal karyotyping.
- Mutations, Mendelian disorders, disorders with multifactorial inheritance cytogenetic disorders involving autosomes and sex chromosomes.
- Single gene disorders with nonclassic inheritance.
- Diagnosis of genetic disorders involving molecular and genetic techniques.

Neoplasia

- Definition, nomenclature, and biology of tumor growth
- Molecular basis of cancer with special reference to carcinogenic agents and molecular basis of multistep carcinogenesis.
- Epidemiology and clinical features of tumors.

- Grading, staging and laboratory diagnosis of cancer.

Infectious Diseases

- Pathology and general principles of microbial pathogenesis, special techniques for diagnosing bacterial, fungal, parasitic, and viral infections.

Environmental and nutritional pathology

- Common environmental and occupational exposures leading on to diseases.
- Nutritional deficiencies and obesity related disorders.

Disease of Infancy and Childhood

- Congenital anomalies, birth injuries, diseases of neonates, inborn errors of metabolism, tumor, and tumor like lesions of infancy and childhood.

Immunopathology

- Innate immunity- Role of phagocytic cells, complement, mast cells & humoral mechanisms.
- Specific Acquired Immunity- Details about antibody production & action, Brief principles about memory, Ag specificity & vaccination.
- Cell involved in Immune response- T- Lymphocytes, B-lymphocytes, macrophages, dendritic cells, and natural-killer cells.
- Cytokines with details about their properties and functions.
- Structure and function of histocompatibility molecules and disease association.
- Disorders of the immune system.
- All hypersensitivity reactions.
- Autoimmune disorders with special reference to SLE, Rheumatoid arthritis, Sjogren's syndrome, systemic sclerosis, polyarteritis nodosa and other vasculitides, Mixed connective tissue disorders and inflammatory disorders.
- Immunodeficiency syndrome – Acquired with emphasis on AIDS.
- Amyloidosis including pathogenesis, special stains & clinical correlation.
- Transplant rejection in detail.
- Graft vs Host Disease.

B) Systemic Pathology:

The study of normal structure and function of various organ systems and the etiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease and functional correlation with clinical features.

Blood vessels, lymphatic and veins

- Normal morphology, congenital anomalies, atherosclerosis, hypertensive vascular disease.
- Inflammatory and neoplastic diseases of all the vessels.

Heart

- Normal morphology, its blood supply and effect of aging on heart.
- Ischemic, Hypertensive, valvular, congenital heart diseases.
- Cardiomyopathies
- Myocardial disorders
- Pericardial diseases.
- Tumors of the heart.

Lungs and Mediastinum

- Congenital anomalies
- Obstructive and restrictive pulmonary diseases
- Diseases of vascular origin
- Infections of Lung
- Infections of Mediastinum
- Tumors of lung
- Lung transplantation
- Diseases of pleura
- Thymus – Developmental, autoimmune, and inflammatory disorder and tumors.

Head and Neck

- Oral cavity: - inflammatory disease, Preneoplastic lesions and tumors.
- Diseases of teeth and supporting structures.
- Upper airways and ear – congenital anomalies, infections, and tumors.
- Salivary glands – Infections autoimmune disorders and tumors.

Gastrointestinal Tract

- Congenital anomalies, infections, inflammatory and vascular disorders and tumors of esophagus, stomach, small and large intestines, appendix, and anal canal.
- Diseases of the peritoneum, Omentum and Mesentery Retroperitoneum.
- Inflammatory and neoplastic lesions.

Liver

- Normal morphology with general features of hepatic disease including LFTs.
- Infectious, autoimmune drug induced metabolic and circulatory disorders of liver.

- Hepatic diseases associated with pregnancy, neonates, organ and bone marrow transplantation.
- Liver transplantation pathology.
- Cysts, Nodules, and tumors of liver.

Biliary tract

- Congenital anomalies, injuries, Infection, inflammation, of Gallstones and tumors of gall bladder and extra hepatic bile ducts. Pancreas.
- Congenital anomalies, pancreatitis, and neoplasms of pancreas.

Kidney

- Clinical manifestations of renal diseases
- Congenital anomalies
- Diseases affecting glomeruli, tubules, interstitium and blood vessels.
- Cystic diseases of kidney
- Nephrolithiasis
- Tumors of kidney
- Kidney Transplant pathology

Lower urinary tract and male genital system

- Congenital anomalies, inflammation and tumors of bladder, ureter, urethra, penis, testis, epididymis, and Scrotum.
- Inflammation, enlargement, and tumors of prostate.

Female genital tract

- Physiology, cytology and histology of female genital tract, menstrual disorders, and hormonal abnormalities.
- Congenital anomalies, inflammation, preneoplastic and neoplastic lesions of vulva, vagina, cervix, uterus, fallopian tubes, ovaries and mesonephron.
- Gestational and placental disorders.

Breast

- Inflammations, benign epithelial lesions, and tumors of the breast.
- Diseases of male breast.

Endocrine System

- Normal hormonal levels and functions of all the endocrine glands.
- Hypo and hyperactivity of glands of endocrine system i.e., pituitary, thyroid, parathyroid, pancreas, adrenals, and pineal gland.

- Autoimmune diseases, inflammations and tumors affecting these glands,
- Neuroendocrine tumors,

Skin and Subcutaneous tissue

- Disorders of pigmentation and melanocytes,
- Inflammatory, vesiculobullous, and infectious disease,
- Proliferative lesions and Tumors of the epidermis, dermis, and skin appendage.

Musculoskeletal system

- Bone Modelling, growth, and development, genetic and acquired abnormalities in bone cells, matrix and structure, fractures, necrosis and infections of bones, tumors and tumor-like lesions,
- Joints: Arthritis, tumor, and tumor-like lesions.
- Soft tissue: Tumors and tumor-like lesions.

Peripheral nerves and skeletal muscles

- General reactions of motor units.
- Inflammatory, infectious, hereditary, metabolic, and traumatic neuropathies.
- Atrophy, dystrophy, myopathies of the skeletal muscles.
- Diseases of neuromuscular junction.
- Tumors of peripheral nerves and skeletal muscles.

Skull and Central Nervous System

- Degenerative, metabolic, toxic, demyelinating, infectious, cerebrovascular malformations, and traumatic injuries.
- Tumors.

Eye and Orbit

- Infections, inflammatory, congenital diseases and neoplasms of orbit, eyelid, conjunctiva sclera, uvea, cornea, retina, and optic nerves.

C) Hematology and Transfusion medicine

The study of Hematology includes all aspects of the diseases of the blood and bone marrow.

This would involve the study of the normal, and the causes of diseases and the changes thereof.

Biology of stem cell and Hematopoiesis

- Overview of stem cell biology and cellular biology of hematopoiesis.
- Transcription factors and humoral regulation in normal and malignant hematopoiesis.
- Interaction between hematopoietic stem cells, progenitor cell and stromal compartment of bone marrow.

- Stem cell homing & mobilization.

Erythroid maturation, differentiation, and abnormality

- Pathobiology of human erythrocyte & Hemoglobin Anemia.
- Approach to anemia in adults and children in: Clinical correlation & diagnostic modalities.
- Classification of anemias (Morphological, pathophysiological, and based on erythropoiesis i.e., proliferative vs non-proliferative).
- Iron deficiency anemia including iron metabolism and differential diagnosis from other microcytic hypochromic anemias.
- Disorder of iron metabolism including iron overload.
- Anemia of chronic disorders with special reference to infections, collagen vascular disorders, inflammation etc.
- Megaloblastic anemia and other causes of megaloblastosis.
- Definition, approach, and classification of hemolytic anemia.
- Lab diagnosis of Hemoglobin disorders and hereditary anemia like Thalassemia and related hemoglobinopathies, sickle cell anemia.
- Hemoglobin associated with altered Oxygen affinity.
- Red blood cell enzymopathy, membrane disorder, autoimmune hemolytic anemia, non-immune hemolytic anemia, paroxysmal nocturnal hemoglobinuria.
- Approach to Pancytopenia/ Cytopenia.
- Bone marrow failure syndrome.
- Porphyria.

WBC disorders, complement and immunoglobulin biology

- Normal granulopoiesis.
- Acquired and congenital disorders of phagocytosis (neutrophil, monocyte, eosinophil, and macrophages).
- Disorder of leukocyte number, function, and morphology.

Storage disorder

Hematological responses to Infections

- Viral disorders - Infectious mononucleosis, Hepatitis, and dengue.
- Parasitic infections - Malaria, Kala azar.

Hematological malignancies

- Conventional & molecular cytogenetic and immunohistochemical basis of hematological malignancies.

- Classification (WHO, ICC).
- Their basis and diagnostic approach to various hematological malignancies.
- Pathophysiology, prognostic factors, cytochemistry, cytogenetics of various leukemias.
- Pathophysiology and classification of MDS, MPN/MDS, myeloproliferative disorders.
- Pathophysiology of Non-Hodgkin's lymphoma, Clinical staging of Hodgkin's lymphoma.
- Role of molecular cytogenetics and immunohistochemistry in Hodgkin's and Non-Hodgkin's lymphoma and lymphoproliferative disorders.
- AIDS related and Transplant related lymphomas.
- Plasma cell dyscrasias and gammopathies.
- Mastocytosis.
- Role of chemotherapy and antineoplastic agents based on molecular mechanism of hematological malignancies, clinical use of hematopoietic growth factors.

Hematopoietic stem cell transplantation

- Role and indications of HST, immunodeficiency state, hematological Malignancies and Non-hematological disorders.
- Practical aspect of umbilical cord stem cells transplantation.
- Peripheral stem cell collection.
- Role of stem cell in tissue repair.
- Complications of Hematopoietic stem cell transplant.
- Gene therapy and genetic engineering.

Prenatal diagnosis of genetic hematological diseases

Hemostasis & Thrombosis

- Megakaryocyte and platelet structure.
- Molecular basis of platelet function, activation.
- Role of blood vessel, coagulation system and fibrinolytic system in hemostasis.
- Clinical and lab evaluation of bleeding and coagulation disorders.
- Clinical & diagnostic aspects of factor deficiencies including hemophilia, von Willebrand disease, DIC, Vitamin K deficiency.
- Thrombotic and non-thrombotic purpura.
- Hereditary and acquired platelet disorders and its management.
- Thrombophilia (Inherited & acquired).
- Lab evaluation and management of hypercoagulable states.

Human blood group antigen and antibody and Immuno-hematology

- Selection of donor and screening..
- Principle, indication and storage of red blood cells, WBC, platelet, and plasma transfusion.
- Various methods of component separation and plasma derivatives with special reference to Fresh frozen plasma, cryo-precipitates, platelet concentrate, single donor plasma, albumin, and Immunoglobulin.
- Graft Rejection, GVH diseases, Transfusion Reactions, Blood grouping & cross matching.
- Blood bank audit.
- Apheresis

Hematological manifestations of systemic diseases

- Liver disorders, renal disorders, infections, cancers, parasitic diseases, AIDS, pregnancy, and surgical patients.

Spleen and its disorders

D) Laboratory Medicine (Clinical Pathology including Parasitology)

- Principles of testing, indications, values with ranges in normal and diseased states in relation to:
 - Liver function tests
 - Renal function tests
 - Endocrine function tests
 - Body fluid analysis including stool, urine, semen, CSF, etc.
- Principles of laboratory automation, trouble shooting, and quality assurance.

D) Special techniques

The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields:

- Immunopathology,
- Electron microscopy,
- Histochemistry,
- Immunohistochemistry,
- Cytogenetics and in-situ hybridization,
- Molecular Biology,
- Digital Pathology and image analysis,

- Maintenance of records,
- Information retrieval, use of Computer and Internet in medicine.

E) Instrumentation and automation

- Principles, indications, working, maintenance, and troubleshooting of equipment used in various laboratories:
 - Histopathology laboratory – Histopathology tissue processor, microtome, water bath, embedding station, Stainer, IHC Stainer, ultramicrotome, etc.
 - Microscopes – Immunofluorescence, FISH, Confocal, Electron, etc.
 - Cytopathology Laboratory – Centrifuge, Cyto centrifuge, Cytospin apparatus, liquid-based cytology, etc.
 - Hematology Laboratory – automated cell counter, flow cytometer, coagulometer, HPLC, Electrophoresis apparatus, immunoblot, etc.
 - Clinical Pathology – Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, chemiluminescence, etc.
 - Digital pathology – Whole slide scanners
 - Molecular pathology – PCR, Sanger sequencer, NGS sequencers, etc.
- Automation in Pathology.
- Good lab practices and safety, record maintenance of capital equipment and consumables, purchase specifications, approximate costs of reagents and equipment, maintenance of store logbooks, etc.

F) Quality assurance program

- Internal and external quality assurance methods.
- Intra assay variations, batch variations, validation of chemicals and instruments.

G) Establishment Act and Rules and regulations formed by Govt. or regulatory bodies

H) Biomedical Waste management

- Disposal methods for each specimen, reagents, instruments, autoclaving techniques, recycling of products and e-waste.

I) Biostatistics, Research Methodology and Clinical Epidemiology

J) Ethics and Medico legal aspects relevant to Pathology

K) Current topics and recent advances in pathology

B. PSYCHOMOTOR DOMAIN

Demonstrate following predominant Psychomotor domain competencies		
Sr. No.	Competency	Perform under supervision/ perform independently/ Observation only
I.	HISTOPATHOLOGY (SURGICAL PATHOLOGY)	
1.	Given the clinical and operative data, identify and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose common lesions received on an average day from the surgical service of an average teaching hospital	Independently
2.	Perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.	Independently
3.	Identify and systematically and accurately describe the chief histomorphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and correlate with the clinical data to diagnose routine surgical material received on an average day.	Independently
4.	Identify common problems in histopathology processing techniques (poor fixation, delayed fixation, poor staining, etc.,) including automated tissue processing machine troubleshooting and rectify common problems	Independently
5.	Operate and maintain common equipment in the histopathology laboratory such as microtome, water bath, cryostat, tissue processor, auto Stainer, etc.	Perform under supervision
6.	Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome	Perform under supervision
7.	Stain paraffin sections with hematoxylin and eosin stain and common special stains needed for diagnosis	Independently
8.	Cut a frozen section, stain and interpret the slide in correlation with the clinical data provided	Independently

9.	Standardize and validate new antibodies for immunohistochemistry with understanding of controls, clones, and dilutions	Independently
10.	Perform immunohistochemistry on paraffin sections using manual method	Independently
11.	Identify common problems in immunohistochemistry procedure (artifacts, inadequate retrieval, section floating, IHC failure, etc.) and rectify such problems	Independently
12.	Decide on the appropriate immunohistochemical panels for diagnosis, prognosis and predictive purposes in common disease conditions based on standard recommendations and interpret their results	Independently
13.	Write histopathology reports, including synoptic reports, wherever needed, following protocols and international standards. The reports should be succinct and lucid, with clinical notes and advice, as necessary.	Independently
II	CYTOPATHOLOGY	
1.	Perform fine needle aspiration of superficial lumps and make good quality smears including collection of material for cell block preparation and decide on the type of fixative and stain in a given case	Independently
2.	Prepare and stain good quality smears for cytopathological examination	Independently
3.	Provide appropriate guidance to colleagues performing procedure such as a biopsy or an imaging guided biopsy including on-site microscopic assessment of specimen adequacy.	Independently
4.	Decide on the technique of collection, preservation, transport and concentration of various exfoliative cytology specimens (such as filters, centrifuge, liquid-based cytology, cytospin, etc.)	Independently
5.	Perform on-site adequacy assessment in image guided sampling procedures and decide on sample triage for routine diagnosis (type of preparation, stain, etc.) and ancillary tests including microbiological and molecular tests	Independently
6.	Diagnose common cases received in a routine cytopathology laboratory and categorize them into negative, inconclusive and positive, using the correct technique of screening and dotting the slides	Independently

	for suspicious cells, correctly identify the type of tumor, if present, and the presence of organisms, fungi and parasites, if present	
7.	Perform preparations (cytospin smears, liquid-based cytology, cell blocks, etc.) of common cytological samples using equipment such as centrifuge, cytocentrifuge and liquid based cytology apparatus	Observation only
III	HEMATOLOGY	
1.	Perform venipuncture for peripheral blood collection and decide on appropriate collection tubes, storage, and anticoagulant based on indication	Independently
2.	Prepare good quality peripheral blood smears, stain and report peripheral blood counts and other findings including reticulocyte and platelet counts on cell counter and manually	Independently
3.	Perform bone marrow aspirates and biopsy, prepare good quality smears and imprints	Perform under supervision
4.	Perform bone marrow aspirate staining including stain for iron	Independently
5.	Perform cytochemical characterization of leukemia with special stains on bone marrow aspirates	Perform under supervision
6.	Perform and interpret coagulation profile including PT, APTT and FDP	Independently
7.	Perform and interpret sickling test and osmotic fragility test	Independently
8.	Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least common cases referred to the Hematology clinic, given the relevant clinical data	Independently
9.	Given the clinical data, interpret the results of <ul style="list-style-type: none"> i. Red cell indices ii. Plasma hemoglobin iii. Hemosiderin in urine iv. Hemolytic anemia profile including HPLC, Hb electrophoresis etc. v. Hemoglobin and serum protein electrophoresis vi. Clotting time and other point of care tests for bleeding 	Independently

	<ul style="list-style-type: none"> vii. G6PD enzyme estimation viii. Platelet function tests including platelet aggregation and adhesion and PF3 release ix. Russell's viper venom time (RVVT) x. Coagulation Factor assays xi. Serum Fibrinogen xii. Screening for coagulation factor inhibitor, Bethesda Assay, xiii. Fibrin Degradation Products (FDP), D-Dimers xiv. Monitoring of anti-coagulant therapy xv. Thrombophilia profile (Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (AT III)) xvi. Serum ferritin, Serum iron and total iron binding capacity 	
10.	Interpret flow cytometry findings in the immunophenotyping of leukemia, CD34 enumeration, CD 3/CD 19 enumeration, PNH work up, etc.	Independently
11.	Interpret results of cytogenetics and molecular diagnostics in the work up of hematological diseases	Independently
12.	Prepare samples as appropriate for the indication, and operate equipment such as automated cell counter, flow cytometry, coagulometers, HPLC and electrophoresis apparatus	Observation only
IV	LABORATORY MEDICINE	
1.	Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.	Independently
2.	Perform urine analysis including physical, chemical and microscopic, examination of the sediment as well as by Dipstick methods.	Independently
3.	Perform macroscopic and microscopic examination of feces and identify the ova and cysts of common parasites.	Independently

4.	Perform a complete examination: physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid	Independently
5.	Perform semen analysis and interpret results in the context of clinical and hormone findings	Independently
6.	Perform quantitative estimation of blood/serum by automated techniques for common biochemical tests	Independently
7.	Prepare standard solutions and reagents relevant to common biochemical tests including the preparation of normal solution, molar solution and buffers	Independently
8.	Interpret and report common laboratory biochemical tests (LFT, KFT, endocrine function tests) with understanding of clinical implications	Independently
9.	Operate, maintain and troubleshoot common equipment used such as photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, PCR, chemiluminescence, etc.	Perform under supervision
V	TRANSFUSION MEDICINE	
1.	Perform selection and bleeding of donors, ABO and Rh grouping and cross match, antibody screening and titer, selection of blood for exchange transfusion	Independently
2.	Resolve ABO grouping problems and outline measures for investigation of transfusion medicine	Independently
3.	Perform and interpret anti-globulin test in antenatal and neonatal work up	Independently
4.	Prepare blood components such as cryoprecipitates, platelet concentrates, fresh frozen plasma, single donor plasma, red blood cell concentrates, etc. and test blood for presence of pathogens including HBV, HCV, HIV, VDRL, Malaria, etc.	Observation only
VI	AUTOPSY	
1.	Perform an autopsy, dissect various organ complexes, and display the gross findings (Note: An improvised autopsy may also be arranged in places where full autopsy is not possible. Relevant organs from wet specimens in the museum with appropriate clinical history may be arranged for a detailed description and diagnosis. At least ten such	Independently (see Note)

	improvised autopsies may be discussed by each candidate during the entire duration of the course)	
2.	Provide Provisional and Final Anatomic Diagnosis report, major findings correctly and systematically at autopsy, and the Autopsy Protocol as per prescribed instructions.	Independently
VII	MOLECULAR BIOLOGY	
1.	Interpret results of Polymerase Chain Reaction (PCR), real time PCR, Sanger Sequencing in a given clinical context.	Independently
2.	Interpret results of in-situ hybridization (fluorescent and chromogenic) in a given clinical context	Independently
3.	Prepare sample by appropriate methods and perform Polymerase Chain Reaction (PCR), real time PCR, Sanger Sequencing, and in-situ hybridization including troubleshooting	Observation only
VIII	IMMUNOPATHOLOGY	
1.	Interpret direct/ indirect immunofluorescence results in the context of common diseases of the skin, medical renal diseases and autoimmune diseases	Independently
2.	Prepare sample by appropriate methods and perform indirect immunofluorescence on a frozen section from skin/ renal biopsy	Perform under supervision
IX	ELECTRON MICROSCOPY	
1.	Interpret transmission electron microscopy results in common non-neoplastic and neoplastic diseases	Independently
2.	Prepare specimen by appropriate methods and process tissue for electron microscopy, interpret semi-thin sections and view ultra-thin sections under electron microscope	Observation only
X.	DIGITAL PATHOLOGY	
1.	Navigate and annotate whole slide scanned images	Independently
2.	Select and scan slides for digitalization and perform basic image analysis functions such as length measurements, enumeration, etc.	Observation only
XI.	TEACHING	
1.	Demonstrate different methods of teaching-learning and assessments	Independently
2.	Engage and teach undergraduates and paramedical staff in the form of small group teaching and demonstrations	Independently

3.	Engage in peer teaching in the form of presenting seminars and journal clubs and be able to use different modes of teaching including PowerPoint projections and charts	Independently
XII.	RESEARCH	
1.	Write the thesis (and/or a scientific paper) in accordance with the prescribed instructions, as expected of international standards	Independently

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents/demonstrators during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time. Maintenance of e-records of such procedures is encouraged.

The three-year training programme for the MD degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 36 months with breaks only for examinations and mandatory postings. Posting schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken. Departments may vary the postings slightly based on the clinical profile of the hospital, within the time period bands given below, however at least the lower limit for each of the four main components of the course must be covered during postings.

Posting schedule is given below:

S. No	Section/ Subject	Duration in months
(i)	Surgical Pathology, Autopsy, Immunohistochemistry	11-16
(ii)	Hematology, Laboratory Medicine, and Blood bank	8-10
(iii)	Cytopathology	6-9
(iv)	Basic Sciences, Immunopathology, Cytogenetics, Electron microscopy, Molecular Biology etc. and Research Techniques including Thesis	2-6
	Total	36 (including exam)

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings, and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, workload and overall working schedule in the concerned subject. The Pathology resident is expected to sit in reporting every day, having seen the slides the previous day with written descriptions, which should be evaluated daily by the reporting faculty. This is the mainstay of training in all disciplines of Pathology.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per subject requirements. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. Salient features of Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work/ Interactive slide and gross sessions: Minimum - once every 1-2 weeks.

Laboratory work, slide and gross specimen teaching sessions should be coordinated and guided by faculty from the department. Various methods like case-based discussions, oral or written quiz, etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases. This includes institutional activities such as clinical combined rounds (CCR), clinic-pathological correlation conferences (CPC), and departmental activities like autopsy conferences.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated

between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

- Laboratory-based specialty units/departments e.g. **Biochemistry / Microbiology/ Infection control unit/Laboratory Medicine, Hematology, Blood bank, Transplantation Immunology, Forensic Medicine, Proteomics,** etc.
- Medical Education Unit (MEU) or Department of Medical Education (DOME): optional

G. b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MS/MS in broad specialties in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member

of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Logbook

During the training period, the postgraduate student should maintain a Logbook indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The logbook entries must be done in real time. The logbook is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Logbook is to:

- a) help maintain a record of the work done during training,
- b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
- c) provide feedback and assess the progress of learning with experience gained periodically.

The Logbook should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed logbook in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head

of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in logbook particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology

All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Logbook** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.

2. At least **two presentations** at state/national level conference. One paper (thesis or non-thesis related work) should be published /accepted/publication draft in an indexed journal.

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. **Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory examination**

The examinations shall be organized based on 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill, and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject (general pathology, pathophysiology, immunopathology, and molecular biology).

Paper II: (Systemic pathology – surgical and cytopathology).

Paper III: (Hematology, transfusion medicine and laboratory medicine including instrumentation and quality control).

Paper IV: Recent advances in the subject.

The papers should have ideally one (01) structured long answer question which will evaluate comprehensive in-depth knowledge and 6-8 short answer questions.

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread at least over **two** days for each student and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The final clinical examination in broad specialty clinical subjects should include:

- Cases pertaining to major systems (e.g., one long case and three short cases),
- Stations for laboratory, procedural and communication skills,
- Logbook Records and reports of day-to-day observation during the training,
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

The practical examination in Pathology should follow general guidelines outlined below which may be modified according to local university guidelines and should be spread over at least two days. The following marks distribution is suggested:

Practical 500 marks (including 100 marks for internal assessment)

Section I: Histopathology: 150 marks

- Slides (12-15)
- Grossing/autopsy
- Long case (write a full description with clinical information provided) and/or 2 biopsy cases with ancillary tests reporting (written work only, no viva)

Section II: Cytopathology and histo/cyto techniques: 80 marks

- Slides (5-8)
- Histo/Cyto techniques
- Special stain exercise

- Immunopathology, OSPE, EM

Section III: Hematology, transfusion medicine and clinical pathology: 120 marks

- Slides
- Exercises
- Case study
- Blood bank
- Clinical pathology exercises and OSPE

Section IV: Viva, basic sciences, and communication skills: 50 marks

- Pedagogy/thesis presentation
- Oral viva
- Basic Sciences

Details of exercises in individual sections are given below:

I. Clinical Pathology:

- Discussion of a clinical case history.
- Plan relevant investigations of the above case and interpret the biochemistry findings.
- Two investigations should be performed including at least one clinical pathology exercise like CSF, pleural tap etc. analysis and complete urinalysis.

II. Haematology:

- Discuss hematology cases given the relevant history. Plan relevant investigations.
- Perform complete hemogram and at least two tests preferably including one coagulation exercise.
- Identify electrophoresis strips, osmotic fragility charts etc., interpretation of data from auto analyzers, HPLC and flow cytometry.
- Examine, report, and discuss around ten cases given the history and relevant blood smears and/or bone marrow aspirate smears and bone marrow biopsy interpretation.

III. Transfusion Medicine:

- Perform blood grouping
- Perform the necessary exercise like cross matching.
- Coomb's test, gel cards interpretation.

IV. Histopathology and cytopathology:

- Examine, report, and discuss 12-15 cases histopathology and 5-8 cytopathology cases, given the relevant history and slides.
- Perform a Hematoxylin and Eosin stain and any special stain on a paraffin section. Should be conversant with histopathology techniques including cryostat.
- Long case (write a full description with clinical information provided) and/or 2 biopsy cases with ancillary tests reporting

V. Autopsy:

- Given a case history and relevant organs (with or without slides), give a list of anatomical diagnosis in an autopsy case.

VI. Gross Pathology

- Describe findings of gross specimens, give diagnosis, and identify the sections to be processed. The post graduate student should perform grossing in front of the examiners for evaluation.

VII. Basic Sciences:

- 10-15 spots based on basic sciences be included
- Identify electron micrographs
- Identify gels, results of PCR, immunological tests including interpretation of Immunofluorescence pictures, etc.
- Identify histochemical and immuno-histochemistry stains

VIII. Teaching exercise

- Teach on a small topic for about 10 min or present dissertation and research
- General Viva-Voce (Grand Viva) – structured viva may be done separately or combined with above exercises

Recommended Reading:

Books (latest edition)

1. Histology for Pathologists. Stephen S. Sternberg (Ed), Raven Press, New York.
2. Robbin's Pathologic Basis of Disease Ramzi S.Cotran, Vinay Kumar, Stanley L Robbins WB Saunders Co., Philadelphia.
3. Ackerman's Surgical Pathology. Juan Rosai Mosby. St. Louis.
4. Diagnostic Surgical Pathology. Stephen S Sternberg. Lippincott, William Wilkins. Philadelphia.

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8. Diagnostic Cytology and its Histopathologic Basis, Koss LG, J.B. Lippincott, Philadelphia.
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03-05 international Journals and 02 national (all indexed) journals.

Student appraisal form for broad specialty non-clinical disciplines											
	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic aptitude and learning										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	Work related to training										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work environment										

2.5	Ability to record and document work accurately and appropriate for level of training										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment pattern been discussed with the trainee?	Ye									
	If not explain.	s	No								
	Name and Signature of the assessee										
	Name and Signature of the assessor										
	Date										

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**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

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**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR MD IN
PAEDIATRICS**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PAEDIATRICS

PREAMBLE

The purpose of any postgraduate (PG) education is to train an individual, in this case a qualified MBBS doctor, to achieve competencies across all domains that enables the student to perform the professional role as an expert and specialist practicing a specialty in the community (Newborn to adolescent care; ambulatory and in-patient care; Well child/Healthy and Ill child; health promotion, disease prevention and curative care; individual and family centered care; emergency care, Intensive and routine Care). The shift towards competency-based medical education by Medical Council of India and continued by the National Medical Commission (NMC) focuses education to be outcome based, emphasizing abilities, balancing domains of learning and promoting a learner centered ownership of the curriculum.

The practice of medicine has and will continue to change. Existing changes in the environment and practice have included an explosion of information, stress on knowledge at the expense of skills/attitudes/critical thinking, increased access of information and health delivery systems by lay public, development and access to sub-specialties, technological and IT advances, costs of management (diagnostic and therapeutic), changes in disease trends (non-communicable diseases, behavioral/developmental disorders, malignancies, immunology, etc.), medico-legal litigations, emphasis on quality standards, improved patient safety, violence/anger against health personnel and the emergence of professional-ethical dilemmas to name a few.

The NMC's competency based education is organized using a framework of competencies (predefined abilities) that forms the backbone of the curriculum as defined outcomes. These competencies are defined as observable abilities of a health professional, integrating multiple components across all domains, cognitive, psychomotor skills, and affective. Identified competencies are to be measured and assessed to ensure their acquisition which in turn determines competence. Defined competencies in each domain facilitates education progressing from being a novice towards mastery with formative assessments (feedback) vital for success. Every domain will have weightage and the phenomenon of allowing the ability in one should not be allowed to compensate the lack of ability in another.

These changes are reflected in the review of Core Competencies keeping them mostly aligned with CBME Undergraduate efforts. Each competency will require Sub-competencies/milestones enabling both student and teacher monitor progress that is transparent making both accountable. Specific Learning Objectives that will be necessary to achieve (and assess) outcomes are certainly also required to complete the process. This document has been prepared by subject-content specialists of NMC. The Expert Group of the NMC had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies

SUBJECT SPECIFIC OBJECTIVES

Goal

The goal of the MD Paediatrics post-graduate course on successful completion, is to mould the individual into a qualified Pediatrician who is a specialist doctor with the ability (competence) to assess the state of health; promote health; and diagnose as well as manage disease (acute or chronic, emergency or routine) in children of all ages from newborn to the adolescent.

Their expertise includes dealing with medical and surgical conditions of varied degrees of complexities providing a spectrum of care from prevention, promotion, resuscitation, emergency care, acute care, chronic care and procedures (diagnostic and therapeutic) including providing palliative care. Unlike in most adults, children go through changes in growth and development leading to anatomical, behavioral, and developmental changes that emphasizes that the Specialist incorporates this dynamic requirement into screening, assessments, diagnostic and therapeutic decisions. They will continue to play an important part in the health of the family and community especially through education and support of prevention of disease and health promotion since Paediatrics is child-centered and family-focused given the relationships and social structures of families. Pediatricians will also continue to provide consultative services to many other physicians across the specialties including Emergency, Burns, Plastic Surgery, Anesthesiologist, Surgeons, Infectious Disease, Community and Family Medicine.

SUBJECT SPECIFIC OBJECTIVES

The objectives of the postgraduate course (MD) in Paediatrics are to produce a competent pediatrician who:

- Acquires competencies relevant to all aspects of Paediatrics (newborn to adolescent) that are essential to function as a clinical expert in providing newborn and pediatric health services for the community at all levels.
- Recognizes the holistic health needs of healthy neonates, infants, children, and adolescents
- Performs responsibilities of the provision of clinical care in keeping with principles of the National Health Policy.
- Performs responsibilities in a professional and ethical manner.
- Acquires skills in effectively communicating not only with the health team but with the child, family, and the community
- Is actively involved in keeping oneself up to date with scientific advances in Paediatrics and Medicolegal aspects of practice.
- Is oriented to principles of research methodology enabling critical appreciation of published scientific evidence and contributing through scholarship
- Acquires skills to enable education of all stakeholders including health team members
- Acquires skills and understanding of dealing with health team members enabling optimizing system-based practice.

SUBJECT SPECIFIC COMPETENCIES

Towards achieving suitable outcomes certain Competencies are essential to be achieved, assessed that will enable the qualified professional to perform the role of a Paediatric Specialist.

Aligned with the NMC's existing Undergraduate CBME, the following are refined and identified as themes or roles mandatory to perform the responsibility as a Pediatric Specialist in the community after acquiring an MD Paediatric post-graduation:

1. Clinical Expert
2. Communicator

3. Professional
4. Scholar
5. Team Member

Core Competencies

(The term 'children' is hereby used to include all age groups from birth to 18 years - newborn, neonates, infants, toddlers, children and adolescents)

To perform each of these above roles as a Paediatrician, every role determines competencies which in turn requires Specific Learning Objectives covering all the domains of learning.

By the end of the MD Paediatric course, the postgraduate student should be able to:

1. Clinical Expert

- 1.1. Appreciate and recognize maternal and child health needs in the context of the health priority of the country at all levels ie. Individual, Community, Local, Regional, and National.
- 1.2. Apply an understanding of the determinants of child health at individual, community, and population levels in practice of disease prevention, health promotion and clinical care of all children.
- 1.3. Understand the existing inequities in accessibility to child friendly health, economics of child health and existing status of child health across gender, communities, region, and nation (eg. NHFS survey).
- 1.4. Participate in population/community efforts towards prevention, promotion, and disease control relevant and with implications for child health (ie. National Health Programs).
- 1.5. Appreciate and recognize the importance of nurturing care for the early growth and development as the very foundation of Paediatrics and help each child realize her/his optimal growth and development potential.
- 1.6. Actively support the optimization of quality of growth, development, and holistic health of children in care through education enhancing the promotive, preventive, and curative measures.
- 1.7. Provide continuum of care and rehabilitation for children afflicted by chronic disease.
- 1.8. Scientific Knowledge and Evidence

1.8.1. Apply an understanding of scientific basis, concepts, principles, and advances as the basis of health and disease in the screening, diagnosis, and management of all children including growth and development.

1.9. Clinical History/Examination

1.9.1. Demonstrate appropriate proficiency in basic clinical skills appropriate for children, ie. History, Physical Examination and Assessments of Growth/ Development/ Behavior, in arriving at the most likely clinical differential; in identifying precipitating or predisposing factors; prioritizing high risk versus low-risk conditions; and, those in need of emergency versus routine care.

1.9.2. Organize and analyze an authentic history and relevant examination towards a valid clinical assessment of health of all children including growth, development, and behavioral assessments.

1.10. Investigations

1.10.1. Order rational Investigations and interpret results keeping in mind cost effectiveness and purpose in child health (ie., confirming diagnosis that impacts management decisions).

1.11. Procedures/Interventions

1.11.1. Order, perform with safety and interpret results of procedures/ interventions that are cost-effective for diagnostic and therapeutic purposes in child health.

1.12. Critical Thinking

1.12.1. Demonstrate a logical clinical approach to diagnose children in health and disease in all settings.

1.12.2. Manage using appropriate resources all children in health and disease in settings not less than secondary level facilities

1.12.3. Demonstrate clinical reasoning at every step from gathering, organization, prioritization, analysis and creating logical diagnostic hypothesis from clinical data relevant to childhood (history to examination to investigations)

1.12.4. Formulate rational, judicious, and cost-effective plans (Investigation, Therapeutic and Counseling/Education plans) for all children in health and disease (acute and chronic) taking into consideration individual/ family circumstances, interpersonal dynamics, socioeconomic status, vulnerabilities, epidemiology, and population health factors.

- 1.12.5. Choose investigations and prescribes medications/interventions that are rational and cost-effective balancing benefits and costs in child health in the context of family status.
- 1.12.6. Critically appreciate scientific literature especially relevant to children under their care.
- 1.13. Responsiveness
 - 1.13.1. Rapidly assess/screen, recognize and manage critically ill sick children prioritized for immediate attention.
 - 1.13.2. Demonstrate sensitivity and appreciate the emotional and behavioral characteristics and needs of children while dealing with them
- 1.14. Quality of Care
 - 1.14.1. Demonstrate practices that maximize child safety
 - 1.14.2. Optimize safe working practices in child health delivery settings
 - 1.14.3. Participate in incident reporting of adverse events and errors enabling quality improvement of child health
 - 1.14.4. Participate in continuous Child Health Care related Quality Improvement measures especially patient related audits, recognition of gaps and implementation of interventions to improve quality
- 1.15. Advocacy
 - 1.15.1. Responding to a Child's health needs by advocating for them
- 1.16. Documentation
 - 1.16.1. Maintain Child health records of relevant demographic details clinical details, progress, interpretations, educational, monitoring and management decisions accurately and neatly organized
 - 1.16.2. Provide relevant concise summaries and certification in completeness to authorized legal guardians of children
 - 1.16.3. Maintain childhood morbidity and mortality data for audit purposes.

2. Communicator

2.1. Effective Communication

- 2.1.1. Demonstrate all aspects of effective and empathetic communication during most encounters with children and parents/guardians (listening skills, culturally appropriate verbal and non-verbal cues, simple understandable

language, allow questions, clarify answers and concise written communications for prescriptions and patient education)

2.1.2. Demonstrate mutually respectful communications with children/parents/guardians (verbal, telephonic, electronic and written) that is collaborative and effective between health system colleagues of all levels.

2.2. Effective Counselling

2.2.1. Provide professional assistance and guidance in assisting children/parents/ authorized legal guardians determine their autonomous decisions regarding their own health (especially related Diagnostic Interventions and Therapeutic options).

3. Professional

3.1. Responsibility

3.1.1. Demonstrate responsibility for all aspects of the conduct of child care, academic tasks and research in children undertaken.

3.1.2. Demonstrate social accountability consistent with community and professional expectations through active participation in child health relevant Community Outreach programs

3.1.3. Demonstrate an understanding of one's own limits and seeks assistance appropriately in dealing with children in health and disease.

3.2. Integrity

3.2.1. Demonstrate commitment with honesty for consistent and uncompromising adherence to moral and ethical principles and values in protecting child rights and wellbeing during care, academics, and research.

3.3. Compassion and empathy

3.3.1. Demonstrate the ability to understand and share the feelings of children and families while dealing with them as care providers.

3.3.2. Demonstrate the ability to understand and share the feelings of health team members while working with them for the good of children.

3.4. Stigma and Discrimination

3.4.1. Demonstrate ability to comprehend the differences in values and beliefs while respectfully continuing child health care without discrimination

3.5. Ethical principles

- 3.5.1. Recognize ethical conflicts specific for child health between principles of ethics and justifies options/decisions while discussing within health care team discussions.
- 3.5.2. Demonstrate respect for confidentiality in issues related to child health.
- 3.5.3. Demonstrate ability to honor the doctor-child/parent/legal guardian relationship in all dealings with respect ensuring due care especially avoiding all inappropriate behavior and activities that lead to conflicts of interest.
- 3.5.4. Demonstrate mutual respect for all members on the child health team and behaves equitably and collaboratively while dealing with them.
- 3.5.5. Demonstrate prioritization of child's welfare and community benefits over self when appropriate.
- 3.6. Medicolegal Law and Code of Ethics
 - 3.6.1. Practice within the NMC's standards as prescribed by the Code of Ethics especially in dealings with children.
 - 3.6.2. Practice within the Law of the land fulfilling legal requirements during the provision of care especially relevant to children.

4. Scholar

4.1. Research

- 4.1.1. Refer to evidence-based guidelines in the decision-making process for child care justifying limitations.
- 4.1.2. Understand research methodology and the creation of a research studies for child health.
- 4.1.3. Demonstrate the ability to critically appreciate the quality and implications of scientific literature justifying its application in the delivery of child health care.
- 4.1.4. Demonstrate an ability to identify pertinent research questions relevant to child health through active participation and involvement in research.

4.2. Academics

- 4.2.1. Demonstrate features of active adult learning through enthusiasm and displaying a positive attitude in the educational process while participating in educational activities to build child health care capacities (Intra- and inter-institutional).
- 4.2.2. Use appropriate educational techniques to promote health education amongst children/parents/legal guardians/community

4.2.3. Use appropriate educational techniques to facilitate learning of other child health care team members including undergraduates, nurses, paraclinical staff and peers

4.2.4. Maintain competency by keeping up to date with child health guidelines through continued medical education with scientific knowledge and skills to enable quality practice

4.3. Application

4.3.1. Apply child health expertise in an area of study that is published in academic journals

4.3.2. Apply child health expertise while participating in health education and community efforts

5. Team Member

5.1. Teams

5.1.1. Demonstrate an understanding of the roles and competencies of other health care providers dealing with child health.

5.1.2. Demonstrate the ability to engage and collaborate with all child health care team members keeping the patient at the center of all such collaboration.

5.1.3. Recognize and discuss in a non-judgmental way the roles of informal stakeholders as extended teams especially in child care planning (especially mature adolescent, extended family, alternative medicine practitioners, support networks, etc.)

5.1.4. Demonstrate knowledge of health care financing, implications for management and its application in assisting patient to access the best possible care through extended team networking while dealing with child health.

5.1.5. Maintain personal health and wellbeing not only of self but of team members.

5.2. Leaders

5.2.1. Demonstrate leadership and management skills enabling effective working as a child health team

5.2.2. Lead, manage, and participate as a member of an effective and efficient child health care team while collaborating respectfully either as leader or member.

5.2.3. Facilitate child health team capacity building of competencies by leading through conduct of effective education sessions for members of the health team learning.

- 5.2.4. Manage time and human resources efficiently and effectively to deliver optimal child health care.

SYLLABUS

Syllabus gives an outline and summary of topics to be covered in the MD Paediatric Course.

In Competency Based Education, outcomes are required to be defined, taught, learnt, and assessed that determines competence at the end of the course. Defined Outcomes should focus on what is expected practically in the “real world” by the professional performing roles of the expert physician. This syllabus is focused on all age group of children from neonates to toddlers to children to adolescents as per existing practice. The syllabus thus stresses on “real world presentation of symptoms and signs” and is categorized under the following:

- A. Cognitive Domain
 - a. Basic Sciences
 - b. Approaches/Management of common symptoms/signs inclusive of analysis, interpretation, and application of investigations
 - c. Specific Topics classified as per traditional systems
- B. Psychomotor Domain
- C. Affective Domain
- D. Pedagogic and Research Skills

A) Predominant in Cognitive (Knowledge) Domain

a. Basic Sciences

- *Should be able to justify and apply in the practice of Paediatrics, an understanding of the fundamentals of basic sciences as listed below:*

1. Applied Anatomy

1.1. Embryogenesis of all organ systems

1.2. Central Nervous System

1.2.1. Structures, Functions, Clinical considerations

- 1.2.1.1. Cerebral Cortex
- 1.2.1.2. Corticospinal tracts
- 1.2.1.3. Extrapyrmidal tracts
- 1.2.1.4. Cerebellar connections
- 1.2.1.5. Sensory tracts
- 1.2.1.6. Ventricles

1.3. Spinal Cord, Peripheral Nerves

1.3.1. Structures, Functions, Clinical considerations

- 1.3.1.1. Lower Motor Neuron

- 1.4. Bladder and Bowel control
- 1.5. Vascular supply – Principal arteries and veins
- 1.6. Extremities, Abdomen, Thorax, Head and Neck
- 1.7. Fetal circulation

2. Physiological basis and Pathophysiology in Health and Disease

- 2.1. Physical Growth
- 2.2. Temperature regulation
- 2.3. Acid Base Balance
- 2.4. Fluid Balance
- 2.5. Hematopoiesis
- 2.6. Hemostasis
- 2.7. Electrolyte balance
- 2.8. Bone mineralization: Calcium-Phosphate balance
- 2.9. Puberty
- 2.10. Renal function
- 2.11. Hepatic function
 - 2.11.1. Bilirubin
 - 2.11.2. Drug metabolism
- 2.12. Respiratory function
- 2.13. Cardiac function
- 2.14. Gastrointestinal
- 2.15. Endocrine functions
- 2.16. Developmental Milestones
- 2.17. Adolescence
- 2.18. Placenta functions
- 2.19. Fetal to Infant Transitions (Cardio-respiratory)
- 2.20. Nutrition
- 2.21. Allergy

3. Biochemical basis of health and disease

- 3.1. Cell biology
 - 3.1.1. Cell cycle
 - 3.1.2. Cell signaling
- 3.2. CHO metabolism
- 3.3. Lipid metabolism
- 3.4. Protein metabolism
- 3.5. TCA Cycle
- 3.6. Hemoglobin
- 3.7. Clinical Chemistry
 - 3.7.1. Vitamins
 - 3.7.2. Minerals
- 3.8. Plasma Proteins
- 3.9. Coagulation Pathway

4. Genetics and Molecular Medicine

- 4.1. Human Genome
- 4.2. Nucleic acids

- 4.2.1. Protein synthesis
- 4.3. Recombinant DNA Technology
 - 4.3.1. Basic techniques
 - 4.3.2. Applications
- 4.4. Chromosomal abnormalities
 - 4.4.1. Pedigree charting
- 4.5. Prenatal/Postnatal diagnosis
- 4.6. Immunogenetics
 - 4.6.1. HLA

5. **Clinical Microbiology**

- 5.1. Virology
 - 5.1.1. Classifications
 - 5.1.2. Diagnostics
 - 5.1.3. Therapeutics
 - 5.1.4. Resistance
- 5.2. Bacteriology
 - 5.2.1. Classification
 - 5.2.2. Endo/Exotoxins
 - 5.2.3. Diagnostics
 - 5.2.4. Therapeutics
 - 5.2.5. Resistance
 - 5.2.6. Antibiotic Stewardship
- 5.3. Mycology
 - 5.3.1. Classification
 - 5.3.2. Diagnostics
 - 5.3.3. Therapeutics
 - 5.3.4. Resistance
- 5.4. Parasitology (Protozoology and Helminthology)
 - 5.4.1. Classification
 - 5.4.2. Diagnostics
 - 5.4.3. Therapeutics
 - 5.4.4. Resistance
- 5.5. Waste disposal, sterilization, disinfection
 - 5.5.1. Infection Control

6. **Immunology**

- 6.1. Immune response system
 - 6.1.1. Innate, Adaptive
 - 6.1.2. Cellular
 - 6.1.3. Antibodies
 - 6.1.4. Cytokines
 - 6.1.5. Clinical considerations
- 6.2. Immunoglobulins

- 6.2.1. Types
- 6.2.2. Clinical considerations
- 6.3. Complement
 - 6.3.1. Components
 - 6.3.2. Pathways
 - 6.3.3. Deficiencies
 - 6.3.4. Clinical considerations
- 6.4. Hypersensitivity reactions
- 6.5. Blood group Immunology
 - 6.5.1. ABO
 - 6.5.2. Rh
 - 6.5.3. Minor groups
- 6.6. Immunological assays
- 6.7. Science of Vaccinology
 - 6.7.1. Vaccines
 - 6.7.2. Classification
 - 6.7.3. Schedule
 - 6.7.4. Indications, contraindications
 - 6.7.5. Adverse effects
 - 6.7.6. Catch up doses
- 6.8. Immunodeficiency
 - 6.8.1. Primary
 - 6.8.2. Secondary
- 6.9. Autoimmune disease
 - 6.9.1. Basis
 - 6.9.2. Autoantibodies
 - 6.9.3. Clinical considerations
- 6.10. Transplant Immunology
 - 6.10.1. Stem cell
 - 6.10.2. GVH disease
 - 6.10.3. Solid organ transplant
- 6.11. Cancer Immunology
- 7. Pharmacology**
 - 7.1. Pharmacokinetics – common medications
 - 7.2. Antimicrobials
 - 7.3. Analgesia, sedation
 - 7.4. Drug interactions
 - 7.5. Adverse effects
 - 7.6. Antidotes for poisons
 - 7.7. Drug induced disease
- 8. Epidemiology**

- 8.1. Rates
- 8.2. Principles of study design
- 8.3. Measures of effects
- 8.4. Association and causation
- 8.5. Diagnostic tests

9. Statistics

- 9.1. Distribution of data
- 9.2. Measures of Central tendency
- 9.3. Measures of dispersion
- 9.4. Probability distributions
- 9.5. Sampling
- 9.6. Statistical significance

10. Professionalism and Ethics

- 10.1. Professionalism
 - 10.1.1. Clinical competencies
 - 10.1.2. Effective communication
 - 10.1.3. Understanding of Ethics
 - 10.1.4. Accountability
 - 10.1.5. Altruism
 - 10.1.6. Excellence
 - 10.1.7. Humanism
- 10.2. Ethics
 - 10.2.1. Code of ethics
 - 10.2.2. Principles of Ethics
 - 10.2.3. Ethical workup
 - 10.2.4. Doctor-Patient relationship
 - 10.2.5. Confidentiality and privacy
 - 10.2.6. Doctor-Doctor relationship
- 10.3. Medico-legal essentials
 - 10.3.1. POSCO
 - 10.3.2. Certifications
 - 10.3.3. Documentation
 - 10.3.4. Informed consent
 - 10.3.5. MLC formalities

11. Pedagogy

- 11.1. How adults learn
- 11.2. Competencies and Specific Learning Objectives
- 11.3. Teaching Learning Methodologies
- 11.4. T-L Media including Power Point Presentations
- 11.5. Assessments- Formative and Summative

12. Management

- 12.1. Time Management
- 12.2. Conflict Management
- 12.3. Communication especially Listening

- 12.4. How to study – Lectures? Wards? Journal club?
- 12.5. Fundamentals of Counselling
- 12.6. Stress Management
- 12.7. Teamwork
- 12.8. Leadership

b. Approaches/Management of common symptoms/signs inclusive of analysis, interpretation, and application of investigations (In every age group from newborn to adolescent)

- **Approaches** (Clinical and Investigation) of the following clinical symptoms/ signs
Management plans (Investigation, Treatment, Care, Counselling, Education, Follow Up, Rehabilitation Plans) of healthy children (section 1.1) and children with the following clinical symptoms/signs.

1.1. Healthy Children

- 1.1.1. Healthy neonate
- 1.1.2. Healthy infant
- 1.1.3. Healthy child
- 1.1.4. Healthy adolescent

1.2. Cardiovascular Symptoms/Signs

- 1.2.1. Murmurs
- 1.2.2. Cyanosis
- 1.2.3. Syncope
- 1.2.4. Dizziness
- 1.2.5. Breathlessness
- 1.2.6. Palpitations
- 1.2.7. Chest Pain

1.3. Development (and Behavioral) Symptoms/ Signs

- 1.3.1. Normal development
- 1.3.2. Delayed milestones
- 1.3.3. Regression of milestones
- 1.3.4. Unusual behaviors
- 1.3.5. Poor scholastic performance
- 1.3.6. Deviations in sexuality
- 1.3.7. Dysmorphic features
- 1.3.8. Suicide attempt
- 1.3.9. Behavioral issues -disinterest, isolation, poor social interaction
- 1.3.10. Substance abuse
- 1.3.11. Abnormal eating behavior
- 1.3.12. Sleep disturbance
- 1.3.13. Breath holding spells
- 1.3.14. Multiple unexplained unrelated complaints
- 1.3.15. Technology dependence
- 1.3.16. Speech abnormalities

1.4. Dermatology

- 1.4.1. Neonatal skin lesions
- 1.4.2. Infantile skin lesions
- 1.4.3. Acquired skin rashes in childhood
- 1.4.4. Urticaria
- 1.4.5. Neurocutaneous presentations

1.5. Emergencies

- 1.5.1. Dehydration
- 1.5.2. Respiratory distress
- 1.5.3. Hypoxia
- 1.5.4. Shock
- 1.5.5. Incessant crying
- 1.5.6. Sick looking
- 1.5.7. Status epilepticus
- 1.5.8. Acute Severe Asthma
- 1.5.9. Trauma
- 1.5.10. Animal/human bite
- 1.5.11. Abuse
- 1.5.12. Cardio-pulmonary failure
- 1.5.13. Oliguria/Anuria
- 1.5.14. Raised intracranial pressure
- 1.5.15. Coma
- 1.5.16. Traumatic Brain Injury
- 1.5.17. Acute poisoning
- 1.5.18. Envenomation
- 1.5.19. Medico-legal conditions

1.6. Endocrine Symptoms

- 1.6.1. Abnormal stature
- 1.6.2. Hypoglycemia
- 1.6.3. Delayed puberty
- 1.6.4. Precocious puberty
- 1.6.5. Goiter

1.7. Gastrointestinal (and Hepatic) Symptoms

- 1.7.1. Tongue tie
- 1.7.2. Vomiting and regurgitation
- 1.7.3. Diarrhea – Acute
- 1.7.4. Diarrhea – Chronic, persistent, recurrent
- 1.7.5. Abdominal pain – Acute
- 1.7.6. Abdominal Pain - Recurrent
- 1.7.7. Constipation
- 1.7.8. Jaundice
- 1.7.9. Gastrointestinal bleed
- 1.7.10. Hepatomegaly
- 1.7.11. Splenomegaly
- 1.7.12. Hepatosplenomegaly
- 1.7.13. Encopresis
- 1.7.14. Abdominal distention

1.7.15. Abnormal Liver Function tests

1.8. Genital Symptoms

- 1.8.1. Atypical or ambiguous genitalia
- 1.8.2. Menstrual abnormalities
- 1.8.3. Injuries to genitalia
- 1.8.4. Foreskin, penile problems
- 1.8.5. Labial adhesions

1.9. Growth (and Nutrition related) Symptoms

- 1.9.1. Normal growth
- 1.9.2. Normal diet
- 1.9.3. Poor feeding in Infancy
- 1.9.4. Undernutrition
- 1.9.5. Failure to thrive
- 1.9.6. Overweight and obesity

1.10. Hematological Symptoms

- 1.10.1. Pallor
- 1.10.2. Bleeding manifestations
- 1.10.3. Lymphadenopathy
- 1.10.4. Thrombotic manifestations
- 1.10.5. Abnormal Hematological parameters including Pancytopenia

1.11. Infectious (and Immunological) Symptoms

- 1.11.1. Fever with focus
- 1.11.2. Fever without focus
- 1.11.3. Fever - persistent or recurrent
- 1.11.4. Exanthematous Fever
- 1.11.5. Recurrent infections
- 1.11.6. Hospital acquired infection
- 1.11.7. Vaccination Issues– complete, incomplete

1.12. Metabolic Symptoms

- 1.12.1. Acidosis – metabolic, respiratory
- 1.12.2. Alkalosis – metabolic, respiratory
- 1.12.3. Mixed Acid-Base disturbance
- 1.12.4. Dyselectrolytemia – Hypo/Hyponatremia, Hypo/Hyperkalemia, Hypo/hypercalcemia
- 1.12.5. Hyperammoniaemia
- 1.12.6. Hypoglycemia

1.13. Musculoskeletal Symptoms

- 1.13.1. Joint pains with or without swelling
- 1.13.2. Low back pain
- 1.13.3. Deformities of bone growth
- 1.13.4. Scoliosis

1.13.5. Growing Pains involving lower limbs

1.14. Neonatology

- 1.14.1. Term gestation
- 1.14.2. Prematurity
- 1.14.3. Low birth weight
- 1.14.4. Neonatal Jaundice
- 1.14.5. Ill/Sick
- 1.14.6. Neonatal seizures
- 1.14.7. Neonatal respiratory distress
- 1.14.8. Neonatal Apnea
- 1.14.9. Neonatal Shock
- 1.14.10. Metabolic/electrolyte disturbances – Glucose, Sodium, Potassium, Calcium, Bicarbonate, Lactate, Ammonia
- 1.14.11. Feed Intolerance
- 1.14.12. Spinal/Cranial abnormalities
- 1.14.13. Post NICU follow up
- 1.14.14. HIV-HepB-Syphilis exposure/infection
- 1.14.15. Inadequate breast milk
- 1.14.16. Antenatal detected renal abnormalities

1.15. Neurological Symptoms

- 1.15.1. Seizures
- 1.15.2. Altered sensorium/Coma
- 1.15.3. Motor weakness
- 1.15.4. Incessant Irritability
- 1.15.5. Headache
- 1.15.6. Abnormal Head circumference
- 1.15.7. Sensory abnormalities
- 1.15.8. Abnormal gait
- 1.15.9. Ataxia
- 1.15.10. Facial weakness
- 1.15.11. Involuntary movements

1.16. Ophthalmological Symptoms

- 1.16.1. Red eye
- 1.16.2. Watering of eye
- 1.16.3. Discharge from eye
- 1.16.4. Poor vision
- 1.16.5. White reflex
- 1.16.6. Deviation of eyes

1.17. Otorhino-laryngology Symptoms

- 1.17.1. Nasal discharge, Nasal congestion, Sneezing
- 1.17.2. Sore Throat
- 1.17.3. Ear Pain/discharge
- 1.17.4. Tonsillar hypertrophy
- 1.17.5. Epistaxis
- 1.17.6. Impaired hearing

1.18. Renal and Urological Symptoms

- 1.18.1. Enuresis
- 1.18.2. Dysuria
- 1.18.3. Proteinuria
- 1.18.4. Hematuria
- 1.18.5. Edema
- 1.18.6. Hypertension
- 1.18.7. Dyselectrolytemia
- 1.18.8. Polyuria
- 1.18.9. Scrotal and Inguinal swelling
- 1.18.10. Oliguria/Anuria

1.19. Respiratory Symptoms

- 1.19.1. Cough
- 1.19.2. Breathlessness
- 1.19.3. Noisy breathing - snoring, stridor, wheeze
- 1.19.4. Hemoptysis

1.20. Community Situations

- 1.20.1. Vaccination camps
- 1.20.2. School Health Checkups
- 1.20.3. Outbreaks of childhood diseases

1.21 Analysis, interpretation, and application of Investigations

- 1.21.1. Radiology X-rays (Chest AP/PA/Lateral, abdomen, spine, extremities)
- 1.21.2. Contrast X-rays (Micturating cystourethrogram)
- 1.21.3. Ultrasound (Lung: Consolidation, Left Heart failure, effusion; Circulation: Intravascular Volume; Neonatal Brain: Hydrocephalus, Intracranial Collections; Central veins: Patency for US guided central lines; Lymphadenopathy: For US guided FNAC aspirations)
- 1.21.4. CT scan with/without contrast (Brain: Cerebral edema, Midline shift, Meningitis, Encephalitis, ADEM, Hemorrhage, Infarction, SOLS, Hydrocephalus)
- 1.21.5. MRI scan (Brain: Gross White vs Grey matter degeneration)
- 1.21.6. HIDA Scan

1.22. Microbiology

- 1.22.1. Grams stain of CSF, Pus, Peritoneal fluid
- 1.22.2. Ziehl Neilsen Stain of Sputum, Pus
- 1.22.3. Hanging drop for motile cholera
- 1.22.4. PCR reports for infectious disease diagnosis
- 1.22.5. Culture and sensitivity reports of body fluids

1.23. Pathology

- 1.23.1. Pathology reports of human tissue

1.24. Routine labs

- 1.24.1. Hematology reports of Blood counts, peripheral smear, Bleeding and Coagulation parameters, basic immunology
- 1.24.2. Urine routine analysis

1.25. Biochemical

- 1.25.1. Biochemical routine (Electrolytes, Calcium-Phosphate, Renal, Liver profiles, Arterial/venous Blood Gases)
- 1.25.2. Inborn error of metabolism newborn screening reports
- 1.25.3. Endocrine (Glucose related, Thyroid related, Hormonal assays, Lipid profiles)

1.26. Electrophysiological Studies

- 1.26.1. Electrocardiogram

1.27. Lung Function Tests

- 1.27.1. Spirometry

C. *Specific Topics*

Understanding the definition, epidemiology, etiopathogenesis, clinical presentation, investigations, complications, differential diagnosis, treatment, prognosis, prevention, follow up and rehabilitation, if required, of the following, but not limited to:

1. Overview

- 1.1. History of Paediatrics
- 1.2. State of Health of Children – Global, Regional and India
- 1.3. Evidence-based Care in Pediatrics
- 1.4. WHO's Sustainable Development Goals
- 1.5. National Programs relevant to Child Health
- 1.6. Ethics in the Care of Children
- 1.7. Medico-legal aspects relevant to Paediatrics including:
Documentation (Initial History/Examination/Differential Sheet, Progress (SOAP, Problem Oriented), Death and other Certification, Informed Consent, Wound Certificates, POSCO, Financial Receipts, Outpatient/In Patient Registers)

2. Genetics

- 2.1. Inheritance Patterns
- 2.2. Genetic Counseling
- 2.3. Prevention of Genetic Disorders
Management of Genetic Disorders

3. Metabolic Disorders

- 3.1. Approach to Inborn Errors of Metabolism
- 3.2. Approach to Hypoglycemia
- 3.3. Defects of Amino Acid Metabolism
 - 3.3.1. Phenylalanine
 - 3.3.2. Urea Cycle Disorders
- 3.4. Defects of Lipid Metabolism

- 3.4.1. Organic Acidemias
- 3.4.2. Fatty Acid Oxidation
- 3.4.3. Mitochondrial Disorders
- 3.4.4. Peroxisomal Disorders
- 3.4.5. Lysosomal Storage Disorders
- 3.4.6. Gaucher Disease
- 3.4.7. Niemann-Pick Disease
- 3.5. Defects of Carbohydrate Metabolism
 - 3.5.1. Glycogen Storage Disease
- 3.6. GM1 and GM2 Gangliosidosis
- 3.7. Mucopolysaccharidoses
- 3.8. Porphyrias
- 3.9. Newborn Screening
- 4. Immunology
 - 4.1. Laboratory Diagnosis of Immune-mediated Diseases
 - 4.2. Primary Immunodeficiency Disorders
 - 4.2.1. Antibodies
 - 4.2.2. Cellular
 - 4.2.3. Multiple types
 - 4.2.3.1. SCID (Severe combined immunodeficiency)
 - 4.3. Phagocytic system
 - 4.3.1. Neutrophils
 - 4.3.2. Leukopenia
 - 4.3.3. Leucocytosis
 - 4.4. Complement pathway
 - 4.4.1. Complement deficiencies
 - 4.5. Intravenous Immunoglobulin
 - 4.6. Multisystem Inflammatory Syndrome of Childhood
- 5. Allergy
 - 5.1. Basis of Allergy
 - 5.2. Allergic rhinitis
 - 5.3. Atopic dermatitis
 - 5.4. Urticaria, Angioedema
 - 5.5. Anaphylaxis
 - 5.6. Asthma
 - 5.7. Serum sickness
 - 5.8. Drug allergies
 - 5.9. Food allergies
- 6. Fluid and Electrolytes
 - 6.1. Body Fluids – Composition, Osmolality

- 6.2. Fluid Therapy - Maintenance, Replacement
- 6.3. Sodium
- 6.4. Potassium
- 6.5. Calcium
- 6.6. Magnesium
- 6.7. Phosphorus
- 6.8. Acid-base Abnormalities

- 7. Therapeutics
 - 7.1. Principles of Drug Therapy
 - 7.2. Administration of Medications
 - 7.3. Pre-anesthesia Checkup
 - 7.4. Procedural sedation
 - 7.5. Analgesia

- 8. Acutely Ill
 - 8.1. Assessment and Triage
 - 8.2. Cardiopulmonary Resuscitation
 - 8.2.1. Basic Life Support
 - 8.2.2. Pediatric Advanced Life Support
 - 8.3. Minor Injuries – Abrasions, Lacerations

- 9. Pediatric Intensive Care
 - 9.1. Shock
 - 9.2. Respiratory Failure
 - 9.3. Pediatric Acute Respiratory Distress Syndrome
 - 9.4. Ventilation – Non-Invasive and Invasive
 - 9.5. Sedation, Analgesia and Paralysis
 - 9.6. Nutrition in Intensive Care
 - 9.7. ECMO
 - 9.8. Concepts of Futility, Do not Resuscitate, Withdrawal of Care
 - 9.9. Palliative Care
 - 9.10. Death

- 10. Toxins
 - 10.1. Clinical Approach to a Poisoned Child
 - 10.2. Poisonings by Common Drugs
 - 10.3. Hydrocarbon Poisoning
 - 10.4. Poisoning in the Household
 - 10.5. Corrosive Poisoning
 - 10.6. Snakebite
 - 10.7. Insect Stings including Bee, Wasp, Scorpion Sting

- 11. Injuries
 - 11.1. Poly Trauma: Stabilization, Triage, and Transport
 - 11.2. Drowning/Submersion Injuries
 - 11.3. Animal-related Injuries

- 11.4. Burn Injuries
- 11.5. Cold Injuries

- 12. Neonatology
 - 12.1. Neonatal Mortality and Morbidities
 - 12.2. Fetal Physiology and Growth
 - 12.3. Maternal Influences on Fetus
 - 12.4. Transition of the Fetus to Newborn
 - 12.5. Intrauterine diagnosis and management of Fetal disease
 - 12.6. Organization of Neonatal Care

- 13. Normal Newborn
 - 13.1. Delivery Room Care of the Newborn
 - 13.2. Newborn Resuscitation
 - 13.3. Assessment of the Newborn
 - 13.4. Care of the Normal Newborn
 - 13.5. Maintenance of Temperature
 - 13.6. Breastfeeding and Lactation Management

- 14. Disorders of Weight and Gestation in Neonates
 - 14.1. Low Birthweight
 - 14.1.1. Feeding of Low-birth weight
 - 14.1.2. Intrauterine Growth Restriction
 - 14.2. Prematurity
 - 14.3. Post term
 - 14.4. Large for Gestational Age

- 15. High-risk Newborn
 - 15.1. Recognition of High-risk neonate
 - 15.2. Multiple-gestational pregnancies
 - 15.3. Birth Injuries
 - 15.4. Perinatal Asphyxia
 - 15.5. Jaundice in the newborn
 - 15.6. Infant of Diabetic Mother
 - 15.7. Neonatal Hypoglycemia
 - 15.8. Anemia and Polycythemia
 - 15.9. The Bleeding Neonate
 - 15.10. Hemorrhagic Disease of the
 - 15.11. Thrombocytopenia in the Newborn
 - 15.12. Cyanosis in the Newborn
 - 15.13. Necrotizing Enterocolitis
 - 15.14. Retinopathy of Prematurity
 - 15.15. Dyselectrolytemia, Hypocalcemia, Hypermagnesemia
 - 15.16. Neonatal Transport
 - 15.17. Follow-up of the High-risk Neonate

- 16. Neonatal Infections

- 16.1. Neonatal Sepsis – Early and Late
- 16.2. Superficial Infections in Neonates
- 16.3. Neonatal Meningitis
- 16.4. Deep-seated Infections in Neonates
- 16.5. Neonatal Tetanus
- 16.6. Intrauterine Infections

17. Neonatal Neurological Problems
 - 17.1. Seizures in the Neonates
 - 17.2. Hypoxic Ischemic Encephalopathy
 - 17.3. Intra-cranial/ventricular Hemorrhage
 - 17.4. Peripheral nerve injuries

18. Neonatal Respiratory Problems
 - 18.1. Approach to a Neonate with Respiratory Distress
 - 18.2. Neonatal Apnea Neonatal Ventilation
 - 18.3. Hyaline Membrane Disease
 - 18.4. Transient Tachypnea of the Newborn
 - 18.5. Meconium Aspiration Syndrome
 - 18.6. Pulmonary Air Leaks in the Newborn
 - 18.7. Persistent Pulmonary Hypertension (PPHN)
 - 18.8. Pulmonary Hemorrhage
 - 18.9. Bronchopulmonary Dysplasia
 - 18.10. Extra pulmonary air leaks

19. Neonatal Cardiac Problems
 - 19.1. Neonate with a murmur
 - 19.2. Patent ductus arteriosus
 - 19.3. Ductus dependent shunts

20. Hematological disorders in Neonates
 - 20.1. Anemia in Neonate
 - 20.2. Hemolytic Disease
 - 20.3. Polycythemia
 - 20.4. Hemorrhagic Disease

21. Congenital Malformations
 - 21.1. Esophageal Atresia and Tracheoesophageal Fistula
 - 21.2. Diaphragmatic Hernia and Eventration
 - 21.3. Gastrointestinal and Abdominal Malformation
 - 21.4. Genitourinary Malformations
 - 21.5. CNS Malformations
 - 21.6. Single Umbilical Artery, Polydactyly, Skin Tags

22. Growth: Normal and Abnormal
 - 22.1. Normal Growth
 - 22.2. Factors Affecting Growth

- 22.3. Assessment of Physical Growth
- 22.4. Disorders of Growth (Failure to Thrive, Overweight and Obesity)
- 22.5. Abnormalities of Stature

- 23. Development and Developmental Delay
 - 23.1. Theories of Development and Behaviour
 - 23.2. Laws of Development
 - 23.3. Factors Affecting Development
 - 23.4. Normal Development
 - 23.5. Screening of Development and Behaviour
 - 23.6. Approach to Diagnosis of Developmental Delay: Developmental Screening and Surveillance
 - 23.7. Global Developmental Delay
 - 23.8. Specific Developmental Delays
 - 23.9. Cerebral Palsy
 - 23.10. Intellectual Disability
 - 23.11. Learning disabilities
 - 23.12. Hearing Impairment
 - 23.13. Mental Retardation

- 24. Behavior and Learning
 - 24.1. Evaluation of Mental Well-Being
 - 24.2. Psychosocial assessments
 - 24.3. Technology Dependence
 - 24.4. Bullying
 - 24.5. Common Behavioral Problems
 - 24.6. Tantrums and Breath-Holding
 - 24.7. Enuresis and Encopresis
 - 24.8. Sleep Medicine
 - 24.9. Common Speech, Language, and Communication Disorders
 - 24.10. Learning Disorders
 - 24.11. Dyslexia
 - 24.12. Attention-Deficit Hyperactivity Disorder
 - 24.13. Oppositional Defiant and Conduct Disorders
 - 24.14. Autism Spectrum Disorder
 - 24.15. Rett Syndrome
 - 24.16. Anorexia Nervosa and Bulimia
 - 24.17. Anxiety Disorders
 - 24.18. Suicide
 - 24.19. Management of Psychological Illness

- 25. Nutrition and Nutritional Disorders
 - 25.1. Nutritional Requirements
 - 25.2. Nutritive Values of Indian Foods
 - 25.3. Infant and Young Child Feeding
 - 25.4. Adolescent Feeding
 - 25.5. Feeding during Childhood and Food Allergy
 - 25.6. Undernutrition: Prevalence and Etiology

- 25.7. Pathophysiology of Undernutrition
- 25.8. Malnutrition – Moderate and Severe Acute
- 25.9. Vitamin A
- 25.10. Vitamin B Complex
- 25.11. Vitamin C and Scurvy
- 25.12. Vitamin D, Nutritional Rickets, and Hypervitaminosis D
- 25.13. Iodine Deficiency Disorders
- 25.14. Zinc in Child Health
- 25.15. Trace Elements in Nutrition and Health
- 25.16. Fluorosis
- 25.17. Nutritional Rehabilitation including Diet Prescription
- 25.18. Enteral and Parenteral Nutrition
- 25.19. National Nutrition Programs

- 26. Immunization
 - 26.1. Basic Concepts of Vaccination
 - 26.2. Vaccine Administration Practices
 - 26.3. Scheduling of Vaccines
 - 26.4. Vaccine Storage and Cold Chain
 - 26.5. Adverse Events following Immunization
 - 26.6. BCG Vaccine
 - 26.7. Poliovirus Vaccines
 - 26.8. Diphtheria, Tetanus, and Pertussis Vaccines
 - 26.9. Hepatitis B Vaccine
 - 26.10. Haemophilus Influenzae Type B (HIB) Vaccines
 - 26.11. Measles Vaccine
 - 26.12. Rubella Vaccines
 - 26.13. Mumps Vaccine
 - 26.14. Typhoid Fever Vaccines
 - 26.15. Japanese Encephalitis Vaccine
 - 26.16. Rabies Vaccines
 - 26.17. Pneumococcal Vaccines
 - 26.18. Rotavirus Vaccines
 - 26.19. Cholera Vaccines
 - 26.20. Varicella Vaccine
 - 26.21. Hepatitis A Vaccine
 - 26.22. Meningococcal Vaccine
 - 26.23. Seasonal and Pandemic Influenza Vaccines
 - 26.24. Human Papillomavirus Vaccines
 - 26.25. Dengue Vaccines
 - 26.26. Yellow Fever Vaccine
 - 26.27. Combination Vaccines
 - 26.28. Covid-19 Vaccines
 - 26.29. Immunization in Special Situations

- 27. Adolescence
 - 27.1. Gender, Sexual Identity and Sexuality
 - 27.2. Psychosocial Development

- 28. Health Issues in Adolescence
 - 28.1. Factors Influencing Adolescent Health
 - 28.2. Adolescent Nutrition
 - 28.3. Mental Health
 - 28.4. Injuries, Violence, and Suicide
 - 28.5. Menstrual Disorders
 - 28.6. Polycystic Ovary Syndrome
 - 28.7. Teenage Pregnancy
 - 28.8. Sexually Transmitted Infections
 - 28.9. Substance Abuse
 - 28.9.1. Alcohol
 - 28.9.2. Tobacco
 - 28.9.3. Other substances
- 29. Care of the Adolescents
 - 29.1. Adolescent Counseling
 - 29.2. Promoting Health of Adolescents
 - 29.3. Adolescent Friendly Health Services
- 30. Infectious Diseases
 - 30.1. Epidemiology of Infectious Diseases
 - 30.2. Laboratory Diagnosis of Infection
 - 30.3. Microbiome and Child Health
 - 30.4. Antimicrobial Resistance
 - 30.5. Infection Control and Prevention
- 31. Fever
 - 31.1. Fever: General Principles of Management
 - 31.2. Fever with/without focus
 - 31.3. Fever of Unknown Origin
 - 31.4. Infections in Immunocompromised conditions
- 32. Bacterial Infections
 - 32.1. Natural History of Bacterial Infection
 - 32.2. Principles of Antibiotic Therapy
 - 32.3. Gram Positive Infections
 - 32.3.1. Streptococcal Infections
 - 32.3.1.1. Pneumococcal Infections
 - 32.3.1.2. Streptococcal Group A
 - 32.3.1.3. Streptococcal Group B
 - 32.3.1.4. Streptococcal Non A, Non B
 - 32.3.2. Staphylococcal Infections
 - 32.3.3. Enterococcus
 - 32.3.4. Diphtheria
 - 32.3.5. Nocardiosis
 - 32.3.6. *Listeria monocytogenes*
 - 32.3.7. Actinomycosis

- 32.4. Gram Negative Infections
 - 32.4.1. Haemophilus influenzae
 - 32.4.2. Neisseria
 - 32.4.3. Pseudomonas
 - 32.4.4. Pertussis
 - 32.4.5. Salmonella
 - 32.4.5.1. Nontyphoidal Salmonellosis
 - 32.4.5.2. Enteric Fever
 - 32.4.6. Shigella
 - 32.4.7. Escherichia coli
 - 32.4.8. Cholera
 - 32.4.9. Campylobacter
 - 32.4.10. Yersinia
 - 32.4.11. Aeromonas
 - 32.4.12. Brucella
 - 32.4.13. Moraxella catarrhalis
 - 32.4.14. Helicobacter pylori
- 32.5. Anaerobic Bacterial
 - 32.5.1. Clostridium tetani
 - 32.5.2. Clostridium botulinum
 - 32.5.3. Clostridium difficile
- 32.6. Spirochetal Infections
 - 32.6.1. Treponema pallidum
 - 32.6.2. Leptospirosis
 - 32.6.3. Borrelia
 - 32.6.3.1. Lyme
 - 32.6.3.2. Relapsing Fever
- 32.7. Mycoplasma
 - 32.7.1. Mycoplasma pneumoniae
- 32.8. Chlamydia
 - 32.8.1. Chlamydia pneumoniae
 - 32.8.2. Chlamydia trachomatis
 - 32.8.3. Psittacosis
- 32.9. Rickettsia
 - 32.9.1. Spotted Fever
 - 32.9.2. Scrub Typhus
 - 32.9.3. Typhus
 - 32.9.4. Ehrlichiosis
 - 32.9.5. Q fever
- 33. Mycobacterial Infections
 - 33.1. Childhood Tuberculosis: Epidemiology, Pathogenesis, Clinical Features, and Prevention

- 33.2. Diagnostic Tools for Tuberculosis in Children
 - 33.3. Antitubercular Drugs and RNTCP
 - 33.4. Guidelines for Childhood Tuberculosis
 - 33.5. Drug Resistant Tuberculosis
 - 33.6. Atypical Mycobacterial Infections
 - 33.7. Leprosy
34. Viral Diseases
- 34.1. Epidemiology of Viral Infections
 - 34.2. Principles of Antiviral Drugs
 - 34.3. Measles
 - 34.4. Mumps
 - 34.5. Rubella
 - 34.6. Roseola
 - 34.7. Epstein-Barr
 - 34.8. Cytomegalovirus
 - 34.9. Influenza
 - 34.10. Parainfluenza
 - 34.11. Respiratory syncytial virus
 - 34.12. Human metapneumovirus
 - 34.13. Rhinovirus
 - 34.14. Adenovirus
 - 34.15. Coronavirus
 - 34.16. Rotavirus
 - 34.17. Human Papillomavirus
 - 34.18. Arbovirus
 - 34.18.1. Japanese Encephalitis
 - 34.18.2. Other Encephalitis
 - 34.18.3. Tick-borne Encephalitis
 - 34.18.4. Chikungunya
 - 34.18.5. Zika
 - 34.19. Varicella-zoster
 - 34.20. Herpes Simplex
 - 34.21. Rabies
 - 34.22. Parvovirus Infections
 - 34.23. NonpolioEnteroviral Infections
 - 34.24. Poliomyelitis
 - 34.25. Viral Hepatitis
 - 34.26. HIV
 - 34.27. Human Lymphotropic 1 and 2
 - 34.28. Dengue
 - 34.29. Yellow Fever
 - 34.30. Ebola, Hanta
 - 34.31. Rabies
 - 34.32. Viral Hemorrhagic Fevers
 - 34.33. Covid-19
35. Protozoal Disease

- 35.1. Epidemiology of Parasitic Infections
- 35.2. Principles of Antiparasitic therapy
- 35.3. Malaria
- 35.4. Leishmaniasis
- 35.5. Giardiasis
- 35.6. Amebiasis
- 35.7. Filariasis
- 35.8. Cryptosporidiosis
- 35.9. Toxoplasmosis
- 35.10. Helminthiasis
 - 35.10.1. Hookworm Infestation
 - 35.10.2. Ascariasis
 - 35.10.3. Trichuriasis
 - 35.10.4. Enterobiasis
 - 35.10.5. Strongyloidiasis
 - 35.10.6. Tapeworm Diseases
 - 35.10.7. Cysticercosis
 - 35.10.8. Trichinosis
 - 35.10.9. Toxocara
 - 35.10.10. Intestinal, Liver, and Lung Flukes
 - 35.10.11. Hydatid Disease: Echinococcosis
 - 35.10.12. Schistosomiasis

36. Fungal Infections

- 36.1. Fungi
- 36.2. Principles of Antifungal Therapy
- 36.3. Candidiasis
- 36.4. Aspergillosis
- 36.5. Malassezia
- 36.6. Cryptococcosis
- 36.7. Coccidioidomycosis
- 36.8. Blastomycosis
- 36.9. Histoplasmosis
- 36.10. Mucormycosis
- 36.11. Pneumocystis Jirovecii

37. Diarrheal Illnesses

- 37.1. Acute Watery Diarrhea
- 37.2. Dysentery
- 37.3. Cholera
- 37.4. Persistent Diarrhea
- 37.5. Chronic *Diarrhea*
- 37.6. Antibiotic Associated Diarrhea

38. **Gastrointestinal Disorders**

- 38.1. Anatomy and Physiology
- 38.2. Common Symptoms of Gastrointestinal Diseases
- 38.3. Oral Cavity disorders

- 38.3.1. Malocclusion
- 38.3.2. Dental Caries
- 38.3.3. Periodontal disease
- 38.3.4. Common lesions of soft palate
- 38.3.5. Cleft Lip and Cleft Palate
- 38.3.6. Diseases of Salivary Glands
- 38.4. Esophageal atresia, Tracheoesophageal Fistula
- 38.5. Disorders of Esophageal Motility
- 38.6. Gastroesophageal Reflux
- 38.7. Esophagitis
- 38.8. Hiatal Hernia
- 38.9. Ingestions
 - 38.9.1. Foreign Body
 - 38.9.2. Caustic
- 38.10. Infantile Hypertrophic Pyloric Stenosis, Volvulus, Duplication
- 38.11. Duodenal Obstruction
- 38.12. Malrotation
- 38.13. Intestinal duplication
- 38.14. Meckel Diverticulum
- 38.15. Chronic obstructive pseudoobstruction
- 38.16. Chronic Abdominal Pain—Functional Abdominal Pain
- 38.17. Acid Peptic Disease
- 38.18. Pancreas – Function, Tests
 - 38.18.1. Pancreatitis
 - 38.18.2. Treatment of Pancreatic insufficiency
- 38.19. Constipation
- 38.20. Hirschsprung Disease
- 38.21. Malabsorption Disorders
 - 38.21.1. Assessment
 - 38.21.2. Celiac
 - 38.21.3. Enzyme Deficiencies
- 38.22. Inflammatory Bowel Disease
- 38.23. Intestinal Obstruction
- 38.24. Intussusception
- 38.25. Appendicitis
- 38.26. Abdominal Tuberculosis
- 38.27. Ascites
- 38.28. Umbilical Hernia
- 38.29. Inguinal Hernia
- 38.30. Testicular Torsion
- 38.31. Anorectal Disorders
 - 38.31.1. Anal Fissure
 - 38.31.2. Hemorrhoids
 - 38.31.3. Prolapse

- 38.31.4. Pilonidal sinus
- 38.31.5. Anorectal malformations

38.32. Cyclic vomiting

39. **Hepatobiliary Diseases**

- 39.1. Liver Function Tests
- 39.2. Neonatal Cholestasis
- 39.3. Portal Hypertension
- 39.4. Gastrointestinal Bleeding
- 39.5. Metabolic Liver disease

39.5.1. Wilson

39.5.2. Others

- 39.6. Liver Abscess
- 39.7. Viral Hepatitis
- 39.8. Chronic Liver Disease
- 39.9. Acute Liver Failure
- 39.10. Autoimmune Hepatitis
- 39.11. Drug induced Hepatitis
- 39.12. Cystic disease of Liver
- 39.13. Liver transplantation
- 39.14. Liver Tumors
- 39.15. Peritoneum

39.15.1. Ascites

39.15.2. Peritonitis

39.16. Epigastric hernia

40. Disorders of **Hematopoietic System**

- 40.1. The Hematopoietic System
- 40.2. Anemia: Etiology and Classification
- 40.3. Inadequate Production
 - 40.3.1. Physiological anemia of infancy
 - 40.3.2. Congenital Bone Marrow Failure
 - 40.3.3. Aplastic Anemia
 - 40.3.4. Iron Deficiency Anemia
 - 40.3.5. Megaloblastic Anemia
 - 40.3.6. Anemia of Chronic disease
 - 40.3.7. Congenital dyserythropoietic anemia

40.4. Hemolytic Anemia

40.4.1. Hemoglobinopathies

40.4.1.1. Sickle Cell Disease

40.4.1.2. Thalassemia

40.4.2. RBC Membrane Defects

40.4.3. Red Blood Cell Enzyme Defects

40.4.4. Immune Hemolytic Anemia

- 40.5. Polycythemia
- 40.6. Hemorrhagic and Thrombotic disorders
 - 40.6.1. Coagulation Disorders
 - 40.6.2. Hemophilia
 - 40.6.3. Other Clotting Factor Deficiencies
 - 40.6.4. Von Willebrand Disease
 - 40.6.5. Thrombotic disorders
 - 40.6.6. Disseminated Intravascular Coagulation
- 40.7. Platelet
 - 40.7.1. Immune Thrombocytopenia
 - 40.7.2. Hemolytic Uremic Syndrome
 - 40.7.3. Thrombotic Thrombocytopenic Purpura
 - 40.7.4. Kasabach- Merritt Syndrome
 - 40.7.5. Platelet Function Defects
- 40.8. Blood Component Therapy
- 40.9. Spleen
 - 40.9.1. Splenomegaly
 - 40.9.2. Splenectomy
- 40.10. Lymphatics
 - 40.10.1. Lymphadenopathy
- 41. **Respiratory Diseases**
 - 41.1. Congenital Malformations of the Upper Respiratory Tract
 - 41.2. Epistaxis
 - 41.3. Nasal Polyps
 - 41.4. Allergic Rhinitis
 - 41.5. Otitis Media
 - 41.6. Common Cold
 - 41.7. Acute Pharyngitis
 - 41.8. Retropharyngeal abscess
 - 41.9. Sinusitis
 - 41.10. Tonsils and Adenoids
 - 41.11. Community Acquired Pneumonia
 - 41.12. Pleural effusion, Empyema
 - 41.13. Bronchiectasis
 - 41.14. Pneumothorax, Pneumomediastinum, Pyopneumothorax
 - 41.15. Skeletal deformities of Chest
 - 41.16. Obstructive Sleep Apnea
 - 41.17. Congenital Malformations of the Respiratory Tract
 - 41.18. Congenital disorders of Lung
 - 41.19. Croup, Epiglottitis, Laryngitis, Tracheitis
 - 41.20. Bronchiolitis
 - 41.21. Alpha-1 Antitrypsin Deficiency

- 41.22. Aspiration Syndromes
- 41.23. Preschool Wheeze and Bronchial Asthma
- 41.24. Aerosol Therapy
- 41.25. Pneumonia
- 41.26. Parapneumonic Effusion and Empyema
- 41.27. Pneumothorax and Air Leaks
- 41.28. Persistent and Recurrent Pneumonia
- 41.29. Interstitial Lung Disease
- 41.30. Hemoptysis and Alveolar Bleeds
- 41.31. Primary Ciliary Dyskinesia
- 41.32. Cystic Fibrosis
- 41.33. Bronchiectasis
- 41.34. Lung Abscess
- 41.35. Foreign Body Aspiration
- 41.36. Central Hypoventilation
- 41.37. Acute Respiratory Distress Syndrome
- 41.38. SIDS

42. **Cardiovascular Disorders**

- 42.1. Genetic Basis of Heart Diseases
- 42.2. Chest Skiagram in Heart Disease
- 42.3. Electrocardiogram
- 42.4. Echocardiography
- 42.5. Congestive Heart Failure
- 42.6. Cardiac Malposition
- 42.7. Acyanotic Congenital Heart Disease, Left to Right shunt
 - 42.7.1. Ventricular Septal Defects
 - 42.7.2. Patent DuctusArteriosus
 - 42.7.3. Atrial Septal Defects
 - 42.7.4. PAPVC
 - 42.7.5. Atrioventricular Septal Defects
- 42.8. Acyanotic Congenital Heart Disease, Obstructive
 - 42.8.1. Pulmonary Valve Stenosis
 - 42.8.2. Coarctation of Aorta
 - 42.8.3. Pulmonary Venous Hypertension
- 42.9. Acyanotic Congenital Heart Disease, Regurgitation
 - 42.9.1. Mitral Valve Prolapse
- 42.10. Cyanotic Congenital Heart Disease, reduced Pulmonary flow
 - 42.10.1. Tetralogy of Fallot and Variants
 - 42.10.2. Tricuspid Atresia
 - 42.10.3. Double outlet Right Ventricle
 - 42.10.4. Ebstein Anomaly
- 42.11. Cyanotic Congenital Heart Disease, Increased Pulmonary flow

- 42.11.1. Transposition of Great Arteries and variants
- 42.11.2. Truncus Arteriosus
- 42.11.3. TAPVC
- 42.11.4. Hypoplastic Left Heart Syndrome
- 42.12. Others
 - 42.12.1. Anomalies of the Aortic Arch
 - 42.12.2. Pulmonary Arterial Hypertension
- 42.13. Acquired Heart Disease
 - 42.13.1. Acute Rheumatic Fever
 - 42.13.2. Rheumatic Heart Disease
 - 42.13.3. Infective Endocarditis
 - 42.13.4. Myocardial Diseases: Myocarditis and Cardiomyopathies
 - 42.13.5. Diseases of the Pericardium
 - 42.13.6. Kawasaki disease
- 42.14. Cardiac Arrhythmias
- 42.15. Cardiac Emergencies
- 42.16. Heart Failure
- 42.17. Systemic Hypertension
- 43. **Disorders of the Kidney and Urinary Tract**
 - 43.1. Investigations for Kidneys and Urinary Tract
 - 43.2. Congenital Anomalies of Kidneys and Urinary Tract
 - 43.2.1. Cystic Kidney Diseases
 - 43.3. Glomerular Disease
 - 43.3.1. Glomerulonephritis
 - 43.3.1.1. Acute Poststreptococcal Glomerulonephritis
 - 43.3.1.2. Membranous Nephropathy
 - 43.3.1.3. Membranoproliferative Glomerulonephritis
 - 43.3.1.4. Rapidly Progressive Glomerulonephritis
 - 43.3.2. IgA nephropathy
 - 43.3.3. Alport syndrome
 - 43.4. Systemic Vasculitis and Lupus Nephritis
 - 43.5. Goodpasture Disease
 - 43.6. Henoch-Schönlein Purpura Nephritis
 - 43.7. Hemolytic Uremic Syndrome
 - 43.8. Toxic Nephropathy
 - 43.9. Tubulointerstitial Disease
 - 43.9.1. Pyelonephritis
 - 43.9.2. Tubulointerstitial nephritis
 - 43.9.3. Papillary necrosis
 - 43.9.4. Acute Tubular Necrosis
 - 43.10. Vascular Disease

- 43.10.1. Renal vein Thrombosis
- 43.10.2. Hypercalciuria
- 43.10.3. Nephrocalcinosis

43.11. Infections

- 43.11.1. Urinary Tract Infection
- 43.11.2. Cystitis
- 43.11.3. Urethritis
- 43.11.4. Hemorrhagic cystitis
- 43.11.5. Pyelonephritis

43.12. Proteinuria

- 43.12.1. Transient, Orthostatic
- 43.12.2. Nephrotic Syndrome

43.13. Tubular Disorders

- 43.13.1. Renal Tubular Disorders
- 43.13.2. Nephrogenic Diabetes Insipidus
- 43.13.3. Bartter Syndrome
- 43.13.4. Gitelman Syndrome

43.14. Renal Failure

- 43.14.1. Acute Kidney Injury
- 43.14.2. Chronic Kidney disease
- 43.14.3. End-stage renal disease
- 43.14.4. Renal Replacement Therapy
- 43.14.5. Renal Transplantation

43.15. Renal Calculi

43.16. Refractory Rickets

43.17. Hypertension

43.18. Vesicoureteral Reflux

43.19. Voiding Disorders

43.20. Penile anomalies

44. **Gynecological Issues**

- 44.1. Vaginal bleeding in prepubertal children
- 44.2. Breast concerns
- 44.3. Female genital mutilation

45. **Neurological Disorders**

- 45.1. Approach to Neurological Disorders including localization
- 45.2. Cerebrospinal Fluid and Neurophysiology
- 45.3. Neuroimaging
- 45.4. Congenital Anomalies

- 45.4.1. Neural Tube Defects and Spinal Cord Malformations

- 45.4.2. Microcephaly
 - 45.4.3. Brain Malformations
 - 45.4.4. Hydrocephalus
 - 45.4.5. Craniosynostosis
 - 45.5. Seizures
 - 45.5.1. Febrile Seizures
 - 45.5.2. Unprovoked Seizures and Epilepsy
 - 45.5.2.1. Generalized
 - 45.5.2.2. Focal
 - 45.5.2.3. Reflex Seizures
 - 45.5.3. Treatment of Seizures
 - 45.5.4. Status Epilepticus
 - 45.5.5. Nonepileptic Paroxysmal Disorders
 - 45.6. Headaches
 - 45.6.1. Migraine
 - 45.6.2. Tension Headache
 - 45.6.3. Secondary Headaches
 - 45.7. Neurocutaneous Syndromes
 - 45.8. Movement Disorders
 - 45.9. Encephalopathies
 - 45.9.1. Cerebral Palsy
 - 45.9.2. Autoimmune
 - 45.9.3. Mitochondrial
 - 45.10. Neurodegenerative Disorders
 - 45.10.1. Grey versus White Matter
 - 45.10.2. Sphingolipidosis
 - 45.10.3. Neuronal CeroidLipofuscinoses
 - 45.10.4. Adrenoleucodystrophy
 - 45.11. Demyelinating Disorders
 - 45.11.1. Acute Disseminated Encephalomyelitis
 - 45.11.2. Optic Neuritis
 - 45.11.3. Transverse Myelitis
 - 45.11.4. Multiple Sclerosis
 - 45.11.5. Autoimmune and Paraneoplastic
 - 45.12. Stroke
 - 45.12.1. Arterial versus Venous
 - 45.13. CNS Vasculitis
 - 45.14. CNS Infections
 - 45.14.1. Acute Pyogenic Meningitis
 - 45.14.2. Tuberculosis of the Central Nervous
- System

- 45.14.3. Viral Meningoencephalitis
- 45.14.4. Neurocysticercosis
- 45.14.5. Brain Abscess
- 45.15. PseudotumorCerebri
- 45.16. Coma and Raised Intracranial Pressure
- 45.17. Brain Death
- 45.18. Infantile Tremor Syndrome
- 45.19. Neurometabolic Disorders
- 45.20. Spinal Cord Disorders
- 45.21. Traumatic Brain Injury
- 45.22. Neuro-Rehabilitation
 - 45.22.1. Traumatic Brain Injury
 - 45.22.2. Spinal cord Injury
 - 45.22.3. Spasticity
 - 45.22.4. Brachial plexus injury
 - 45.22.5. Meningomyelocele
 - 45.22.6. Disabled Child
- 46. **Neuromuscular Disorders**
 - 46.1. Approach to Diagnosis of Neuromuscular Disorders
 - 46.2. Floppy Infant
 - 46.3. Congenital Muscle Disorders
 - 46.3.1. Congenital Myopathies
 - 46.3.2. Arthrogryposis
 - 46.4. Muscular Dystrophies
 - 46.4.1. Duchenne and Becker Muscular Dystrophy
 - 46.4.2. Myotonic Muscular Dystrophy
 - 46.4.3. Limb Girdle Muscular Dystrophy
 - 46.4.4. Fascio-scapulo-humeral Muscular Dystrophy
 - 46.5. Endocrine/Toxic Myopathies
 - 46.6. Metabolic Myopathies
 - 46.6.1. Periodic Paralysis
 - 46.6.2. Glucogenoses
 - 46.6.3. Mitochondrial
 - 46.6.4. Lipid
 - 46.7. Neuromuscular Transmission Disorders
 - 46.7.1. Myasthenia Gravis
 - 46.7.2. Spinal Muscular Atrophy
 - 46.7.3. Motor Neuron Disease
 - 46.8. Hereditary Motor Sensory Neuropathies
 - 46.8.1. Peroneal Muscular Atrophy
 - 46.8.2. Refsum Disease
 - 46.8.3. Fabry Disease
 - 46.8.4. Leukodystrophy

46.8.5. Acute Flaccid Paralysis

- 46.9. Toxic Neuropathies
- 46.10. Autonomic Neuropathy
- 46.11. Guillain-Barré Syndrome
- 46.12. Bell Palsy

47. **Disorders of the Endocrine System**

- 47.1. Physiology of Neuroendocrinology
- 47.2. Hypopituitarism
 - 47.2.1. Growth Hormone Deficiency and Resistance
 - 47.2.2. Polyuria, Diabetes Insipidus and Syndrome of Inappropriate Secretion of ADH
- 47.3. Thyroid Disorders
 - 47.3.1. Thyroid Hormone Physiology
 - 47.3.2. Hypothyroidism
 - 47.3.3. Thyroiditis
 - 47.3.4. Hyperthyroidism
 - 47.3.5. Goiter and Thyroid Nodules
 - 47.3.6. Newborn Screening for Congenital Hypothyroidism
- 47.4. Parathyroid Disorders
 - 47.4.1. Bone Mineral and Hormone Physiology
 - 47.4.2. Calcium Disorders
 - 47.4.3. Metabolic Rickets
 - 47.4.4. Disorders with Bone Fragility
 - 47.4.5. Hypoparathyroidism
 - 47.4.6. Pseudo hypothyroidism
 - 47.4.7. Hyperparathyroidism
- 47.5. Pubertal Development
 - 47.5.1. Normal Puberty
 - 47.5.2. Delayed Puberty
 - 47.5.3. Precocious Puberty
- 47.6. Adrenal Gland Disorders
 - 47.6.1. Normal Development and Physiology of the Adrenal Gland
 - 47.6.2. Congenital Adrenal Hyperplasia
 - 47.6.3. Adrenal Insufficiency
 - 47.6.4. Cushing Syndrome
 - 47.6.5. Primary Aldosteronism
 - 47.6.6. Pheochromocytoma
- 47.7. Gonad Disorders
 - 47.7.1. Testicular Hypofunction
 - 47.7.2. Ovarian Hypofunction
 - 47.7.3. Gynecomastia
 - 47.7.4. Disorders of Sex Development

- 47.7.5. Cryptorchidism and Micropenis
- 47.8. Glucocorticoid Use and Withdrawal
- 47.9. Diabetes Mellitus
 - 47.9.1. Classification of Diabetes Mellitus
 - 47.9.2. Type 1 Diabetes Mellitus
 - 47.9.3. Type 2 Diabetes Mellitus
 - 47.9.4. Acute and Chronic Complications of Diabetes Mellitus
- 47.10. Monogenic Obesity
- 47.11. Hyperlipidemia
- 47.12. Endocrine Consequences of Thalassemia Major
- 47.13. Endocrine Effects of Radiation and Cancer Chemotherapy
- 47.14. Adult Consequences of IUGR and Preterm Birth
- 48. Malignancies in Children
 - 48.1. Epidemiology and Biology of Cancers
 - 48.2. Principles of Diagnosis and Therapy of Cancer
 - 48.3. Leukemias
 - 48.3.1. Acute Lymphoblastic Leukemia
 - 48.3.2. Acute Myelogenous Leukemia
 - 48.3.3. Chronic Myelogenous Leukemia
 - 48.3.4. Infantile Leukemia
 - 48.4. Lymphoma
 - 48.4.1. Hodgkin Lymphoma
 - 48.4.2. Non-Hodgkin Lymphoma
 - 48.5. Brain Tumors
 - 48.6. Neuroblastoma
 - 48.7. Wilms Tumor
 - 48.8. Soft Tissue Tumors
 - 48.9. Bone Tumors
 - 48.10. Retinoblastoma
 - 48.11. Gonadal, Germ cell neoplasms
 - 48.12. Hemangioma
 - 48.13. Lymphangiomas, Cystic Hygromas
 - 48.14. Thyroid Tumours
 - 48.15. Nasopharyngeal Carcinoma
 - 48.16. Adrenal Tumours
 - 48.17. Histiocytosis
 - 48.17.1. LCH
 - 48.17.2. Hemophagocytic Lymphohistiocytosis
 - 48.18. Oncological Emergencies and Supportive Care
 - 48.19. Hematopoietic Stem Cell Transplant
- 49. **Rheumatological Disorders**

- 49.1. Approach to a Child with Rheumatological Disorder
- 49.2. Laboratory Investigations for Rheumatological Disorders
- 49.3. Drugs and Principles of Management for Rheumatic Disorders
- 49.4. Juvenile Idiopathic Arthritis
- 49.5. Reactive, Post-Infectious Arthritis
- 49.6. Systemic Lupus Erythematosus: Clinical Features and Diagnostic Criteria
- 49.7. Management of Systemic Lupus Erythematosus
- 49.8. Juvenile Dermatomyositis
- 49.9. Large Vessel Vasculitis: Takayasu Arteritis
- 49.10. Medium Vessel Vasculitis: Kawasaki Disease and Polyarteritis Nodosa
- 49.11. Small Vessel Vasculitis: Henoch-Schönlein Purpura and ANCA Associated Vasculitis
- 49.12. Juvenile Scleroderma
- 49.13. Antiphospholipid Syndrome
- 49.14. Growing Pains
- 50. Common **Eye Abnormalities**
 - 50.1. Common Visual Problems
 - 50.2. Congenital Anomalies
 - 50.3. Refractive Errors
 - 50.4. Cornea and Conjunctiva
 - 50.5. Uveitis
 - 50.6. Cataract and Lens
 - 50.7. Glaucoma
 - 50.8. Optic Nerve and Pupil
 - 50.9. Strabismus and Motility Disorders
 - 50.10. Eyelid, Orbit, and Lacrimal Sac
 - 50.11. Ocular Injuries
 - 50.12. Orbital Infections
 - 50.13. Ocular Manifestations of Systemic Disorders
- 51. Common **ENT Problems**
 - 51.1. Hearing Loss
 - 51.2. Congenital malformations of Ear
 - 51.3. External Otitis
 - 51.4. Otitis Media
 - 51.5. Mastoiditis
 - 51.6. Inner Ear
- 52. Common **Skin Problems**
 - 52.1. S
kin of the Newborn: Physiological and Pathological Changes
 - 52.2. Care of Skin in the Newborn
 - 52.3. Infections and Infestations
 - 52.4. Congenital Cutaneous Malformations
 - 52.5. Vitiligo and Other Hypopigmentary Diseases
 - 52.6. Atopic Dermatitis
 - 52.7. Contact Dermatitis

- 52.8. Urticaria and Mastocytosis
- 52.9. Psoriasis, Gianotti-Crosti Syndrome
- 52.10. Acanthosis Nigra
- 52.11. Cutaneous Drug Reactions
- 52.12. Cutaneous Manifestations of Nutritional Deficiency
- 52.13. Cutaneous Manifestations of Collagen Vascular Diseases
- 52.14. Neurocutaneous Syndromes
- 52.15. Vesiculobullous Disorders
- 52.16. Papulosquamous Disorders
- 52.17. Ichthyosis
- 52.18. Genetic Cutaneous Disorders
- 52.19. Hair Disorders
- 52.20. Nail Disorders
- 52.21. Infections of Skin
 - 52.21.1. Impetigo
 - 52.21.2. Subcutaneous Infections
 - 52.21.3. Staphylococcal Scalded Skin Syndrome
 - 52.21.4. Ecthyma
 - 52.21.5. Fungal Infections
 - 52.21.6. Viral Infections
 - 52.21.7. Arthropod bites
 - 52.21.8. Scabies
 - 52.21.9. Pediculosis
 - 52.21.10. Acne

53. **Disorders of Bones and Joints**

- 53.1. Assessment of the Locomotor System
- 53.2. Deformities of Foot and Toes
 - 53.2.1. Congenital Talipes Equinovarus
- 53.3. Torsional deformities of Limb
- 53.4. Leg Length discrepancies
- 53.5. Transient Monoarticular synovitis
- 53.6. Legg-Calvé-Perthes Disease
- 53.7. Neck Problems
 - 53.7.1. Torticollis
 - 53.7.2. Cervical anomalies
- 53.8. Scoliosis and Kyphosis
- 53.9. Developmental Dysplasia of the Hip (DDH)
- 53.10. Osteomyelitis
- 53.11. Septic Arthritis
- 53.12. Osgood-Schlatter Disease
- 53.13. Arthrogyrosis
- 53.14. Injuries to Bones/Joints
- 53.15. Skeletal Dysplasia
- 53.16. Osteogenesis imperfecta
- 53.17. Marfan Syndrome
- 53.18. Metabolic Bone Disease

- 53.18.1. Hypo/Hyperphosphatemia
- 53.18.2. Osteoporosis

- 54. Vulnerable Children
 - 54.1. Street Children
 - 54.2. Child Labor
 - 54.3. Child Abuse and Neglect
 - 54.4. Adoption: Medical and Legal Issues
 - 54.5. Rights of the Child

- 55. Environmental Health
 - 55.1. Climate Change and its impact on Health
 - 55.2. Air Pollution and its impact on Health
 - 55.3. Biomedical Waste Management

- 56. Community Pediatrics
 - 56.1. Indicators of Child Health
 - 56.2. Environment and Child Health
 - 56.3. Lead Poisoning
 - 56.4. Adoption
 - 56.5. Travel Medicine
 - 56.6. Protection of Children from Sexual Offences ACT 2012
 - 56.7. Rights of People With Disability Act 2016
 - 56.8. National Programs for Child Health as relevant to National Health Mission including RBSK.
 - 56.9. Integrated Management of Neonatal and Childhood Illness-Facility (IMNCI-F)
 - 56.10. Investigation of an Outbreak

- 57. Quality Assessment and Improvement
 - 57.1.1. Point of Care Quality Improvement

B. Psychomotor Domain

- *Should be able to perform independently in the practice of Paediatrics, the following diagnostic and therapeutic interventions as listed below:*

1. Physical Examination

- 1.1. Measurement of Vitals
- 1.2. Measurement of Anthropometry
- 1.3. General physical examination
- 1.4. Physical Examination of Systems
- 1.5. Development (Screening) Assessment
- 1.6. Behavioral (Screening) Assessment
- 1.7. Sexual Maturity Assessment
- 1.8. Newborn Assessment including gestational assessments
- 1.9. Breastfeeding Assessment of Position and Attachment
- 1.10. Motor Disability Assessment

- 1.11. Autism Spectrum Disorder Screening
- 1.12. Fundus examination
- 1.13. Middle ear examination
- 1.14. Throat examination
- 1.15. Triage - Rapid assessment of Airway, Breathing and Circulation
- 1.16. Hand hygiene
- 1.17. Biomedical Waste disposal guidelines

2. Non-Invasive Monitoring

- 2.1. Pulse oximetry
- 2.2. Electrocardiogram
- 2.3. Vital Data Monitor

3. Procedures – Diagnostic

- 3.1. Informed Consent
- 3.2. Aseptic measures for all invasive procedures
- 3.3. Sampling
 - 3.3.1. Venous blood
 - 3.3.2. Arterial blood
 - 3.3.3. Capillary blood
- 3.4. Vascular Access and cannulation
 - 3.4.1. Intravenous – Peripheral
 - 3.4.2. Intravenous - Central
 - 3.4.3. Intraosseous
 - 3.4.4. Intraarterial
 - 3.4.5. Umbilical Vein
- 3.5. Diagnostic Taps
 - 3.5.1. Pleural
 - 3.5.2. Peritoneal
 - 3.5.3. CSF
 - 3.5.4. Pericardial
 - 3.5.5. Joint fluid
 - 3.5.6. Subdural
 - 3.5.7. Ventricular
- 3.6. Urinary Catheterization
- 3.7. Urine collection
 - 3.7.1. Mid-stream sampling
 - 3.7.2. Catheter sampling
 - 3.7.3. Suprapubic puncture
- 3.8. Tuberculin Skin Test
- 3.9. Antibiotic Test Dose
- 3.10. Feeding/Ryles Tube
 - 3.10.1. Insertion

- 3.10.2. Gastric Aspiration
- 3.10.3. Feeds
- 3.10.4. Stomach wash
- 3.11. Respiratory
 - 3.11.1. Naso, Pharyngeal and Nasopharyngeal swab collection
- 3.12. Suppository insertion
- 3.13. Per rectal exam
- 3.14. Inspection of Vulva/Vagina
- 3.15. Aspiration/Biopsy
 - 3.15.1. Bone marrow
 - 3.15.2. Liver
 - 3.15.3. Kidney
 - 3.15.4. FNAC Lymph node
- 3.16. Ultrasound – Lung (B line, Effusion), Circulation (IVC Volume), Vascular access (Central venous), Soft Tissue (Pus)
- 3.17. Blood Group/Type
- 3.18. Smears
 - 3.18.1. Malaria Parasite Smear/Rapid Antigen Test
 - 3.18.2. Peripheral Blood Smear
 - 3.18.3. CSF/Pus Grams Stain
 - 3.18.4. Sputum Ziehl Neilson Smear
- 3.19. Urine dipstick
- 3.20. Stool Hanging drop
- 3.21. Glucometer Blood Sugar
- 3.22. Shake test (Newborn gastric aspirate)
- 3.23. Electrocardiogram
- 3.24. Specific Screening/Assessment Tools
 - 3.24.1. Gestation Assessments
 - 3.24.2. Anthropometric measurements and Growth charting
 - 3.24.3. Peak Flow Meter Measurement
 - 3.24.4. HEADSS screening (Adolescence)
 - 3.24.5. DDST screening (Development Assessment)
 - 3.24.6. Assessment of Sexual Maturity using Tanner's
 - 3.24.7. M-CHAT-R screening (Autism Assessment)
 - 3.24.8. GMSCF Assessment of Motor Disability (Cerebral Palsy)
 - 3.24.9. Pain assessment

4. Procedures – Therapeutic

- 4.1. Informed Consent
- 4.2. Prescriptions/Medication Orders
- 4.3. Neonatal Resuscitation Program including intubation
- 4.4. Basic Life Support
- 4.5. Advanced Paediatric Life Support including intubation

- 4.6. Heimlich, Foreign Body Removal
- 4.7. Exchange Transfusion
- 4.8. Stomach wash
- 4.9. Injections
 - 4.9.1. Intravenous
 - 4.9.2. Intramuscular
 - 4.9.3. Subcutaneous
 - 4.9.4. Intradermal
- 4.10. Infusions
 - 4.10.1. IV bolus
 - 4.10.2. Intravenous
 - 4.10.3. Intraosseous
 - 4.10.4. Blood Component Transfusion
- 4.11. Respiratory
 - 4.11.1. Meter dose inhalation with or without Spacer/Mask
 - 4.11.2. Nebulization
 - 4.11.3. Airway Insertion – Nasopharyngeal, Oropharyngeal
 - 4.11.4. Needle Cricothyroidotomy
 - 4.11.5. Oxygen delivery methods
 - 4.11.6. HFNC/CPAP/Non-Invasive Ventilation
 - 4.11.7. Ventilation – Conventional
 - 4.11.8. Intercostal drainage
 - 4.11.9. Surfactant Administration (INSURE)
- 4.12. Spinal infusion/injection
- 4.13. Therapeutic Ascitic Tap
- 4.14. Peritoneal dialysis
- 4.15. Phototherapy
- 4.16. Incision and Drainage
- 4.17. Dressings
- 4.18. Sling
- 4.19. Transport onto and off stretcher
- 4.20. Neonatal Temperature Warm Chain Measures
 - 4.20.1. Wrapping up Newborn
 - 4.20.2. Kangaroo Mother Care
- 4.21. Immunization Cold Chain Measures
 - 4.21.1. Refrigerator
 - 4.21.2. Vaccine carrier
- 4.22. Restraining a child
- 4.23. Transporting a child
- 4.24. Early Interventional Therapy
- 4.25. Chest Physiotherapy

Milestones to be achieved on Psychomotor Skills through Year 1 to 3.

O-Observe

PS-Perform under supervision

PI-Perform ndependently

Milestones	1st Year	2nd Year	3rd Year
1. Physical Examination			
1.1. Measurement of Vitals	PI		
1.2. Measurement of Anthropometry	PI		
1.3. General physical examination	PI		
1.4. Physical Examination of Systems	PI		
1.5. Development (Screening) Assessment	O, PS	PI	
1.6. Behavioral (Screening) Assessment	O	PS	PI
1.7. Sexual Maturity Assessment	O, PS	PI	
1.8. Newborn Assessment including gestational assessments	PI		
1.9. Breastfeeding Assessment	PI		
1.10. Motor Disability Assessment	O	PS	PI
1.11. Autism Spectrum Disorder Screening	O	PS	PI
1.12. Fundus examination	PI		
1.13. Middle ear examination	PI		
1.14. Throat examination	PI		
1.15. Triage - Rapid assessment of ABC	PI		
1.16. Hand hygiene	PI		
1.17. Biomedical Waste disposal guidelines	PI		
2. Non-Invasive Monitoring			
2.1. Pulse oximetry	PI		
2.2. Electrocardiogram	PI		
2.3. Vital Data Monitor	PI		
3. Procedures – Diagnostic			
3.1. Informed Consent	PI		
3.2. Aseptic measures for all procedures	PI		
3.3. Sampling			
3.3.1. Venous blood	PI		
3.3.2. Arterial blood	PI		

3.3.3. Capillary blood	PI		
3.4. Vascular Access and cannulation			
3.4.1. Intravenous – Peripheral	PI		
3.4.2. Intravenous - Central	O	PS	PI
3.4.3. Intraosseous	PI		
3.4.4. Intraarterial	O	PS	PI
3.4.5. Umbilical Vein	PI		
3.5. Diagnostic Taps			
3.5.1. Pleural	PS	PI	
3.5.2. Peritoneal	PI		
3.5.3. CSF	PI		
3.5.4. Pericardial	O	PS	PI
3.5.5. Joint fluid	O	PS	PI
3.5.6. Subdural	O, PS	PI	
3.5.7. Ventricular	O	PS	PI
3.6. Urinary Catheterization	PI		
3.7. Urine collection			
3.7.1. Mid-stream sampling	PI		
3.7.2. Catheter sampling	PI		
3.7.3. Suprapubic puncture	PI		
3.8. Tuberculin Skin Test	PI		
3.9. Antibiotic Test Dose	PI		
3.10. Feeding/Ryles Tube			
3.10.1. Insertion	PI		
3.10.2. Gastric Aspiration	PI		
3.10.3. Feeds	PI		
3.10.4. Stomach wash	PI		
3.11. Respiratory			
3.11.1. Naso, Pharyngeal, NP swab collection	PI		
3.12. Suppository insertion	PI		
3.13. Per rectal exam	O	PS	PI

3.14. Inspection of Vulva/Vagina	PI		
3.15. Aspiration/Biopsy			
3.15.1. Bone marrow	O, PS	PI	
3.15.2. Liver	O	PS	PI
3.15.3. Kidney	O	PS	PI
3.15.4. FNAC Lymph node	O	PS	PI
3.16. Ultrasound – Lung (B line, Effusion), Circulation (IVC Volume), Vascular access (Central venous), Soft Tissue (Pus)	O	O, PS	PS
3.17. Blood Group/Type	O, PS	PI	
3.18. Smears			
3.18.1. Malaria Parasite Smear/Rapid Antigen Test	O, PS	PI	
3.18.2. Peripheral Blood Smear	O, PS	PI	
3.18.3. CSF/Pus Grams Stain	O, PS	PI	
3.18.4. Sputum Ziehl Neilsen Smear	O, PS	PI	
3.19. Urine dipstick	PI		
3.20. Stool Hanging drop	O, PS	PI	
3.21. Glucometer Blood Sugar	PI		
3.22. Shake test (Neon gastric aspirate)	PI		
3.23. Electrocardiogram	PI		
3.24. Specific Screening/Assessment Tools			
3.24.1. Gestation Assessments	PI		
3.24.2. Anthropometric measurements and Growth charting	PI		
3.24.3. Peak Flow Meter Measurement	PI		
3.24.4. HEADSS screening (Adolescence)	O, PS	PI	
3.24.5. DDST screening (Development Assessment)	O, PS	PI	
3.24.6. Assessment of Sexual Maturity using Tanner's	O, PS	PI	
3.24.7. M-CHAT-R screening (Autism Assessment)	O	PS	PI
3.24.8. GMSCF Assessment of Motor Disability (Cerebral Palsy)	O	PS	PI

3.24.9. Pain assessment	PI		
4. Procedures – Therapeutic			
4.1. Informed Consent	PI		
4.2. Prescriptions/Medication Orders	PI		
4.3. Neonatal Resuscitation Program including ET	PI (BVM)	PI (ET)	
4.4. Basic Life Support	PI		
4.5. Advanced Paediatric Life Support including ET	PI (BVM)	PI (ET)	
4.6. Heimlich, Foreign Body Removal	PI		
4.7. Exchange Transfusion	O	PS	PI
4.8. Stomach wash	PI		
4.9. Injections			
4.9.1. Intravenous	PI		
4.9.2. Intramuscular	PI		
4.9.3. Subcutaneous	PI		
4.9.4. Intradermal	PI		
4.10. Infusions			
4.10.1. IV bolus	PI		
4.10.2. Intravenous	PI		
4.10.3. Intraosseous	PI		
4.10.4. Blood Component Transfusion	PI		
4.11. Respiratory			
4.11.1. Meter dose inhalation with or without Spacer/Mask	PI		
4.11.2. Nebulization	PI		
4.11.3. Airway Insertion – Nasophy, Orophy	PI		
4.11.4. Needle Cricothyroidotomy	O	PS	PI
4.11.5. Oxygen delivery methods	PI		
4.11.6. HFNC/CPAP/Non-Invasive Ventilation	O, PS	PI	
4.11.7. Ventilation – Conventional, High Freq (HFV)	O	PS	PI (Not HFV)
4.11.8. Intercostal drainage	O, PS	PI	
4.11.9. Surfactant Administration	O, PS	PI	

	(INSURE)			
4.12.	Spinal infusion/injection	O	PS	PI
4.13.	Therapeutic Ascitic Tap	O, PS	PI	
4.14.	Peritoneal dialysis	O	PS	PI
4.15.	Phototherapy	PI		
4.16.	Incision and Drainage	O	PS	PI
4.17.	Dressings	PI		
4.18.	Sling	PI		
4.19.	Transport onto and off stretcher	PI		
4.20.	Neonatal Temperature Warm Chain	PI		
4.20.1.	Wrapping up Newborn	PI		
4.20.2.	Kangaroo Mother Care	PI		
4.21.	Immunization Cold Chain Measures			
4.21.1.	Refrigerator	PI		
4.21.2.	Vaccine carrier	PI		
4.22.	Restraining a child	O, PS	PI	
4.23.	Transporting a child	O, PS	PI	
4.24.	Early Interventional Therapy	O	PS	PI
4.25.	Chest Physiotherapy	O, PS	PI	

C. Predominant in Affective Domain

Should be able to effectively and empathetically.....

1. Communication – Child/Attender/Guardian

- 1.1. Elicit a relevant and appropriate history from an attender/child including family and support systems
- 1.2. Engage and explain in appropriate language the plan (diagnostic and management including economics of plans) to an attender/child
- 1.3. Explain the prognosis of the child's condition
- 1.4. Educate Parent, an attendant/guardian/child with regards disease/, cultural, and spiritual understanding associated with health care delivery complication prevention, health promotion, and management keeping illustrating ethical ---?
- 1.5. Counsel towards an Informed Consent/Assent
- 1.6. Communicate disturbing/bad news including death

- 1.7. Demonstrates communication skills to appropriately word reports, professional opinions, patient education and counseling with regards
 - 1.7.1. Health and Disease condition with management plan
 - 1.7.2. Nutrition - Breastfeeding, complimentary feeding and nutrition using a Growth chart
 - 1.7.3. Immunization – On schedule, catch up including costs and advantages/disadvantages
 - 1.7.4. Lifestyle
 - 1.7.4.1. Dietary
 - 1.7.4.2. Habits
 - 1.7.5. Genetic risks of relevant inherited conditions
 - 1.7.6. Options for management and future approach in care with advantages and disadvantages
 - 1.7.7. Rights and responsibilities
- 1.8. Demonstrates knowledge or applies an understanding of psychological, social, and economic factors which are pertinent to the delivery of health care.
- 1.9. Demonstrates and effectively engages the patient and / or family in all communication.
- 1.10. Demonstrates ability to provide patient, family and community education through written material especially simple patient information leaflets

Should be able to effectively and respectfully.....

2. Communication – Health Team members

- 2.1. Communicate with all members of the health care team
- 2.2. Communicate with other members of the profession
- 2.3. Communicate with allied professionals associated with Health care

Should be able to

3. Professionalism and Ethical Behaviour

- 3.1. Demonstrates Professional Conduct in patient care and research
 - 3.1.1. Demonstrate respect for the Doctor-Patient relationship
 - 3.1.2. Demonstrate respect for the Doctor-Health Care Team Member relationship
 - 3.1.3. Demonstrate adherence to confidentiality and patient privacy in all communications in and outside the place of work.

- 3.1.4. Demonstrate respect of a patient's rights and decisions including the right to information and second opinion.
- 3.1.5. Demonstrate behaviour aligned with MCI/NMC code of ethics in all related dealings
- 3.1.6. Demonstrates personal and social responsibility/accountability in the provision of health care at an individual, community and population level
- 3.1.7. Demonstrate an awareness of economic costs of health care in all dealings with patients.
- 3.1.8. Demonstrate adherence to research ethics guidelines in the conduct of patient related research.
- 3.1.9. Demonstrates work ethics while working in a health care team.
- 3.1.10. Demonstrates truthfulness, honesty and integrity in all interactions.
- 3.1.11. Provides care that surpasses personal beliefs and prejudices
- 3.1.12. Demonstrates appropriate etiquette in dealings with patients, relatives and other health personnel
- 3.2.** Demonstrates behavior that is Ethical and bound by the Law of the land
 - 3.2.1. Recognizes Ethical conflicts and dilemmas seeking solutions to reduce conflicts and do the right thing.
 - 3.2.2. Complies with legal requirements while dealing with child health and includes issues dealing with the Industry Conflict, MTP Act, PCPNDT act, Child Abuse, Child labour, Legal adoption, Consent and Assent.

D. Pedagogic and Research Skills

Should be able to effectively

1. Pedagogic Skills

- 1.1.** Conduct a small group learning session (Theory and Practical) using appropriate tools
- 1.2.** Create and use an effective Powerpoint Presentation
- 1.3.** Present to a large group

Should be able to effectively

2. Research Skills

- 2.1.** Search scientific literature and critically appraise the evidence using standard study design checklists enabling application to clinical care.

- 2.2. Justify the application of the findings of a research study in clinical practice
(Diagnostic and Therapeutic Studies)
- 2.3. Develop a research hypothesis supported by scientific literature review, design an appropriate study, implement the methodology, generate results by analyzing data, and draw appropriate conclusions.
- 2.4. Should be able to present or/and publish a paper based on the conducted research.

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these.**

A. Lectures: Didactic lectures should be used sparingly. A maximum of 10 lectures per year in the concerned PG department is suggested. All postgraduate trainees are encouraged to attend such lectures. Lectures can cover topics such as:

1. Subject-related important topics as per Paediatric requirements

2. Recent advances
3. Research methodology and biostatistics
4. Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1- 2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once in 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive complete evidence-based review of the topic. The student should be graded by the faculty and peers. Symposium, Colloquium and Seminars may overlap to enhance involvement and active participation of postgraduates.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers. Symposium, Colloquium and Seminars may overlap to enhance involvement and active participation of postgraduates.

E. Bedside clinics: Minimum - once a week.

Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases. Symposium, Colloquium and Seminars may overlap to enhance involvement and active participation of postgraduates.

G. a. Rotational clinical / community / institutional postings

Final decision that determines “external” postings outside the primary department will differ according to department needs, feasibility, sub-speciality availability and accessibility. Apart for mandatory postings, ‘external’ postings listed below are highly recommended (desirable) to expose postgraduates to allied Pediatric sub-specialities given existing trends in practice. Specific Learning Outcomes need to be defined for each of these postings even assessed keeping in mind the Competency based curriculum and their future professional roles as Pediatricians.

Rotations are listed below:

Mandatory Postings

- Paediatric emergency (minimum 1 month a year)
- Neonatology (NICU) (minimum 3 months a year)
- Intensive Care (PICU) (minimum 2 months a year)
- District Residency Programme with participation in Community Outreach Child Health Programs (at least 3 months over the entire course; 3rd or 4th or 5th semester; See Section G-b below).

Desirable postings based on need, availability, accessibility, and feasibility and may be innovatively integrated into schedule of posting to optimize learning experiences.

- Subspecialities Outpatient Clinics / observing- assisting in emergency
 - Clinical
 - Child Psychiatry
 - Pediatric Surgery
 - Developmental Pediatrics
 - Pediatric Nephrology
 - Pediatric Hemato-oncology
 - Pediatric Cardiology
 - Pediatric Gastroenterology
 - Pediatric Rheumatology/Immunology/Allergy
 - Genetic
 - Pediatric Pulmonology
 - Pediatric Dermatology
 - Pediatric Endocrinology
 - Adolescent Health

- DOTS, PPTCT, ART center with pediatric exposure
- Microbiology diagnostic Lab
- Radiology including CT/MRI
- Forensic Medicine especially Child related
- Neuro-rehabilitation (PMR, Physiotherapy, Occupational Therapy)

G b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MD/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be

reinforced. There should be periodic department review of the thesis work, as per following schedule:

- End of 6 months Submission of protocol
- During 2ndyear Mid-term presentation
- 6 months prior to examination Final presentation; submission

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The logbook entries must be done in real time. The logbook is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

- The purpose of the Log book is to:
 - a) help maintain a record of the work done during training,
 - b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
 - c) provide feedback and assess the progress of learning with experience gained periodically.

The Logbook should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed logbook in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in logbook particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an NMC recognized course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS), Neonatal Resuscitation, Advanced Pediatric Life Support and Adult Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

5. ASSESSMENT

FORMATIVE ASSESSMENT ie., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

For Knowledge Assessments, Patient case scenario presentations and discussions including interdepartmental sessions remain the cornerstone of Paediatric learning focused on critical thinking and clinical reasoning. This is also ideally achieved during teaching at the bedsides on rounds and in ambulatory settings such as outpatient clinics if not emergency. Clinical Pathologic Case discussions, Mortality-Morbidity discussions and Prescription-Medication Order Audits are of great value and are encouraged to improve quality of care as well teaching-learning preferably scheduled every month to routine educational program.

For Psychomotor and Affective/Communication Assessments, consider the use of OSCEs, DOPs and even mini-CEX that one may strengthen Formative Feedback/Assessments.

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least one if not two presentation(s) at national/state level conference. If not presented at national level, alternatively, one research paper should be published / accepted in an indexed journal. (It is suggested that the local or University Review committee assess the work sent for publication).

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

The examinations shall be organized based on 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be 4 theory papers (as per PG Regulations).

Paper I: Basic Sciences as related to the subject

Paper II: General Paediatrics

Paper III: Systemic Paediatrics

Paper IV: Recent Advances

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be as per concerned university regulation.

Oral/Viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The final clinical examination in broad specialty clinical subjects should include:

- Cases pertaining to major systems (eg. one long case and three short cases)
- OSCE Stations to cover clinical, procedural and communication skills
- Logbook Records and reports of day-to-day observation during the training
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

RECOMMENDED READING:

Books (latest edition)

1. Nelson Textbook of Pediatrics, Ed: Kliegman RM, St. Geme J. Elsevier.
2. PG Textbook of Pediatrics, Ed: Gupta P, Menon PSN, Ramji S, Lodha R. Jaypee
3. Rudolph's Pediatrics, Ed: Kline MW, McGraw Hill.
4. Textbook of Clinical Neonatology (IAP/NNF), Ed: Pejavar RK, Thakre R. Paras.
5. Cloherty and Stark's Manual of Neonatal Care. Ed: Eichenwald EC, Hansen AR, Martin CR, Stark AR. Wolters Kluwer.
6. Principles of Pediatric & Neonatal Emergencies (IAP). Ed: Gupta P, Bagga A, Ramji S, Chugh K, Lodha R, Dewan P, Kaushik JS, Shah D. Shah. Jaypee.
7. Clinical Methods in Pediatrics. Gupta P. CBS Publisher.
8. The Harriet Lane Handbook. Hughes HK, Kahl LK, Elsevier.
9. Nutrition and Child Development. Elizabeth KE. Paras Medical Publisher.
10. Illingworth's Development of The Infant and The Young Child. Au: Illingworth RS; Elsevier Health.

11. Fenichel's Clinical Pediatric Neurology. Au: Piña-Garza JE, James KC. Elsevier.
12. Park's Pediatric Cardiology for Practitioners. Myung Park M, Salamat M. Elsevier.
13. Lanzkowsky's Manual of Pediatric Hematology and Oncology. Fish J, Lipton J, Lanzkowsky P. Elsevier.
14. Essential Paediatric Pulmonology. Lodha R, Kabra SK. Jaypee.
15. Textbook of Pediatric Rheumatology. Petty RE, Laxer R, Lindsley C, Wedderburn L, Fuhlbrigge RC, Mellins ED. Elsevier.

Journals

03-05 international Journals and 02 national (all indexed) journals.

Online Resources

- a. IAP <https://www.iapindia.org>/<https://diapindia.org/>
- b. GOI MOHFW and IIPS. <http://rchiips.org/nfhs/>
- c. Pubmed. <https://pubmed.ncbi.nlm.nih.gov/>
- d. Google Scholar. <https://scholar.google.co.in/>
- e. Cochrane. <https://www.cochranelibrary.com/>
- f. Uptodate. <https://www.uptodate.com/login>
- g. Clinical Key. <https://www.clinicalkey.com/#!/login>
- h. Medscape. <https://www.medscape.com/>
- i. JM Rey's IACAPAP e-Textbook of Child and Adolescent Mental Health.
Rey JM, Martin A. International Association for Child and Adolescent Psychiatry and Allied Professions. ISBN 9780646574400 Free on <https://iacapap.org/english/>

Student appraisal form for MD in Pediatrics											
	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g. Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of										

	training										
2.6	Participation and contribution to health care quality improvement										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment been discussed with the trainee?	Y es	N o								
	If not explain										
	Name and Signature of the assessee										
	Name and Signature of the assessor										
	Date										

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NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/13

Date: 05-08-2022

**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR MD IN
PHYSIOLOGY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHYSIOLOGY

Preamble

The purpose of postgraduate medical education in Physiology is to produce experts with necessary knowledge, skills and attitude to function as competent physiologists who actively contribute towards growth of the subject through research and intellectual contribution, participate in the training of budding health professionals, participate meaningfully in patient care and lifestyle disorders, stay abreast with the advancements in the field and serve the community at large. Physiology being the basis of entire practice of Medicine, a postgraduate in Physiology needs to acquire all necessary competencies that would enable him or her to function efficiently in domains of preclinical, para- clinical and clinical sciences.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes. The Expert group of the National Medical Commission has endeavored to render uniformity without compromise to purpose and content of this document. The revision within the document are mainly aimed to introduce competencies that ensure application of Physiology beyond preclinical boundaries and thereby improve health outcomes, embrace research and pedagogy as a vital part of training and reduce redundancy of contents. This document envisions a competent Physiologist who performs the roles of a Medical Teacher, Researcher, Member of Health Care Team (Clinical Physiologist), Administrator and Life Long learner with equal zeal and efficiency.

SUBJECT SPECIFIC LEARNING OBJECTIVES

Goal:

The goal is to have uniform standards in the teaching of Physiology at the postgraduate level throughout the country. The guidelines will help in achieving such standards which will ensure availability of competent physiologists equipped with required skills for teaching, patient care (diagnostic, therapeutic and rehabilitative) and applied research.

Learning Objectives

A postgraduate student having qualified for the MD (Physiology) examination should be able to:

1. Achieve comprehensive knowledge of general, systemic and applied Physiology.
2. Teach effectively the basic physiological mechanisms of human body in the context of pathophysiological basis of evolution, clinical presentation and management of disease states to undergraduate and postgraduate medical, dental and paramedical courses.
3. Acquire in-depth knowledge of physiology while catering to the learning needs of specific courses such as sports physiology, speech pathology etc.
4. Understand general principles of medical education (use of appropriate teaching techniques and resources) and apply theoretical frameworks in pedagogy.
5. Interpret and evaluate research publications critically.
6. Conduct research in core physiology, applied physiology and Education which may have significant application towards improving health, patient care and student learning.
7. Generate credible evidence towards advancement of Physiology and its application in basic and applied significance.
8. Acquire skills in conducting collaborative research in the field of physiology with allied sciences, clinical sciences and biomedical engineering.
9. Explain how the knowledge of physiology can be effectively applied in diagnostic and therapeutic clinical settings.
10. Integrate physiology with Diagnostic, Therapeutic, Preventive and Rehabilitative Medicine.
11. Interact with the allied departments and render services in advanced laboratory investigations.
12. Interact effectively with other paraclinical, clinical and allied health sciences departments to develop integrated modules in basic sciences and teach competencies related to the same.
13. Acquire administrative skills to set up concerned department / laboratories and initiate purchase procedures and procure necessary items for running such laboratories.

14. Be an efficient Leader and member of academic, research and health care team.
15. Participate actively in various workshops/seminars/journal clubs of allied subjects to acquire various skills for collaborative research.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course, the postgraduate student should be able to:

A. Predominant in Cognitive Domain

1. Demonstrate in-depth understanding of basic physiological concepts, their clinical applications and physiological demands in special circumstances such as sports, environmental changes, yoga, meditation etc.
2. Demonstrate comprehensive knowledge of physiology of specific organ systems to cater to the learning needs of specialized courses such as speech pathology, kinesiology, aerospace physiology etc.
3. Impart knowledge about the basic physiological mechanisms of human body with reference to their implications in the pathophysiology of disease and the physiologic basis of their management to undergraduate medical and paramedical students.
4. Demonstrate knowledge of integrated study of basic sciences as per the needs of current CBME.
5. Demonstrate higher order thinking and problem-solving skills to exhibit interactive teaching techniques and facilitate contextual study of physiology in various teaching learning sessions.
6. Demonstrate knowledge and ability to participate in the present student centric TL strategies of CBME such as ECE, SDL, AETCOM and AITo (Aligned and Integrated Topic).
7. Demonstrate knowledge of the current assessment practices in undergraduate CBME such as DOAP.
8. Demonstrate knowledge of research methodologies and statistics.
9. Conduct such clinical and experimental research, as would have a significant bearing on human health and patient care.
10. Incubate ideas and contribute towards generation of patents and copyrights related to the subject.

11. Interact with other departments by rendering services in advanced laboratory investigations and relevant expert opinion.
12. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.
13. Contribute to society by imparting physiological understanding of health problems. Disseminate knowledge of human physiology, the clinical applications and research as per the needs or specific demands of the society at large.
14. Outline the components of a basic physiology curriculum, demonstrate ability to develop or implement the same in future academic career.
15. Serve as interface with society at large.

B Predominant in Affective domain

At the end of the course, the postgraduate student should be able to:

1. Demonstrate responsibility, professionalism and ethical conduct in all professional undertakings.
2. Demonstrate ethical conduct in biomedical or animal research.
3. Follow ethical guidelines with regards to research and publications.
4. Demonstrate appropriate behavior of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Display principles of integrity and social accountability as a teacher.
6. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (Equity and social accountability).
7. Mentor/ counsel students to facilitate their holistic development.
8. Communicate effectively with peers, students and teachers in various curricular [teaching-learning, research] activities.
9. Function effectively as a member of the department, professional bodies and maintain professional conduct in interactions with students, peers, patient and staff.
10. Demonstrate the ability to give effective student feedback to undergraduate students.
11. Demonstrate the ability to receive feedback from teachers and peers.

12. Develop the capacity to reflect on own academic progress, develop self-directed learning skills and assess own learning needs.

C. Predominant in Psychomotor Domain

The postgraduate student should acquire practical competencies in the following tasks:

At the end of the course the postgraduate student should be able to:

1. Demonstrate physiological concepts of various organ systems by performing amphibian experiments using simulated models.
2. Demonstrate physiological concepts of specific organ systems by performing mammalian experiments using simulated models.
3. Perform and interpret a complete hematological profile.
4. Perform clinical examination of various organ systems.
5. Perform human experiments pertaining to specific organ systems and interpret results of the same.
6. Perform human experiments related to physiological challenges such as exercise, yoga and meditation.
7. Perform studies in stimulated environment - microgravity; high altitude; hot and cold environment.

Syllabus

Course contents:

A: Cognitive domain

Paper-I: *General and Cellular Physiology including Genetic Basis and Historical perspectives:*

1. Physiology of cell, various cellular mechanisms and genetic control mechanisms.
2. Various principles of Physics and Physical Chemistry involved in physiological phenomenon e.g. haemo-dynamics, bio-electrical potentials, body fluids, methods of measurements.
3. History of Physiology, Noebl laureates and discoveries.
4. Biostatistics, Biophysics, Biochemistry, Micro-anatomy.
5. Growth and Development including aging.

6. Excretion, pH, water and electrolyte balance.
7. Comparative Animal Physiology

Paper-II: *Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology.*

1. Blood and Immunity.
2. Cardiovascular System.
3. Respiratory System.
4. Gastro- Intestinal Tract (GIT) and dietary requirements.

Paper-III: *Systemic Physiology (system concerned with procreation, regulation and neural control)*

1. Nerve-Muscle Physiology including muscle mechanics
2. Endocrine Physiology
3. Nervous System (Central, peripheral and autonomic)
4. Special Senses
5. Reproduction & family planning/fetal & neonatal Physiology

Paper-IV: *Applied Physiology including recent advances*

1. Recent advances relevant to Physiology
2. Patho-physiology pertaining to systemic Physiology
3. Physiological basis of various clinical investigation tests
4. Interaction of human body in ambient environment- high altitude, space and deep sea
5. Exercise & Sports physiology
6. Transgender Physiology
7. Integrated Physiology
8. Yoga and Meditation
9. Social responsibilities of physiologists
10. Application of Artificial Intelligence in Physiology

B: Psychomotor domain:

A. The postgraduate student during the training period must PERFORM independently the following procedures:

i. Hematological profile

1. Estimation of hemoglobin
2. Determination of Total Erythrocyte (RBC) Count and RBC Indices (Blood Standards)
3. Determination of Total Leucocytes (WBC) Count : TLC
4. Preparation of a peripheral Blood Smear and Determination of Differential Leucocyte Count: DLC
5. Determination of Arneth Count
6. Determination of Bleeding Time (BT) and Clotting Time (CT)
7. Determination of Blood groups (A, B,O and Rh system)
8. Determination of Erythrocyte Sedimentation Rate (ESR) and Packed cell volume (PCV)
9. Determination of Osmotic Fragility of Red Blood Cells
10. Determination of Platelet Count
11. Determination of Reticulocyte Count

ii. Human Physiology

a. Clinical Physiology

1. Detailed clinical examination of various systems.

b. Nerve muscle physiology

1. Ergography and hand grip spring dynamography and study of human fatigue.
2. Recording of electromyography (EMG) and its application.
3. Recording of nerve conduction.

c. Cardiovascular system (CVS)

1. Clinical examination of CVS
2. Examination of arterial & venous pulses
3. Measurements of arterial blood pressure and effect of head-up/head-down tilt
4. Recording of 12 lead Electrocardiography (ECG) and its interpretation
5. Measurement of blood flow

6. Heart rate variability
7. Ambulatory Blood pressure monitoring

d. Respiratory system

1. Clinical examination of respiratory system.
2. Stethography – study of respiratory movements and effect of various factors.
3. Assessment of respiratory functions (spirometry, vitalography, and gas analysis).
5. Measurement of BMR.
6. Cardio pulmonary resuscitation (CPR) and Artificial respiration.

e. Gastrointestinal system:

1. Clinical examination of abdomen.

f. Integrative Physiology / Excretory system

1. Recording of body temperature/effect of exposure to cold and hot environment

g. Reproductive system

1. Determination of ovulation time by basal body temperature chart and pregnancy diagnostic test - Immunological Tests.
2. Semen analysis: sperm count, motility and sperm morphology.

h. Nervous System including Special senses

1. Clinical examination of the nervous system and its physiological basis.
2. Examination of higher mental functions.
3. Examination of cranial nerves.
4. Examination of sensory system.
5. Examination of motor system including reflexes.
6. Clinical examination of special senses:
 - (i) Smell and Taste
 - (ii) Test for hearing to differentiate deafness
 - (iii) Physiology of eye:
 - (a) Clinical examination of the eye and pupillary reflex
 - (b) Visual acuity
 - (c) Perimetry – mapping out of visual field and blind spot
 - (d) Accommodation
 - (e) Fundoscopy
 - (f) Colour vision and colour blindness
7. Reaction (visual and auditory) and reflex time.

8. Electroencephalography (EEG) and Polysomnography
9. Autonomic Nervous System (ANS) Testing.
10. **Neuro-electrodiagnostic techniques:** Nerve conduction study, Visual evoked potential (VEP), Brainstem auditory evoked potential (B.A.E.P), Somato-sensory evoked potential (SEP), Motor evoked potential (MEP).
11. Use of various test batteries for psychological evaluation of subject.

i. Sports Physiology

Tests for physical fitness: Cardio – respiratory responses to steady state exercise using:

- (i) Body Composition
- (ii) Conducting the Clinical Exercise Test
- (iii) Harvard step test
- (iv) Bicycle Ergometry
- (v) Treadmill test for determination of VO₂ max

j. Yoga and Meditation Physiology

- i. Physical, Mental and Emotional well being
- ii. Effect of yoga and pranayama on physiological parameters
- iii. Mindfulness
- iv. Concentration, anxiety and stress
- v. Counseling in health and diseases

k. Others

1. Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.
2. Basic Life Support and Cardiac Life Support
3. Effective Digital presentation, medical photography, Good Clinical Practice, Humanities and Bioethics.

iii. Amphibian (Frog) Experiments

All animal experiments must be compliant with Government of India Regulations, notified from time to time). Experiments in Amphibian/Dog/Cat should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines.

1. Effect of temperature on simple muscle twitch.
2. Effect of two successive stimuli (of same strength) on skeletal muscle.
3. Effect of increasing strength of stimuli on skeletal muscle.
4. Effect of increasing frequency of stimuli on skeletal muscle (genesis of tetanus).
5. Effect of free load and after load on skeletal muscle.
6. Effect of repeated stimuli on skeletal muscle (study of phenomenon of Fatigue).
7. Study of isometric contraction in skeletal muscle.
8. Determination of conduction velocity of sciatic nerve and effect of variables on it.
9. Properties of cardiac muscle – Refractory period, All-or-None Law, extra-systole and compensatory pause, beneficial effect.
10. Regulation of Heart, Vagus dissection and effect of Vagal and WCL stimulation.
11. Effect of physiological and pharmacological variables on intact frog's heart.
12. Perfusion of isolated frog's heart-role of sodium, potassium, calcium ions and drugs.

B. The postgraduate student during the training period must ASSIST in the following procedures:

Human Physiology

i. Cardiovascular system (CVS)

- Cardiac TMT Holter Monitoring
- Collection and Assessment of Arterial blood gas

ii. Nervous System including Special senses

- Intra operative neuro monitoring (IONM)

C. The postgraduate student during the training period must OBSERVE the following procedures:

i. Hematological profile

- Determination of Absolute Eosinophil Count
- Study of Haemopoietic Cells present in the Bone Marrow

- Other high end hematological investigations (specify): Flow cytometry, Platelet functions, D Dimers, coagulation profile etc.

ii. Human Physiology

➤ **Cardiovascular system (CVS)**

- Echocardiography
- Central venous line insertion, CVP monitoring

➤ **Respiratory system**

- Introduction to working of continuous positive airway pressure and Bilevel positive airway pressure (CPAP & BiPAP) Therapy
 - Ventilator setting

➤ **Gastrointestinal system:**

- GI Manometry

➤ **Reproductive system**

- Ovulation study by using ultrasonography

➤ **Integrative Physiology / Excretory system**

- Pressure and PH studies in esophagus, stomach, intestine and rectum

➤ **Others**

- Genetic testing and introduction to procedural skills for clinical genetics/ prenatal diagnosis/ adult genetics - birth defects, genetic hematology, dysmorphology, skeletal dysplasia, neurological and muscular disorders, primary immunodeficiency diseases, autoimmune and multi-factorial disorders, biology and genetics of cancer.
- Interaction of human body in ambient environment - high altitude, space and deep sea
- Exercise & Sports physiology
- Integrated Physiology
- Yoga and Meditation
- Social responsibilities of physiologists
- Application of Artificial Intelligence in Physiology

iii. Mammalian Experiments (Dog/Rabbit/Guinea pig/Rat/Mice)

- General management of mammalian experiments.

- Recording of heart rate, blood pressure and respiration and study the effects of various factors; drugs; asphyxia; occlusion of common carotid artery.
- Effect of stimulation of central and peripheral end of vagus on arterial blood pressure and respiration after vagotomy.
- Effect of stimulation and distension of carotid sinus on blood pressure and respiration.
- Effect of stimulation of splanchnic nerve.
- Effect of stimulation of peripheral somatic nerve (sciatic nerve).
- Study of hypovolemic shock and its reversal.
- Perfusion of isolated mammalian heart and study the effects of drugs and ions.
- Recording of Isolated Intestinal movement and tone and studying the effect of drugs and ions.
- Study of various stages of menstrual cycle, cervical smear and vaginal smear.

Departmental resources

It is to be mandatory for the department to establish and develop the following laboratories. In addition to teaching, these laboratories should be involved in active research and in patient care services in one or more well defined fields.

1. Clinical Neurophysiology Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

- (i) Electroencephalography
- (ii) Evoked potential recording
- (iii) Electromyography
- (iv) Nerve conduction studies
- (v) Autonomic nervous system (ANS) testing
- (vi) Any other newer technology like Functional Near infrared spectroscopy (fNIRS), Intra operative neuro monitoring (IONM), polysomnography
- (vii) Diabetic neuropathy assessment kit

- (viii) Reaction time apparatus
- (ix) Electroretinography

2. Cardio-Respiratory Laboratory

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

- (i) Electrocardiography
- (ii) Blood-gas Analysis
- (iii) Computerized multifunctional spirometry
- (iv) Laboratory for measuring pulmonary diffusion capacity and functional residual capacity (FRC)
- (v) Whole-body plethysmography
- (vi) Laboratory for Blood flow measurements (Impedance plethysmograph/Laser flow meter/ Doppler flow meter)
- (vii) Ankle brachial pressure index/ Vascular Doppler

3. Exercise Physiology Laboratory

The department should generate liaison with sports authorities and clinical departments to provide services for testing and grading exercise and physical efficiency for health monitoring and diagnostics (disease). This should be done by using the following techniques:

- (i) Two step test exerciser
- (ii) Bicycle Ergometry
- (iii) Tread mill
- (iv) Respiratory gas analysis and measurement of basal metabolic rate (BMR)

4. Metabolic/Endocrinology/Reproductive Bio-medicine laboratory

This laboratory should perform various tests pertaining to gastrointestinal, renal, metabolic, endocrinal and reproductive bio-medicine. The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease).

1. Body Fat Analysis
2. Spectrophotometer
3. pH meter
4. Elisa Reader/Washer

5. Luminometer
6. Semi-autoanalyzer
7. Artificial reproductive techniques/ semen laboratory/ infertility laboratory

Post graduate students should be posted in the above laboratories and extend the required services on routine basis.

The Department should be equipped with general facilities like PG resource room with internet access and a departmental library with books especially those related to pertinent higher studies in Physiology and field of research. The college/department should make important journals available (at least four Indian journals and two international journals – Online/Offline).

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to

basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per subject requirements All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. **Salient features of** Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum - once every 1-2 weeks.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases.

G. a. Rotational clinical / community / institutional postings

- Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions including Medical Education Unit (MEU) or Department of Medical Education (DOME). The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines.
- **Clinical Postings:** Compulsory clinical postings in following departments must be undertaken as per specified number of days in table 1 depicted below:

Table 1: Plan of Clinical postings for MD Physiology

Prof Year	Department	Period of posting	Focus areas
1 st year	Biochemistry	15 days	1. Auto & Semi auto Analyzer, Electrophoresis, Chromatography, RIA, Study of serum chemistry (proteins, Lipid, glucose, electrolytes, enzymes etc.) – 8 days 2. Constituents of normal and abnormal urine, liver function tests, Renal function tests, Gastric function tests – 7 days
I st year	Pharmacology	20 days	1. Animal House (to learn technique of Animal Handling, Blood sampling, anesthesia, Euthanasia, effective Analgesia and infection control after

			<p>surgery. Study of Animal behavior like eating, drinking, locomotion, sexual activity etc.)</p> <p>2. Experimental Pharmacology lab to study ongoing animal experimental procedures including dissection for rat phrenic nerve hemidiaphragm and others – 10 days</p> <p>2. Study various guidelines related to ethical use of animals in experiments. To study preparation of different animal models and various tests to study physiological parameters. – 15 days</p>
I st year	Pathology	30 days	<p>1. Blood bank - Cross matching, blood Storage, Immunohistochemistry, Immunological tests – 15 days</p> <p>2. Central Lab. - Tests for bleeding & clotting disorders, study of Haemopoietic Cells present in the Bone Marrow – 10 days</p> <p>3. Semen analysis, determination of ovulation time by basal body temperature chart and pregnancy diagnostic tests – 5 days</p>
I st year	Microbiology	10 days	<p>1. Fluorescent microscopy, use of Elisa reader & Washer – 5 days</p> <p>2. Immuno-physiology and other facilities available in the dept. – 5 days</p>
II nd year	Ophthalmology	15 days	<p>1. Direct and indirect Ophthalmoscopy, Retinoscopy – 8 days</p> <p>2. Slit lamp microscopy, Tonometry, Pachymetry, Study of corneal topology, Optometry, Auto-refractometer – 7 days</p>
II nd year	Tuberculosis & Chest Disease (Pulmonary Medicine)	15 days	<p>1. Whole body plethysmography – 8 days</p> <p>2. Bronchoscopy & other facilities available in the dept. – 7 days</p>
II nd year	ENT	15 days	<p>1. Audiometry – 7 days</p>

			2. Oto-rhino-laryngoscopy, direct and Indirect Laryngoscopy, BERA, BSAEP – 8 days
III rd year	General Medicine	20 days	1. TMT, Holter analysis, ABG, ECG – 10 days 2. EMG, NCV – 10 days
III rd year	Psychiatry	10 days	1. EEG 2. Biofeedback
III rd year	Casualty	15 Days	1. To know basics of how to handle emergency 2. Minor procedures

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

G b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MD/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

I. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

J. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

K. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting (as specified in table 1) . This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

- a) help maintain a record of the work done during training,
- b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
- c) provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

- L. Course in Research Methodology:** All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e. assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up,
case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programs (at least 02 each)

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A postgraduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify postgraduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject (General and Cellular Physiology including Genetic basis and historical perspectives)

Paper II: Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology

Paper III: Systemic Physiology (system concerned with regulation, neural control and procreation)

Paper IV: Recent advances in the subject (including applied Physiology)

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The practical examination should include:

- Case presentation pertaining to major systems
- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject

Recommended Reading:

Books (latest edition)

1. A.C. Guyton – Text book of Medical Physiology
2. W.F. Ganong – Review of Medical Physiology
3. William's Textbook of Endocrinology
4. J.E. Cotes- Respiratory Physiology
5. D.T. Harris – Experimental Physiology
6. Wintrobe's – Clinical Hematology
7. Principles of medical physiology by Sircar
8. Brown B.L. – Cell signaling, Biology and medicine of signal transduction
9. Berne and Levy- Medical Physiology

10. Textbook of Medicine by Harrison
11. Principles of Neural sciences edited by E. R. Kandel, J. H. Schwartz and T. M. Jessell
12. Williams Hematology edi. by M.A. Lichtman, E. Beutler, K. Kaushansky, T.J. Kipps, U. Seligsohn, J. Prchal
13. Medical Physiology: by W. F. Boron and E. L. Boulpaep
14. Medical Physiology: by A. Rhodes and G. A. Tanner
15. Neuroscience : by Dale Purves

Practical Books:

1. Hutchison's Clinical Methods: An Integrated Approach to Clinical Practice.
2. Macleod's clinical Examination
3. Textbook of Practical Physiology: by Dr. G. K. Pal and Dr. Pravati Pal
4. Textbook of Practical Physiology: by Dr. C. L. Ghai
5. Textbook of Practical Physiology: by Dr. Ranade
6. Textbook of Practical Physiology: by Dr. A. K. Jain

Journals:

03-05 International Journals and 02 National (all indexed) journals

Annexure 1

Student appraisal form for MD in Physiology											
	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic aptitude and learning										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	Work related to training										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work environment										
2.5	Ability to record and document work accurately and appropriate for level of training										

3	Professional attributes											
3.1	Responsibility and accountability											
3.2	Contribution to growth of learning of the team											
3.3	Conduct that is ethically appropriate and respectful at all times											
4	Space for additional comments											
5	Disposition											
	Has this assessment pattern been discussed with the trainee?	Yes	No									
	If not explain.											
	Name and Signature of the assessee											
	Name and Signature of the assessor											
	Date											

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Physiology

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**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/15

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**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR M.D. IN
PSYCHIATRY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PSYCHIATRY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle medical problems effectively and should be aware of the recent advances pertaining to his specialty. The post graduate student should acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The primary **goal** of the MD course in Psychiatry is to produce a post graduate clinician able to provide health care in the field of Psychiatry. A physician qualified in Psychiatry, at the end of the course, should be able to diagnose and treat psychiatric disorders, take preventive and curative steps for the disease in the community at all levels of health care and qualify as a consultant and teacher in the subject.

At the end of the MD course in Psychiatry, the student should be able to:

- Understand the relevance of mental health in relation to the health needs of the country,
- Ethical considerations in the teaching and practice of Psychiatry,
- Identify the social, economic, biological and emotional determinants of mental health,
- Identify the environmental causes as determinants of mental health,
- institute appropriate diagnostic, therapeutic and rehabilitative procedures to the mentally ill patient,

- Take detailed history, conduct appropriate ethically valid physical examination and institute appropriate evaluation procedures to make a correct clinical diagnosis,
 - Perform relevant investigative and therapeutic procedures for the psychiatric patient,
 - Recommend appropriate laboratory and imaging examinations and interpret the results correctly,
 - Plan and deliver comprehensive treatment of a psychiatric patient using principles of rational drug therapy,
 - Plan rehabilitation of psychiatric patient suffering from chronic illness,
 - Clinically manage psychiatric emergencies efficiently,
 - Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities,
 - Demonstrate communication skills of a high order in explaining management and prognosis, providing counselling and giving health education messages to patients, families and communities,
 - Develop appropriate skills to practice evidence-based psychiatry,
 - Demonstrate competence in basic concepts of research methodology and epidemiology,
 - Be aware of and take appropriate steps in the implementation of national mental health programs, effectively and responsibly,
 - Be aware of the concept of essential drugs and rational use of drugs,
 - Be aware of the legal issues in the practise of Psychiatry,
 - Be aware of the special requirements in the practice of Child and adolescent Psychiatry and Geriatric Psychiatry.
 - Be aware of the role of sex and gender in the practice of psychiatry
 - Be able to determine the capacity and capability of the individual (especially children and adolescents) to identify and articulate a gender identity
- **Research:** The student should know the basic concepts of research methodology and plan a research project in accordance with ethical principles. S/he should also be able to interpret research findings and apply these in clinical practice. S/he should know how to access and utilize information resources and should have basic knowledge of statistics.
 - **Teaching:** S/He should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students, health professionals, members of allied disciplines (e.g. behavioural sciences), law enforcement agencies, families and consumers and members of the public.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

By the end of the course, the student should demonstrate knowledge in the following:

1. General topics:

1. The student should be able to demonstrate knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to Psychiatry.
2. The student should be able to explain aetiology, assessment, classification and management and prognosis of various psychiatric disorders (including psychiatric sub-specialities including Neuroanatomy, Neurophysiology, Neurochemistry, Neuroimaging, Electrophysiology, Psychoneuroendocrinology, Psychoneuroimmunology, Chronobiology and Neurogenetics).
3. Acquire knowledge of delirium, dementia, and amnesic and other cognitive disorders and mental disorders due to a general medical condition.
4. The student should be able to discuss long term care of persons with chronic mental health problems
5. The student should acquire knowledge of emergency measures in acute crisis arising out of various psychiatric illnesses including drug detoxification and withdrawal.
6. The student should acquire knowledge of pharmacokinetics & pharmacodynamics of drugs involved in psychiatric management of patients.
7. The student should acquire knowledge of (a) normal child development and adolescence (b) neurodevelopmental disorders, intellectual disability and specific learning disability and their management
8. The student should acquire knowledge and be able to explain mechanisms for rehabilitation of psychiatric patients.
9. The student should acquire knowledge of substance related disorders and their management.
10. The student should acquire knowledge of psychotic disorders, mood disorders, and anxiety disorders and their management
11. The student should understand difference between sex and gender/ biological and social construction of personhood; sexual/gender identity; transgender, gender non-conformity, and other gender diverse identities, sexual/sexuality identity, sexual orientation, sexual desire; the wide variety, and cultural presence of various sexual orientations and desires; gender dysphoria and its management.

12. The student should acquire knowledge of eating disorders and sleep disorders and their management
13. The student should be conversant with recent advances in Psychiatry.
14. The student should be conversant with routine bedside diagnostic and therapeutic procedures and acquire knowledge of latest diagnostics and therapeutics procedures available.
15. The student should be conversant with various policy related aspects of Psychiatric practice in India (e.g. Mental Health Act, National Health Mental Health Programmes etc.).
16. The student should be conversant with research methodologies.
17. Student should be conversant with the role of Yoga and Meditation in the management of psychiatric disorders.

B. Affective Domain:

1. The student should be able to function as a part of a multidisciplinary team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. The student should always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information, confidentiality and second opinion.
3. The student should develop communication skills to prepare reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire the following clinical skills and be able to:

1. Obtain a proper relevant history and perform thorough clinical examination including detailed mental state examinations using proper communication skills.
2. Able to do risk assessment and mental capacity assessment.
2. Provide a clinical formulation, arrive at a logical working diagnosis and differential diagnosis after clinical examination.
3. Order appropriate investigations keeping in mind their relevance and cost effectiveness and obtain additional relevant information from family members to help in diagnosis and management.

4. Identify psychiatric situations calling for urgent or early intervention and refer at the optimum time to appropriate centres.
5. Write a complete case record with all necessary details.
6. Write a proper discharge summary with all relevant information.
7. Obtain informed consent for any examination/procedure.
8. Perform clinical audit.
9. Must be able to perform modified Electroconvulsive therapy (ECT).
10. Should have the following skills in relation to gender related issues:
 - Demonstrate the ability to assess the gender identity of an individual and distress caused (if any) due to the individual's own gender identity in simulated environment.
 - Describe and understand how to discuss sexual orientation, sexuality identity, gender identity, as well as intersex identity (differences in sex development) as part of routine history taking.
 - Demonstrate the ability to educate and counsel individuals or family members about intersex variations, sexual orientations, sexuality identities, gender incongruence, gender dysphoria, and gender identities. Demonstrate ability to identify when a mental health referral is needed for the above.
 - Demonstrate knowledge that conversion therapy practices for sexual orientation or gender identity or on people with intersex variations is unethical.
 - Describe differences between Gender Incongruence and Gender Dysphoria.
 - Describe and understand gender identity, the biological and gender binaries, rejection of gender binary, gender non-conforming, gender non-binary, androgynous, and other identities.
 - Demonstrate the ability to educate an individual and family members that Gender Incongruence by itself is not a disorder and does not require clinical intervention. Any form of conversion therapy is unethical.
 - Discuss situations where there is a role for mental health support in Gender Dysphoria i.e., discussing with family, deciding on hormonal treatments or Sex Reassignment Surgery (Gender Affirming Care or Gender Affirmative Therapies or Gender Confirmation Surgery).

The student, at the end of the course should be able to perform independently, the following:

1. Conduct detailed Mental Status Examination (MSE)
2. Cognitive behaviour therapy
3. Supportive psychotherapy
4. Modified ECT and non-invasive neuromodulation
5. Clinical IQ assessment
6. Management of alcohol withdrawal
7. Alcohol intoxication management
8. Opioid withdrawal management
9. Delirious patients
10. Crisis intervention

The student must be able to assess a patient with following symptoms:

1. Psychotic symptoms
2. Seizures true and pseudo seizure
3. Anxiety symptoms
4. Affective symptoms
5. Cognitive symptoms
6. Catatonia
7. Delirium
8. Malingering
9. Behavioral symptoms of developmental disorders

The student, at the end of the course should be able to perform under supervision, the following:

1. Behaviour therapy
2. Family therapy
3. Interpersonal therapy
4. Cognitive behaviour therapy and other newer therapies
5. First level psychological intervention for sexual abuse, sexual assault and domestic violence
6. Genetic counselling

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know the subject in depth; however emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in managing behavioural problems commensurate with the specialty must be ensured.

The student must acquire knowledge in the following:

Theoretical concepts:

1. Neurophysiology and Neuro-chemistry
2. Functional and behavioural neuroanatomy
3. Genetics
4. Psychoneuroendocrinology
5. Psychoneuroimmunology
6. Electrophysiology and cognitive neuroscience
7. Neuro-imaging
8. Memory

9. Sleep and circadian rhythm
10. Learning – Theories
11. Theory of personality
12. Clinical Psychology including Psychometry and Psychodiagnostics
13. Transcultural Psychiatry
14. Research Methodology and Statistics
15. Psychodynamics
16. Psychiatric assessment (including History Taking, Neurological Examination, Mental Status Examination, Investigations, Use of rating scales, etc.).
17. Classification In Psychiatry
18. Organic Psychiatry (including Psychological Features and Clinical Assessment of Cerebrovascular Disorders, Delirium, Epilepsy, Head Injury, Headache, HIV – AIDS, Infections, etc.)
19. Movement Disorders (including Medication-Induced Movement Disorders, etc)
20. Substance Related Disorders (including Alcohol-Related Disorders, Amphetamine-Related Disorders, Caffeine-Related Disorders, Cannabis-Related Disorders, Cocaine-Related Disorders, Hallucinogen-Related Disorders, Inhalant-Related Disorders, Nicotine-Related Disorders, Opioid-Related Disorders, Phencyclidine-Related Disorders, Sedative-, Hypnotic-, or Anxiolytic-Related Disorders, etc.)
21. Psychosis (including Schizophrenia, Schizophreniform Disorder, Schizoaffective Disorder, Delusional Disorder, Brief Psychotic Disorder, Shared Psychotic Disorder, etc).
22. Mood Disorders (including Depressive Disorders, Bipolar Disorders, Cyclothymic Disorder, etc.)
23. Anxiety Disorders (including Panic Disorder, Agoraphobia, Phobias, Obsessive-Compulsive Disorder, Generalized Anxiety Disorder, etc).
24. Stress and related disorders (Posttraumatic Stress Disorder, Acute Stress Disorder Adjustment Disorder etc.)
25. Somatoform Disorders (including Somatization Disorder, Undifferentiated Somatoform Disorder, Conversion Disorder, Pain Disorder, Hypochondriasis, Body Dysmorphic Disorder, etc.)
26. Factitious Disorders
27. Dissociative Disorders (including Dissociative Amnesia, Dissociative Fugue, Dissociative Identity Disorder, Depersonalization Disorder, etc.)
28. Personality disorders
29. Sexual disorders, gender dysphoria and psychological issues among LGBTQIA+ groups (including Sexual Desire Disorders, Sexual arousal

- Disorders, Orgasmic Disorders, Sexual Pain Disorders, Vaginismus, Paraphilias, etc)
30. Eating Disorders (including Anorexia Nervosa, Bulimia Nervosa, etc.)
 31. Sleep Disorders (including Insomnia, Narcolepsy, Breathing-Related Sleep Disorders, Circadian Rhythm Sleep Disorders, Parasomnias, Nightmare Disorder, Sleep Terror Disorder, Sleepwalking Disorder, etc.)
 32. Impulse-Control Disorders (including Intermittent Explosive Disorder, Kleptomania, Pyromania, Pathological Gambling, Trichotillomania, etc)
 33. Psychosomatic Disorders including Consultation Liaison psychiatry
 34. Miscellaneous: Non-compliance, Malingering, Antisocial Behaviour, Borderline Intellectual Functioning, Age-Related Cognitive Decline, Bereavement [including Death], Academic Problems, Occupational Problems, Identity Problems, Religious or Spiritual Problems, Acculturation Problems, Phase of Life Problems, Chronic Fatigue Syndrome, etc.)
 35. Abuse (Physical / Sexual) or Neglect Of Child /Adult
 36. Culture Bound Syndromes
 37. Pre-Menstrual Dysphoric Disorder
 38. Perinatal Psychiatry
 39. Emergencies In Psychiatry including suicide, its management and medico-legal aspect
 40. Psychotherapy
 41. Psychopharmacology
 42. Electro-Convulsive Therapy, Other brain stimulation methods (rTMS, DBS, tDCS and others) and Neurosurgery
 43. Child and Adolescent Psychiatry (including Learning Disorders, Motor Skills Disorder, Communication Disorders, Pervasive Developmental Disorders (Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder), Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, Pica, Tic Disorders, Elimination Disorders, Separation Anxiety Disorder, Selective Mutism, Reactive Attachment Disorder of Infancy or Early Childhood, Stereotypic Movement Disorder, etc.)
 44. Intellectual disability
 45. Geriatric Psychiatry (including dementia, legal and ethical issues, positive psychiatry in aging, psychiatric aspects of long term care)
 46. Community psychiatry
 47. Rehabilitation of psychiatric patients
 48. Ethics In Psychiatry

49. Forensic and Legal Psychiatry (including Mental Health Care Act, Persons with Disability Act, Narcotic Drugs and Psychotropic Substance Act etc.)

The student may know the following:

1. History of Psychiatry
2. Epidemiology
3. Mind – the evolving concepts
4. Psychiatry rating scales
5. Placebo Effect
6. Sex and Gender Issues in Psychiatry
7. Psychosurgery

TEACHING AND LEARNING METHODS

Teaching methodology

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated. Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lecturers should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. The student should have hands-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning the subject should be given. Self learning tools like assignments and case base learning may be promoted.

The post graduate student should have knowledge of:

- Psycho-pharmacology and broadening the treatment options using medicines.
- Neuro-imaging techniques to understand behaviour and psychiatric illness.
- Community-Psychiatry.
- Functioning of psychiatric hospital.

Community Psychiatry should go beyond familiarization with the National Mental Health Programme. The post graduate student should have hands on experience with:

- Training programmes for primary care physicians
- Organizing Mental Health Camps

- Carrying out Health Education Activities
- Forensic /Legal Psychiatry
- Integration of Mental Health Care with General Health Care

2. **Thesis writing:** Thesis writing is compulsory.
3. **Research Methodology:** The student should know the basic concepts of research methodology and biostatistics, plan a research project, understand ethical issues of research especially in vulnerable groups such as those with mental illness and intellectual disability as well as minors, be able to retrieve information from the library, use reference managers .
4. **Teaching skills:** The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
5. **Continuing Medical Education Programmes (CME):** Each student should attend at least two CME programmes, in 3 years.
6. **Conferences:** The student should attend courses, conferences and seminars relevant to the specialty, and encouraged to make presentation in conferences
7. A post graduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
8. **Seminars:** There should be a weekly seminar in which the PG students present material on assigned topics in rotation. It should be followed by discussion in which all trainees are supposed to participate. Generally, the topics covered should be those that supplement the formal teaching programme.
9. **Case Conference:** A case conference should be held every week where a PG student prepares and presents a case of academic interest by rotation and it is attended by all the members of the Department.
10. **Psychosomatic Rounds:** This is a presentation of a case of psychosomatic illness, or a medical illness with pronounced psychiatric problems. It should be held weekly in collaboration with various departments and attended by the faculty and the PG students of psychiatry and the concerned Department.
11. **Research Forum:** There should be a monthly meeting of one hour each in which the PG students present their plan of research as well as the report of the completed work of their projects. The other research scholars/staff in the department also may participate in it. The faculty, PG students and the non-medical professionals should make critical comments and suggestions.

12. **Journal Club:** A monthly meeting of Journal club should be held in which a senior PG student presents a critical evaluation of a research paper from a journal. All PG students are expected to attend.
13. **Case presentations:** All new in-patients and outpatients cases should be routinely reviewed with one of the Consultants. In addition, the PG student is required to present case material at routine rounds and other case conferences. Senior PG students will conduct evening classes on clinical topics.
14. **Extra-mural activities:** The post graduate students are encouraged to attend certain academic activities in allied subjects held outside parent department e.g. seminars/lectures held at Departments of Sociology, Psychology, Neurology etc.
15. **Psychotherapy tutorials:** These should be held in small groups supervised by a consultant, in which a case is presented by a PG student and psychotherapeutic management discussed.

16. Rotation:

Clinical Postings

- A major tenure of posting should be in General Psychiatry. It should include care of in-patients, out-patients, special clinics and maintenance of case records for both in and out patients.
- Exposure to the following areas should be given :-

Schedule of clinical postings for M.D Psychiatry *(36 months)

Area/ Specialty

Ward and OPD (Concurrent)	18 months
Neurology	2 months
Emergency Medicine/ Internal Medicine	1 month
Consultation Liaison Psychiatry	3 months
Psychiatric hospital and Forensic Psychiatry	1 month
Clinical Psychology	1 month
Addiction Psychiatry	3 months
Child and Adolescent Psychiatry	3 months
Community psychiatry	2 months#
Elective posting	2 months (as per choice in the same Institute)

* The stated duration can be subjected to minor modifications depending on available resources

Exposure to community based services should be integral to various postings.

Applicable only for trainees in General Hospital Psychiatric units: Facilities for these need to be arranged.

The post graduate student in Psychiatric hospitals would have extended period of exposure to consultation - liaison psychiatry and other medical specialties. Exposure to community based services should be integral part of various postings. The post graduate student shall be given full responsibility for patient care and record keeping under the supervision of the senior PG students and consultants. The post graduate

student shall also take patients for psychological interventions in an individual as well as group setting. S/he must complete a minimum of 100 hours of supervised psychological interventions.

- **Inter-Unit Rotation of posting**

Inter-unit rotation in the department should be done for a period of up to one year (divided during the first year and third year while the post graduate student stays in the parent unit throughout the duration of his thesis work).

17. Clinical meetings:

There should be intra - and inter - departmental meetings for discussing the uncommon / interesting medical problems.

18. Log book:

Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book and signed by the authorized teacher and Head of Department.

19. The Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of clinical skills laboratories in medical colleges is mandatory. Objective structured clinical examination (OSCE) modules may be developed and used in teaching.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs
6. Professionalism and teamwork

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination:

There shall be four papers each of three hours duration.

Paper I: Basic Sciences as related to Psychiatry

Paper II: Clinical Psychiatry

Paper III: Psychiatric Specialties

Paper IV: Recent Advances

3. Clinical/Practical and Oral/viva voce examination should consist of:

- Presentation of long case of Psychiatry
- Neurology short case
- A short case Psychiatry
- Viva –voce

Due importance should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading

Books (latest edition)

1. Textbook of Psychiatry Publisher: Lippincott Williams and Wilkins, Editors: Benjamin James Sadock, Virginia Alcott Sadock, Pedro Ruiz
2. Kaplan and Sadock's Synopsis of Psychiatry, Editor: RJ Boland, ML Verduin, P Ruiz; Publisher: Wolters Kluver India
3. Introduction to Psychology by Clifford T. Morgan Editors: Clifford T Morgan, Richard A King, John R Weiss, John Schopler, Publisher: MC Graw Hill

4. New Oxford Textbook of Psychiatry Edited by: John R. Geddes, Nancy C. Andreas and Guy M. Goodwin, Publisher: Oxford
5. Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications, Editor: Stephen M Stahl, Publisher: Cambridge
6. Forensic Psychiatry: RC Jiloha, D Kataria, P Kukreti (Jaypee)
7. ECT administration manual, NIMHANS Editors: Bangalore N Gangadhar, A Shyam Sundar, Jagadisha Thirthalli, Shivarama Varambally, Kesavan Muralidharan, C Naveen Kumar, Preeti Sinha, Biju Viswanath, Publisher: NIMHANS
8. Community Psychiatry in India (Eds Chavan, Gupta, Arun, Sidana, Jadav) Jaypee.
9. Fish's Clinical Psychopathology – Signs and Symptoms In Psychiatry By Patricia Casey, Editor: Patricia Casey, Brendan Kelly, Publisher: Tree Life Media
10. Sims Symptoms in the Mind: Textbook of Descriptive psychopathology, Editor: Femi Oyebode, Publisher: Elsevier
11. Bickerstaff's Neurological Examination in Clinical practice, Editor: Kameshwar Prasad, Ravi Yadav, John Spillane, Publisher: Wiley
12. A Primer of Research, Publication and Presentation: Sandeep Grover, Shahul Amin, Jaypee
13. Maudsley's Prescribing Guidelines in Psychiatry, Editors: Author: David M. Taylor, Thomas R. E. Barnes, Allen Young, Publisher: Wiley
14. Lishman's Organic Psychiatry Editor: Anthony S. David, Simon Fleminger, Michael D. Kopelman, Publisher: Wiley Blackwell
15. Kaufman's Clinical Neurology for Psychiatrists, Elsevier.

Journals

03-05 international Journals and 02 national (all indexed) journals.

Student appraisal form for MD in Psychiatry											
	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g. Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										

	Name and Signature of the assesse										
	Name and Signature of the assessor										
	Date										

Module on Gender related Issues and Gender Dysphoria for the MD Curriculum of Psychiatry

At the end of the course the student will be able to:

- Demonstrate the ability to assess the gender identity of an individual and distress caused (if any) due to the individual's own gender identity in simulated environment.
- Describe and understand how to discuss sexual orientation, sexuality identity, gender identity, as well as intersex identity (differences in sex development) as part of routine history taking.
- Demonstrate the ability to educate and counsel individuals or family members about intersex variations, sexual orientations, sexuality identities, gender incongruence, gender dysphoria, and gender identities. Demonstrate ability to identify when a mental health referral is needed for the above.
- Demonstrate knowledge that conversion therapy practices for sexual orientation or gender identity or on people with intersex variations is unethical.
- Describe differences between Gender Incongruence and Gender Dysphoria.
- Describe and understand gender identity, the biological and gender binaries, rejection of gender binary, gender non-conforming, gender non-binary, androgynous, and other identities.
- Demonstrate the ability to educate an individual and family members that Gender Incongruence by itself is not a disorder and does not require clinical intervention. Any form of conversion therapy is unethical.
- Discuss situations where there is a role for mental health support in Gender Dysphoria i.e., discussing with family, deciding on hormonal treatments or Sex Reassignment Surgery (Gender Affirming Care or Gender Affirmative Therapies or Gender Confirmation Surgery).

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MD in Psychiatry

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN ANAESTHESIOLOGY

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training in anaesthesiology should be able to recognize the health needs of the community. He or she should be competent to handle effectively medical problems and should be aware of the recent advances pertaining to his/her specialty. She/he should be highly competent anaesthesiologist with broad range of skills that will enable him/her to practice anaesthesiology independently. The PG student should also acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library. She/he should attend conferences, workshops and CMEs regularly to upgrade his/her knowledge.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

The training should have clear objective, is competency based, is well planned & evaluated, is supervised and delivered by well trained teachers. It will have special emphasis on attitude and behavior, safety, communication, presentation, audit, teaching, ethics and law and management.

No limit can be fixed and on the number of topics that can be prescribed as course contents. The student is expected to know his/her subject in depth from various text books and journals; however more emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competency in anaesthesia skills commensurate with the specialty (actual hand on training) must be ensured.

Specific learning objectives:

1. **Theoretical knowledge:** The student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Statistics and Physics) as applied to Anaesthesia. The student should acquire in-depth knowledge including recent advances. He/she should be fully conversant with the bedside procedures (diagnostic and therapeutic) and have knowledge of latest diagnostics and therapeutics procedures available including radiological methods.
2. **Teaching:** The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students. The student should be familiar with the latest teaching (computer and power point presentation) modes including simulators training and evidence based medical education.
3. **Attitude development:** The student should develop attitude that leads to appropriate communication with colleagues to function in a group in Operating Room /Intensive Care Unit, and develop the ability to function as a leader in the operating room.

SUBJECT SPECIFIC COMPETENCIES

The student during the training programme, should acquire the following competencies:

A. Cognitive domain

- Demonstrate knowledge of Anatomy related to;
 - ❖ Diaphragm, upper and lower airway, heart and coronary circulation ,
 - ❖ Regional anaesthesia - field block, central neuraxial, blockade, block for acute pain states
 - ❖ Procedures like -Intramuscular injections, arterial and venous cannulations and
 - ❖ Patient Positioning under anaesthesia
- Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, hepatobiliary, renal, endocrine, pregnancy, haematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic response to stress and trauma) in detail and translate its application in a problem solving manner.
- Demonstrate knowledge of Biochemistry relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice (premedication, induction agents - intra-venous and inhalational, neuromuscular blocking agents and reversal of muscle relaxants) - general principles, concepts of

pharmacokinetics and pharmacodynamics, drug interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.

- Demonstrate knowledge of gas laws, medical gas supply system, fluidics, electricity, diathermy and oxygen therapy.
- Demonstrate knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc), breathing systems and monitors, fiber optics, Lasers, Pacemakers and defibrillators, monitoring equipments (used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block), Sterilization of equipments, manufacture, filling and transport of gases and liquid oxygen. etc.
- Demonstrate knowledge of importance of pre-anaesthetic assessment and optimization of a patient; consisting of evaluation, interpretation of laboratory investigation as applied to the care of the patients in planning and conduct of general anaesthesia.
- Demonstrate knowledge of basic life support, advanced cardiac, trauma life support, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universal precautions, selection, maintenance and sterilization of anaesthesia and related equipment, Infection control, cross contamination in OT and ICU. Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it.
- Demonstrate knowledge of principles of artificial ventilation, management of unconscious patients, oxygen therapy, shock- (pathophysiology and management) and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recovery room, in terms of management of
 - ❖ Post-operative pain: various modalities
 - ❖ Nausea and vomiting
 - ❖ Identified emergencies and postoperative complications.
 - ❖ Special precautions to be taken in specific surgical patients.
- Demonstrate knowledge of acute pain management, chronic pain therapy & therapeutic nerve blocks, acupuncture, acupressure and other non-conventional methods of treatment.
- Describe documentation, medico-legal aspects of anaesthesia and concept of informed consent.
- Demonstrate knowledge of research methodology and basics of biostatistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.

- Demonstrate ability to interpret blood gas analysis and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
- Explain blood coagulation mechanism, and their disturbances, rational use of blood and blood components.
- Demonstrate knowledge pertaining to special anaesthetic techniques as relevant to:
 - ❖ Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
 - ❖ Associated medical disorders in surgical patients
 - ❖ Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
 - ❖ Induced hypothermia, incidental, environmental safety of patient.
 - ❖ Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
 - ❖ Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
 - ❖ Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
 - ❖ Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator, Multiple organ failure
- Demonstrate knowledge pertaining to care of terminally ill, Hospices management, Do not resuscitate orders.
- Demonstrate knowledge of general principles of medical audit and Critical incident reporting.
- Demonstrate knowledge of Ethics and clinical trial.
- Demonstrate knowledge of Hospital, ICU and OT design and planning.
- Demonstrate knowledge of Medical education including evidence based medical education.
- Demonstrate knowledge of principles of human resources and material management.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire skills in the following broad areas and be able to:

- Demonstrate ability **as a perioperative physician**, in terms of
 - ❖ Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
 - ❖ Collecting and synthesizing preoperative data from parent hospital and other sources and to develop a rational strategy for the peri-operative care of the patient.
 - ❖ Thorough and systematic approach to preoperative evaluation of patients with and without systemic diseases, undergoing different types of operations.
 - ❖ Prioritizing problems, present cases clearly and systematically to attending consultants.
 - ❖ Developing working relationships with consultants in other specialties to assist in preoperative evaluation and get a good consultation.
 - ❖ Interacting with preoperative patients and developing effective counseling techniques for different anaesthetic techniques and peri-operative procedures.
 - ❖ Assessing and explaining risk of procedure and taking informed consent.
 - ❖ Managing information in preoperative evaluation and outcome enhancement and communication skill to patients and relatives.
 - ❖ Ability to choose and order the required investigations to be done in a particular patient peri operatively
- Demonstrate ability in performing
 - ❖ Pre-operative equipment check
 - ❖ selection of drugs
 - ❖ Preparation of work table etc.
- Identify conditions like difficult airway by following difficult airway algorithms.
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a Failed intubation drill on a Mannequin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.

- Demonstrate abilities to manage Electrolyte and acid base derangements; osmolarity and osmolality.
- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical correlation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:
 - a. Electrocardiogram with ST-segment analysis
 - b. Noninvasive blood pressure
 - c. Capnograph: values and changes in values and waveform.
 - d. Pulse oximetry: values and changes in values
 - e. Neuromuscular blockade monitor
 - f. Invasive arterial pressure: waveform and changes in the waveform
 - g. Central venous pressure: values and waveform
 - h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing.
 - i) Cardiac output
 - ii) Mixed venous oxygen saturation
 - iii) Evoked potential
 - iv) Transesophageal echocardiography: basic understanding
- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.
- Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumbar puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.
- Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V, under supervision.
- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.
- Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.
- Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery,

and for all major surgeries, able to manage critically ill patients and treat intractable pain.

- Demonstrate following abilities in **Emergency Anaesthesia, Trauma and Resuscitation:**
 - ❖ Organize resources in case of mass casualty.
 - ❖ Perform triage.
 - ❖ Assess, transport and manage mass casualties / disaster management and camp anaesthesia.
 - ❖ Manage massive haemorrhage and massive blood transfusion.
 - ❖ Transport critically ill patient.
 - ❖ Perform anaesthetic management of geriatric patients with fracture neck of femur
 - ❖ Manage severe burns patients, rapidly progressing spinal compression, massive haemoptysis and lobectomy, peritonitis from various suspected causes, preparation and management of bowel obstruction, septicaemic shock, acute upper airway obstruction such as foreign body, epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta
 - ❖ Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.
 - ❖ Management of intra-operative cardiac arrest
 - ❖ Management of intra-operative bronchospasm
- Demonstrate ability to document a Medico-legal aspect.
- Demonstrate ability to provide special sedation /**anaesthesia requirements outside operating Room**, eg **Radiology**: for CT, MRI (especially in relation to dye allergy and embolization, **Oncho radiotherapy**, **Electroconvulsive shock therapy** (modified ECT. **Non-invasive cardio-radiologic procedures** including balloon angioplasty and cardiac catheterization, **Non-invasive neuro-radiologic procedures, lithotripsy** etc .
- Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.
- Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty
- Demonstrate following abilities in the **Post Anaesthesia Care Unit (PACU)**
 - ❖ Assess the patient's recovery and condition for a safe discharge or transfer.
 - ❖ Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthesia Care Unit (PACU) especially those in relation to cardio-respiratory systems:
 1. Airway integrity and compromise.

2. Arrhythmia
3. Hypertension
4. Hypotension
5. Pain prevention and pain relief
6. Nausea and vomiting
7. Decreased urine output
8. Emergence delirium
9. Delayed emergence from anaesthesia
10. Shivering
11. Post-obstructive pulmonary edema.

- ❖ Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.
- ❖ Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.

- **Demonstration of following abilities in Intensive Care Unit**

- ❖ **Understanding the spectrum of critical illnesses requiring admission to ICU.**
- ❖ Recognizing the critically ill patient who needs intensive care -Trauma, burns, all types of shock, Sepsis, SIRS and ARDS, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.
- ❖ Monitoring progress of patients by physiological scoring systems
- ❖ Practicing infection control practices and control of nosocomial infections.
- ❖ Inserting central venous lines, arterial lines using ultrasound and interpreting the data.
- ❖ Managing cardiovascular instability, respiratory failure and postoperative pulmonary complications
- ❖ Understanding of the operation of mechanical ventilators including different ventilatory modalities non-invasive ventilation, complications and modes of weaning.
- ❖ Principles and application of Oxygen Therapy
- ❖ Glycemic control in the critically ill patient
- ❖ Practice of Hypothermia and prevention of cerebral injury after cardiac arrest
- ❖ Delivering appropriate nutritional support - enteral and parenteral.
- ❖ Proper use of sedative/hypnotic drugs in the ICU.
- ❖ Practicing ethical and legal aspects of critical care
- ❖ Good communication skills with patient and relatives.
- ❖ Proper Sterilization of ICU equipment.

- Demonstration of following abilities in **Acute and Chronic Pain Management**
 - ❖ Assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.
 - ❖ Classify types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.
 - ❖ Practice the different modalities of physical therapy that may relieve both acute and chronic pain
 - ❖ Practice the acute pain, cancer pain guidelines and WHO treatment ladder.
 - ❖ Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.
 - ❖ Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, Physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy, Pharmacology and side effects of epidural/intra-thecal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess. Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture
- Demonstration of abilities to manage **Chronic Pain**
 - ❖ Practice different modalities of chronic pain management - physical therapy, psychotherapy, (including cognitive behavioural approaches), neuro-ablation, neuro-augmentation, spinal opioid, interventional neuro-blockade, non-opioid analgesia.
 - ❖ Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).
 - ❖ Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain - phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.
 - ❖ Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
 - ❖ Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve

- ❖ Recognize complications associated with each blocks and know appropriate treatment of each
 - ❖ Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.
 - ❖ Mechanisms and side effects of other therapies used for treating pain.
 - ❖ The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.
 - ❖ Awareness of the principles for insertion and management of implantable drug delivery pumps.
 - ❖ Awareness of the basic principles of palliative care.
- **Demonstrate practice of Regional Anaesthesia**
 - ❖ Applying general principles of pharmacology of local anaesthetics and various adjuvants.
 - ❖ Familiarizing with the relevant anatomy for regional techniques.
 - ❖ Application of indications and contraindications to regional anesthetic technique including central neuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.
 - ❖ Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.
 - ❖ Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.
 - ❖ Performing the following regional anaesthesia techniques:
 - Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Paravertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.
- **Demonstrate practice of Thoracic Anaesthesia**
 - ❖ Pre-operative assessment of patients undergoing Thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy
 - ❖ Various approaches and their relevant equipments for lung isolation.
 - ❖ Various double lumen tubes and their placement.
 - ❖ Application of Principle of chest drain.
 - ❖ Respiratory Physiology and management of one lung ventilation (OLV). Indications, contraindications and hazards of OLV.

- ❖ Application of the knowledge of Anatomy of lung and broncho-pulmonary segments.
 - ❖ Anatomy and techniques for intercostals nerve block and thoracic epidural. Management of thoracic epidural anaesthesia and analgesia
 - ❖ Anatomy, techniques and placement of paravertebral block/catheter.
 - ❖ Post-operative care of patients after lung surgery.
 - ❖ Peri-operative management of patients with myasthenia gravis.
 - ❖ Peri-operative management of patients with mediastinal mass.
 - ❖ Anaesthetic management of mediastinoscopy, major airway stenting.
 - ❖ Lung volume reduction surgery and problems.
- **Demonstrate practice of Cardiovascular Anaesthesia:**
 - ❖ Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories. Pulmonary circulation, coronary circulation, cerebral circulation, visceral circulation.
 - ❖ Application of the knowledge of Distribution of blood volume to different organs and systems and their control. Microcirculation. Venous system, venous pressure, its influence on various functions.
 - ❖ Regulation of blood pressure, hypotensive anaesthesia.
 - ❖ Anatomy and physiology of all operable congenital heart disease like ASD, VSD, PDA, TOF, transposition of great vessels.
 - ❖ Application of the knowledge of anatomy and physiology of vascular heart disease like co-arcuation of aorta.
 - ❖ Assessment of cardiac patient with ischaemic heart, valvular heart disease and other diseases listed above. Understanding of cardiac catheterization, echocardiography, stress testing, and radio-nucleide imaging.
 - ❖ Application of Principle and complication of cardiopulmonary bypass
 - ❖ Application of Principle of trans-esophageal echocardiography
 - ❖ Application of Principle of circulatory support: inotropes, IABP, pacing
 - ❖ Coagulation and management of coagulopathy.
 - ❖ Off pump bypass
 - ❖ Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, recanalisation procedures.
 - ❖ Understanding of the adult patient with congenital heart disease and their management during anaesthesia.
 - ❖ Postoperative cardiac critical care, including cardiovascular problems, analgesia.
 - ❖ Insertion of invasive monitoring for arterial monitoring, central venous pressure monitoring, pulmonary artery catheter insertion and interpretation.
 - ❖ Robotic cardiac surgery.

- **Demonstrate practice of Paediatric Anaesthesia**

- ❖ Application of knowledge of Anatomical changes in paediatric patient and neonates.
- ❖ Application of knowledge of Physiology and pharmacology in paediatric patient.
- ❖ Guideline for pre-operative fasting in children and pre-medication.
- ❖ Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.
- ❖ Anaesthesia management for premature and newborn.
- ❖ Emotional problems for parent and child and principles of premedication. Consent by parents and their presence during induction. To become skilled in communicating with children, parents and other relatives.
- ❖ Problems of transporting a sick pediatric patient from the ward to the operating room and back with regard to temperature maintenance, cardiovascular stability, ventilation and oxygenation.
- ❖ Estimate preoperatively blood volume, hourly fluid requirements, fluid deficit, third space loss, acceptable blood loss and apply principles of fluid and blood replacement in the perioperative period.
- ❖ Induce and maintain anaesthesia by inhalation, intravenous, intramuscular and rectal routes and monitor pediatric patients.
- ❖ Understand the benefits, risks and techniques of regional anaesthesia in children. Anatomy and techniques of caudal, dorsal penile and inguinal regional block, spinal and epidural block
- ❖ Learn to recognize and treat post anaesthesia complications like apnea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
- ❖ Common problems related to common congenital syndromes presenting for surgery. Anaesthetic management of a child with concurrent disease – Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's, Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanotic congenital heart disease.
- ❖ Paediatric resuscitation: drugs, doses and defibrillation of children of all ages, from the very premature neonates to those children with complex coexisting disease.
- ❖ Management of patients requiring paediatric intensive care, ventilatory management, and support of circulation.
- ❖ Resuscitation of neonates and children of all ages. A period of one to two months in a PICU is recommended for all post graduate students undergoing advanced training in paediatric anaesthesia.
- ❖ Paediatric pain management
- ❖ Assessment of a child with URTI, with a heart murmur.
- ❖ Management of fluid and electrolytes in children.

- ❖ Anaesthetic management of a malignant hyperthermia susceptible child.
- ❖ Anaesthetic management of FB bronchus, oesophagus, Wilm's tumour, congenital diaphragmatic hernia, tracheo-oesophagus fistula, thoracotomy.
- ❖ Anaesthesia for Fetal Surgery.
- ❖ Sedation techniques including the selection, management and monitoring of children for diagnostic and therapeutic procedures, with particular attention to working in areas outside the theatre suite.
- **Demonstrate practice of Transplant anaesthesia**
 - ❖ Application of knowledge of basic pathophysiology of renal and liver failure. Principles of anesthetizing an immuno-compromised patient.
 - ❖ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management.
- **Demonstrate practice of Neuroanaesthesia**
 - ❖ Application of basic knowledge of cerebral circulation and intra cranial pressure and its implications
 - ❖ Anaesthesia to patients with neurologic disease, head injury undergoing neurologic or non-neurologic surgery and for diagnostic procedures requiring anaesthesia.
 - ❖ Anesthetic implications of the most common neurosurgical procedures, transnasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery. Surgery for supratentorial pathology.
 - ❖ Application of basic concepts behind electrophysiologic monitoring of the brain and spinal cord.
 - ❖ Application of knowledge of general principles of positioning the patient for surgery and the advantages and disadvantages of each position.
 - ❖ Effects of anaesthesia on the electroencephalogram (EEG) and evoked potentials.
 - ❖ Differential diagnoses and treatment alternatives of intraoperative intracranial hypertension (“tight brain”)
 - ❖ Management of Head Trauma, and its anesthetic management and various protocols regarding their management and associated trauma.
 - ❖ Intracranial surgery and spinal surgery, both routine and emergency.
 - ❖ Monitoring: techniques for detection and management of air embolism.
 - ❖ Lumbar puncture and CSF drainage.
 - ❖ Non-surgical management of the head trauma patient, Systemic complications of severe brain injury.
 - ❖ Management of subarachnoid haemorrhage and vasospasm.
 - ❖ Diagnosis and management of patients with brainstem death; and dealing with patient's relatives

- **The following are special procedures which the post graduate student must be able to perform**

Sr. No.	Name of procedure
1.	Blind Nasal intubation
2.	Failed intubation drill (includes Fiberoptic Laryngo/ Bronchoscope)
3.	Double Lumen Tube
4.	Bronchial Blocker placement
5.	Jet Ventilation
6.	Suctioning and physiotherapy of wet lung
7.	Intubation in Neonates
8.	Initiation and management of ventilation
9.	Combined Spinal Epidural
10.	Brachial Plexus Block
11.	Intravenous Regional Anaesthesia
12.	Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle - each
13.	Cervical-Superficial and Deep, Stellate, Splanchnic - each
14.	Central Venous Line by Brachial, Jugular and Subclavian veins
15.	Radial and Femoral Artery cannulation
16.	CVP monitoring
17.	Pulmonary Capillary Wedge Pressure
18.	Neuro-muscular transmission Monitoring
19.	Anaesthetic Depth eg. BIS monitoring

- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopaedic, Gynaecology – Obstetrics, General surgery, Onchosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc

Suggested Time Frame for Training the PG Students:

The student should be taught as per the following schedule to acquire the skills:

1. First 6 months:

- During the first 6 months, the student should be taught expertise in the management of uncomplicated cases not belonging to any super specialty (ASA I and II cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal anaesthesia to ASA I and II cases for minor and major surgery, under graded supervision.
- The postgraduate student should learn the basic principles of safe and effective anaesthesia, resuscitation, and both the prevention and treatment of pain,

perioperative care of the surgical patient, care of handling equipments, basic techniques in anaesthesia, and anaesthetic pharmacology, and electrical safety.

- He/she should select the thesis topic and submit the protocol for his thesis.

2. Next 18 months

- The student should widen his experience and should be able to undertake anaesthetic care of all routine cases, assist in the anaesthetic care for routine obstetric practice, understand basic principles of critical care, pain management, and participate in audit.
- The student should be trained in administration of general anaesthesia and regional anaesthesia for ASA I to V under supervision. The student should be able to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision, and use of Ultrasound machine for giving blocks and venous cannulation. The student should learn paediatric and trauma life supports and maintain skills for basic and advanced cardiac life support.
- It is advised that they should be posted in the following specialties: general surgery including gastrointestinal surgery, transplant, ENT, Urology, Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and peripheral theatres like ECT, radiodiagnostic and therapeutic procedures (CT scan, MRI scan, angiography).
- The student should be able to analyze data and write a thesis. He/she should be able to present scientific data.

3. Last 12 months

- Thesis should be submitted minimum of 6 months before the final MD examination.
- The post graduate student should be given experience of various super-specialties like cardiothoracic and vascular surgery, neurosurgery and transplantation, and paediatric surgery. The student should be able to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries. The aim at the end is to be competent and independent soon after the third year of junior residency in providing anaesthesia to elective and emergency cases.
- The post graduate student should be able to manage critically ill patients and treat intractable pain. They should also know how to organize resources in case of mass casualty. The curriculum should be able to provide 04 months of elective Intensive Care Unit posting (2 months during initial years under supervision and 2 months independently in the last six months).

4. At the end of 3 years, the post graduate student should have the skills to:

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialties.

- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
- Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- Should be able to participate in anaesthesia audit.

Overall the student should acquire skills in the following practical competencies:

- ❖ Information management in preoperative evaluation and outcome enhancement and communication skill to patient and relatives.

Syllabus

The course content of **1st year** should cover the following:

1. **Anatomy related to:**

- Diaphragm, upper and lower airway
- Regional anaesthesia, field block, central neuraxial, blockade, block for acute pain states
- Intramuscular injections, arterial and venous cannulations and positioning.

2. **Physics related to:**

- Anaesthesia machine - assembly of necessary items.
- Airway equipment including laryngoscopes, airway devices
- Breathing systems
- Monitoring in anaesthesia with concepts of minimum monitoring
- Gas laws, medical gas supply system
- Fluidics
- Electricity and diathermy
- Oxygen therapy

3. **Physiology related to:**

- Theories of anaesthesia
- Respiratory, cardiovascular, hepatobiliary, renal and endocrine system, pregnancy, blood, muscle and N-M junction, Nerve impulse transmission, ECG, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP.

- Central, autonomic and peripheral nervous systems.
- Metabolic response to stress and trauma.

4. **Pharmacology** related to

- General principles, concepts of pharmacokinetics and pharmacodynamics
 - Drug interactions in anaesthesiology, anaphylactoid reactions
 - Drugs used for premedication, induction of anaesthesia, general anaesthetics-intra-venous and inhalational, neuromuscular block and reversal of muscle relaxants.
5. **Biochemistry** relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
 6. Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia, general principles of pre-anesthetic assessment and medication, recovery from anaesthesia and post operative care, effects of positioning during anaesthesia.
 7. Introduction to the operation theatre, post-anaesthesia care rooms
 8. Introduction to acute, chronic pain and pain management.
 9. Documentation and medico-legal aspects of anaesthesia. Defensive anaesthesia. Concept of informed consent.
 10. Resuscitation - basic and advanced life support (cardiac and trauma life support), neonatal resuscitation.
 11. Intensive care of critical patients with introduction to artificial ventilation, management of unconscious patients, oxygen therapy, shock - pathophysiology and management.
 12. Introduction to Research methodology, basics of biostatistics.

The course content of **2nd year** should cover the following:

Anatomy related to blocks for chronic pain, chemical neurolysis and different organ systems.

1. **Physics related to:**

- equipments used in anaesthesia monitors, ventilators, vaporizers,
- fiberoptics.
- Laser
- Pacemaker and defibrillator
- Monitoring equipment used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block.
- Sterilization of equipment
- Computers in anaesthesia

2. Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
3. Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
4. Blood coagulation mechanism, disturbances, blood components.
5. Special anaesthetic techniques as relevant to –
 - Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
 - Associated medical disorders in surgical patients
6. Geriatric and pediatric anaesthesia
7. Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
8. Medical statistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.
9. Care of terminally ill, Hospices management. Do not resuscitate orders.
10. Postures and anaesthesia.
11. Induced hypothermia, incidental, environmental safety of patient.
12. Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
13. Third world anaesthesia.
14. Inherited metabolic diseases and anaesthesia.

The course contents of **3rd year** should cover the following:

1. Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
2. Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
3. Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator.
4. Multiple organ failure
5. Infection control, cross contamination in OT and ICU.
6. Immune response and anaesthesia.
7. Concept of cytokines, and other enzymes.
8. Selection, maintenance and sterilization of anaesthesia and related equipment
9. Chronic pain therapy and therapeutic nerve blocks.
10. Acupuncture, acupressure and other non-conventional methods of treatment.
11. Principles of neonatal resuscitation, ventilation and critical care.
12. Principles of human resources and material management.

13. General principles of medical audit. Critical incident reporting
14. Ethics and clinical trial.
15. Hospital, ICU and OT design and planning.
16. Medical education including evidence based medical education.

TEACHING AND LEARNING METHODS

Postgraduate Training

Teaching methodology

Didactic lectures are of least importance.

- Teaching should include seminars, journal clubs, symposia, tutorials, case discussions, and research presentations.
- Reviews and guest lectures should get priority for theoretical knowledge.
- Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning.
- Student should have hands-on training in performing various procedures (medical/surgical concerning his specialty) and ability to interpret various tests/investigations.
- Exposure to newer specialized diagnostic/therapeutic procedures concerning his/her subject should be given.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Log books shall be maintained regularly and should be checked and assessed periodically by the faculty members imparting the training.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

Thesis: Supervision

- The postgraduate is responsible to a Faculty member and the latter should be available to advise and assist the student in his clinical assignments
- Departmental teaching committee will be responsible for the educational activities of the department and the teaching schedule.
- This involves providing services for emergencies and it makes different demands upon the anaesthesiologist. It should be learned through experience, with reduced staff. The clinical work during emergency should have a close supervision. The standards should be maintained of the agreed competence on schedule. The

emergency duties should be properly arranged with duty off. The postgraduates may have to do emergency duty as per schedule

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

Simulators:

Simulators should be used for the events of high importance but infrequent occurrence and where there may be high risks to the patients. The simulators can also be used for assessment purposes.

Rotation:

Schedule for three years of MD Anaesthesia postings:

The post graduate student should be exposed to the following areas of clinical anaesthesia practice:

1. Pre-anaesthesia clinic
2. Pain clinic
3. Recovery and Post anaesthesia Care Unit (PACU)
4. Intensive Care Units
5. Dialysis and transplant
6. All specialty theatres
7. Peripheral areas: Radiology, MRI, ECT and other interventional laboratories

The suggested schedule of the Operating Theatre can be as follows: This may change as per availability of specialities.

Operation theatre	Months
General Surgery	6
Urology	1
Ophthalmology	1
Otorhinology	2
Dental	1
Orthopedics/Trauma/casualty	3
Gynecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic	1
CTVS	2
Neurosurgery	2

ICU	4
Pain	1
Recovery	1
Organ Transplant posting in the other areas. ECT, Cardiac Cath)	(Radiology,Radiotherapy)

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination. The thesis is assessed separately.

Quarterly assessment during the MD training should be based on:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

Post graduate Examination

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

The final examination consists of three parts:

- 1) Thesis
- 2) Theory evaluation
- 3) Practical/Clinical and Oral evaluation

1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory consists of four papers of 3 hours each having 10 short structured questions with 10 marks each:

Paper I: Basic Sciences as applied to Anaesthesiology

Paper II: Practice of Anaesthesia: Anaesthesia in relation to associated systemic and medical diseases.

Paper III: Anaesthesia in relation to subspecialties/superspecialties

Paper IV: Intensive Care Medicine, Pain Medicine and Recent advances.

3. Practical/Clinical Examination: will consist of: 3 clinical cases,

Long case: One, duration 30 min (history, examination, Diagnosis and Management, Discussion)

Short cases: Two, 15 minutes each for short case. In short cases only relevant history important to anaesthesia to be taken (history, clinical examination and diagnosis, discussion).

Oral/Viva-voce should be conducted preferably on four tables with one examiner on each table:

Table one: ECG, X-rays, ABG Cards, Pulmonary function tests, Capnographs, clinical exercises card. Table two: Anaesthetic Drugs, Emergency Drugs, IV Fluids, Nerve Blocks (skeleton) .

Table three: Anaesthesia machine including circuits and Vaporizers, ETT, Supraglottic Airway devices, ICU Ventilator and oxygen therapy equipment.

Table four: Resuscitation equipments, resuscitation demonstration, Difficult Airway Equipment, monitoring equipments.

Alternatively,

1. One long case, viva voce at one station with all examiners, and : 150 marks
2. 28 OSCE station covering two stations of short cases, drugs ECG, X-rays, PFT, ABG, Respiratory loops, Resuscitation etc.,: 150 marks

Recommended Reading

Books (latest edition)

1. Lee's Synopsis of Anaesthesia
2. Clinical Anesthesiology by Morgan
3. Cardiac Anaesthesia By Joel Kaplan
4. Clinical Anaesthesia by Barash, Cullen and Stoelting
5. Textbook of Anaesthesia by Aitkenhead Rowbotham and Smith
6. Anaesthesia for neonates and infants by Smith
7. Pharmacology and Physiology for Anaesthetists by Stoelting
8. Principles of Obstetric Anaesthesia by Craford
9. Miller's Anesthesia
10. Stoelting RK, Miller RD Basics of Anaesthesia
11. ICU Book, Paul Marino
12. Text Book of Critical Care, by Fink et al
13. Regional Anaesthesia, P Prithviraj
14. Practical Management of Pain, Raj
15. Stoelting and Dierdorf: Anaesthesia and Co-existing Disease
16. Dorsch and Dorsch: Understanding Anaesthesia Equipments
17. ECG by Shamroth/Goldman
18. Anatomy for Anaesthetists by Harold Ellis
19. Clinical Anesthesia by P.G.Barash
20. Longnecker's Anaesthesiology- Mcgraw Hill

Must refer:

1. Cucchiara and Michenfelder: Clinical Neuroanaesthesia
2. Cottrell and Smith: Anaesthesia and Neurosurgery
3. Complications in Anaesthesiology by Orkin
4. Complications in Anaesthesia by Raven
5. Airway management by JL Benumof
6. Obstetric Anaesthesia by Chestnut

Journals

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/24

Date: 16-11-2022

**GUIDELINES FOR COMPETENCY BASED
POSTGRADUATE TRAINING
PROGRAMME FOR
MD IN BIOCHEMISTRY**

GUIDELINES FOR COMPETENCY-BASED POSTGRADUATE TRAINING FOR MD IN BIOCHEMISTRY

Preamble

A competency is the capability to apply or use a set of related knowledge, skills, and abilities required to successfully perform "critical work functions" or tasks in a defined work setting. Competency-based training is a learning model in which the required level of knowledge and skill (competency) on a task must be demonstrated. The purpose of the competency-based postgraduate education in Biochemistry is to create specialists, with the required knowledge, skills, and attitude, who would provide high-quality healthcare complying with the principles of personal integrity and professional ethics and would advance the cause of science through teaching, research & training along with constant updating of his/her knowledge and skills as a lifelong self-directed learner.

The student, after undergoing training in MD Biochemistry, should be able to demonstrate his/her knowledge of the basic concepts and recent advances in the subject, and a defined set of skills including expertise in various laboratory techniques applicable to metabolic and molecular aspects of medicine, planning and executing research projects, writing research papers/ articles demonstrating the acquired training in research methodology. The postgraduate training course should equip the student with skills to become a competent teacher who is also able to demonstrate his/her competence in planning teaching programs and apply those to facilitate the learning of the students in medical and allied health science courses in compliance with the curriculum while advancing the same with needful and feasible innovations. He/she should demonstrate competence in integrating teaching-learning of Biochemistry with other relevant subjects/disciplines to facilitate the holistic application of the subject of Biochemistry in patient care. He/she should be able to demonstrate his/her training in good laboratory practices with the ability to set up/manage a quality-controlled and quality-assured diagnostic laboratory, generate, evaluate, interpret and report the diagnostic laboratory data, with a good understanding of the sources of errors,

corrective and preventive actions, hospital and laboratory information system network, and interact with clinicians as may be needed for effective patient care.

This document aims to provide teachers and learners with comprehensive guidelines to achieve a defined set of outcomes through learning and assessment and apply those in a given setup. This document has been framed by the Expert Group of the National Medical Commission with an aim to render a uniform PG medical curriculum to be implemented by all the medical colleges in the country. The curriculum so designed has been named the competency-based PG medical education curriculum in conformity with the purpose and content of PG medical education.

SUBJECT-SPECIFIC LEARNING OBJECTIVES

Goal:

The goal of the training program in MD Biochemistry is to enable a student to become a competent teacher/facilitator of teaching-learning processes, researcher, problem solver, and healthcare provider. He/ she should be able to acquire a defined set of cognition and skills as detailed below and demonstrate his ability to apply the same in a given healthcare setup.

a. Acquisition of Knowledge

The student should be able to explain the molecular, physical, and physiological logic of the processes involved in the maintenance of normal health and their deviation in a disease state. He/should be able to integrate his/her acquired knowledge in principles and concepts of classical biochemistry, biophysics, and molecular biology, comprehend and apply his/her cognition and skills in a professional patient care setup.

b. Acquisition of Skills

The student should be able to facilitate the UG and PG learning of biochemical concepts and principles and should be able to render hands-on training in the Biochemical laboratory investigations and experimentations relevant to the strengthening of biochemical concepts, scientific and clinical problem-solving, and biomedical research. He/she should be able to

analyze, interpret and evaluate the data, and rationalize their application in clinical management and experimental research.

c. Teaching and training

As a competent healthcare personnel, the student should develop his/her learning skills by applying the fundamental principles of medical education, through teaching and assessing the undergraduate students in medicine and allied health science courses and, by contributing to the training of postgraduate students.

d. Diagnostic laboratory skills

The student should be competent in setting up/supervising/managing a diagnostic laboratory in Biochemistry in a hospital or in any other setup (diagnostic units in remote places or independent of a hospital setting) ensuring quality control along with quality assurance and providing reliable healthcare support services. The student should be able to provide consultation to clinicians and also contribute to community healthcare by conducting screening tests.

e. Professionalism, Ethics, Communication skills

The student should be able to develop and sustain work ethics and empathetic behavior with students and colleagues. He/she should be able to demonstrate professional integrity, honesty, and higher ethical standards and be able to display appropriate attitude and communication skills to interact with colleagues, teachers, students, laboratory personnel, and other healthcare professionals. While dealing with the patients and their relatives, he/she should exhibit compassion, care, and concern.

f. Research

The student should be able to demonstrate his/her competence in carrying out research work and related activities from the planning phase to writing (dissertation/thesis, research report/research paper) by applying the principles of research methodology.

LEARNING OBJECTIVES

At the end of three years of training in the MD Biochemistry course, a postgraduate student should be able to:

- Demonstrate his/her knowledge of Biochemistry, Cell Biology, Molecular Biology, Molecular diagnostics, Biophysics, and applied aspects of all the mentioned branches to contribute to the teaching-learning processes and healthcare management.
- Identify learning needs and set the learning objectives for his/her self-directed learning and acquire and apply the needful learning in subjects like Genetics, Nutrition & Dietetics, Immunochemistry, and Laboratory Medicine in a relevant context.
- Apply the Medical Education principles to effectively contribute to Teaching-Learning processes, Assessment & Integrated learning.
- Demonstrate his/her knowledge about various aspects of the Competency-based UG medical education implemented w.e.f academic year 2019-20.
- Explain, comprehend and analyze the basics of Cellular and Molecular Biochemistry, functional mechanisms of the biomolecules and their logistics in the human body in normal health and their deviations in the disease conditions. He/she should be able to integrate his/her cognition and skills to facilitate medical education for undergraduate, postgraduate, and allied health sciences students and for patient management.
- Demonstrate administrative, decision-making, group activity, teamwork, and leadership skills in (a) setting up a department in the medical institution and (b) diagnostic services in the hospital and managing them as a part of the healthcare team.
- Analyze, interpret and evaluate laboratory data and provide consultancy to the clinician for judicious use of lab tests, with appropriate interpretation whenever needed, to facilitate the diagnosis, treatment, follow-up, and overall management of patients.
- Conduct research and related activities in the field of Biochemistry, Clinical Biochemistry, Molecular diagnostics, and Medical Education.
- Analyze, interpret, evaluate, appraise and present research-related data and publications to identify the best clinical evidence for research and demonstrate his/her competence in scientific /clinical work presentation.
- Describe the principles of evidence-based medicine, evidence-based practice, good laboratory practice, and good clinical practice.

- Communicate effectively to fellow colleagues, teachers, patients & their relatives and other healthcare members for providing services to the community.
- Actively participate in all the teaching-learning-related activities like CMEs/workshops/conferences/hands-on-training/Interdepartmental meets/clinical meetings and acquire interpersonal skills.

SUBJECT/DOMAIN-SPECIFIC COMPETENCIES

At the end of three years training course, the postgraduate student should be able to demonstrate the competencies under the following three domains:

A. Cognitive domain (Knowledge domain)

1. Describe the biochemical principles and mechanisms to define and explain a healthy, and a diseased state, and execute the application of the biochemical mechanisms in the perception, diagnosis, and treatment of a disease.
2. Describe the biomolecules and their importance in sustaining life processes.
3. Explain the concept of intermediary metabolism, energy transactions, and metabolic and molecular homeostasis in the sustenance of life.
4. Explain the characteristics, components, and functional significance of different metabolic pathways, their specific intermediates, their inter-conversions, pathway-specific, organ-specific, and interrelated regulation of metabolic pathways, and apply that in explaining the biochemical logic in the functioning of the body in health and disease.
5. Describe and apply the concept of nutrition in health and disease, and critically evaluate the role of essential micro- and macro-nutrients, and their interlinks with cellular metabolism.
6. Apply the integrated knowledge and understanding of biochemical principles and mechanisms in clinical problem-solving.
7. Demonstrate knowledge of genetic engineering in various fields of medicine.
8. Apply the principles of biostatistics in research, clinical laboratory practices, community-based health data collection, and epidemiological surveys.
9. Demonstrate knowledge of the establishment of a diagnostic laboratory and its accreditation process.

10. Analyze, interpret and evaluate biochemical laboratory findings in integration with the relevant clinical data to evaluate, analyze and monitor a disease state.
11. Apply the knowledge acquired in the basic principles of research methodology to develop a research protocol.
12. Make use of the latest available statistical tools for analyzing the research data, and interpreting and disseminating the results.
13. Demonstrate familiarity with the advances in artificial intelligence and computer-based modeling as and when required.
14. Describe and implement various components of the Competency-based UG Medical Education.
15. Apply the principles of teaching-learning technology while taking interactive classroom lectures, prepare modules for case-based learning (CBL) and problem-based learning (PBL), organize and conduct CBLs/PBLs, case discussions, small group discussions, seminars, journal clubs, and research presentations.
16. Explain the principles of instrumentation and their automation in the Biochemistry laboratory and demonstrate knowledge about the latest advances in technology.
17. Exhibit knowledge of professional ethics and integrity in his/her day-to-day conduct and services rendered.
18. Apply the updated knowledge to suggest and implement judicious use of clinical laboratory investigations.
19. Demonstrate knowledge on the use of laboratory gadgets and instruments taking necessary precautions.
20. Demonstrate knowledge on the preparation of solutions and reagents with necessary precautions as may be required for the estimations in experimental and diagnostic laboratories.
21. Display knowledge about recent advances and trends in the core subject area, research, and laboratory practice along with point-of-care testing (POCT) in the field of biochemistry.

B. Affective domain (Attitudes including Communication and Professionalism)

1. Communicate appropriately with peers, teachers, healthcare professionals, and patients coming from a variety of backgrounds to explain the molecular and metabolic basis of health and disease in integration with lifestyle management.
2. Demonstrate care, concern, respect, empathy, and compassion while dealing with patients and their relatives at any point of interaction.
3. Demonstrate progressive improvement in AETCOM in routine endeavors through self-assessment, feedback from the peers, stakeholders and adapting to relevant learning.
4. Explain effectively to the patients/their relatives the precautions and preparations needed for them to comply with for specific biochemical analysis/laboratory tests that they will be subjected to.
5. Ensure that the related technical staff is apprised of the above and is duly trained while dealing with the patients.
6. Apply ethical principles and display proper etiquette in dealing with patients, relatives, and other health personnel.
7. Demonstrate appropriate attitude and ethical behavior in exchanging feedback with peers, teachers, clinicians, patients, and their relatives.
8. Display ethical behavior, and personal and professional integrity in his/her conduct and services.
9. Demonstrate the ability to maintain confidentiality in declaring the laboratory results to the concerned personnel wherever applicable.
10. Display awareness and respect for the rights of the patients.
11. Demonstrate counseling skills, especially in the context of nutritional and genetic counseling.
12. Demonstrate competency in judicious decision-making free from personal beliefs/thoughts, pride, and prejudice and, that, no such limitations impact his/her professional performance.

C. Psychomotor domain

1. Demonstrate the principles and facts of cellular and molecular biochemistry by performing relevant laboratory exercises and analytical tests on body fluids, and other

biologically important substances, along with documentation of the test procedures, results, and interpretation of findings.

2. Develop a differential diagnosis, wherever applicable, based on the results obtained after performing the requisite tests.
3. Plan & conduct lectures, practical demonstrations, tutorial classes, and case-based or problem-based small group discussions for undergraduate students of medical and allied disciplines.
4. Identify, select and perform various biochemical tests in the clinical laboratory which are useful in the diagnosis, treatment, follow-up, and overall management of diseases and be able to interpret the results of such tests.
5. Perform relevant biochemical, immunological, and molecular biology techniques, wherever applicable.
6. Demonstrate compliance with the standard operating procedures of various methods and techniques used in a clinical biochemistry laboratory.
7. Perform enzymatic assays and conduct experiments to study enzyme kinetics affirming the ability to discuss, interpret and document the related data.
8. Perform routine investigations in hematology and microbiology, as and when required.
9. Demonstrate presentation skills at academic meetings and scientific paper writing skills.
10. Prepare research protocols and conduct relevant experimental studies.
11. Analyze and solve clinical and experimental problems.

By the end of the course, the postgraduate student should be able to demonstrate his competency in performing the following procedures independently:

- Demonstrate the use of all the routine glassware/equipment used in UG teaching-learning in Biochemistry (as per MSR) and advanced instruments used in the clinical laboratory attached to the respective hospital for patient care.
- Preparation of buffers, normal laboratory solutions like molar/molal/normal and reagents with validation.
- Perform all the undergraduate practicals as per the new competency-based medical education prescribed by NMC.

- Perform experiments to study selected reactions of carbohydrates, amino acids and proteins, and lipids.
- Perform experiments to demonstrate constituents of milk.
- Perform experiments to demonstrate normal and abnormal constituents of urine.
- Perform Paper chromatography for separation of amino acids.
- Determination of enzyme activity and study of enzyme kinetics, using any two suitable enzymes (e.g., alkaline phosphatase from any liver tissue or acid phosphatase from potatoes).
- Plot standard curve for different estimations.
- Estimate (including calibration) and interpret clinical analytes as detailed below:
 - Blood glucose, glycated hemoglobin, the performance of glucose tolerance test and glucose challenge test,
 - Total protein, albumin, and A:G ratio,
 - Electrolytes, arterial blood gas analysis,
 - Cholesterol, triglycerides, free fatty acids, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), phospholipids, Lp(a), and calculated parameters under lipid profile,
 - Amylase, lipase,
 - Urea, creatinine, uric acid, urinary microalbumin,
 - Parameters of liver function tests (bilirubin, hepato-biliary enzymes such as AST, ALT, ALP, GGT, serum proteins/albumin and prothrombin time, CRP),
 - Calcium, magnesium, phosphorus, copper (and ceruloplasmin), serum iron, TIBC, and ferritin,
 - Markers of myocardial damage (CK, CK-MB, troponins, LDH),
 - Vitamin D, B₁₂, and folate,
 - Point-of-care testing (POCT).
- Electrophoresis of serum proteins, lipoproteins,
- Separation and molecular weight determination of proteins by SDS-PAGE,
- Electrophoretic separation of LDH isozymes or any other isoenzymes,
- Hb electrophoresis,

- Renal clearance tests,
- CSF and other body fluid analysis,
- Stone analysis,
- Thyroid function tests, Tumor markers, and relevant hormone assays by ELISA/RIA/Chemiluminescence.

Clinical Laboratory

- Demonstrate familiarity with the essentials of a clinical laboratory setup, the working of autoanalyzer, data transfer, statistical considerations, authorizing and reporting results in an advanced clinical laboratory with an ability to enlist the possible sources of errors (pre-analytical, analytical and post-analytical), perform root cause analysis, and undertake corrective actions, and preventive actions (CAPA).
- Perform and demonstrate activities under total quality management (TQM) of the Laboratory:
 - a. Specimen collection, handling, processing, and storage of the sample.
 - b. Methods of standardization & calibration.
 - c. Methods of quality control, quality assurance, CAPA & assessment.
- Demonstrate ability to prepare and interpret a Levy-Jennings chart and plot inter-assay and intra-assay variation for any analyte estimated in the laboratory.
- Implementation and interpretation of Westgard rules followed by their CAPA, as required.
 - Determination of reference values for any one parameter for the clinical laboratory.
 - Perform inter-instrumental comparison for at least four parameters.
 - Perform in-house calibration of pipettes, centrifuge, hot-air oven, thermometer, and thermo-hygrometer.
- Student should undergo internal auditor training as per ISO 15189:2012, NABL (optional).
- Able to prepare a lab quality manual and frame relevant Standard Operating Procedure (SOP) and Work Desk Instructions (WDI), for every procedure followed in a clinical lab.

Molecular laboratory techniques

The student should be able to perform the following:

- Isolation of genomic DNA from blood,
- Isolation of RNA, synthesis of cDNA by reverse transcription,
- PCR and Reverse transcriptase PCR (both conventional and real-time),
- Primer designing,
- Blotting techniques,
- Basic techniques and principles of protein/enzyme purification and determining homogeneity.

By the end of the course, the postgraduate student should be able to perform under supervision or, demonstrate familiarity with, as the case may be, the following procedures (at least any five):

1. Separation of peripheral blood leukocytes using relevant isolation technique,
2. Subcellular fractionation/marker enzymes for organelles to demonstrate fractionation and purity of the fraction,
3. Ultracentrifugation,
4. Isolation of plasmids,
5. Basic techniques and essentials in cell culture and establishing different cell culture facilities,
6. High-performance liquid chromatography (HPLC)/GC-MS/LC-MS,
7. Restriction fragment length polymorphism (RFLP),
8. Fluorescent in-situ hybridization (FISH),
9. DNA fingerprinting,
10. Immunodiffusion techniques,
11. Immuno-electrophoresis,
12. Therapeutic drug monitoring,
13. Flow cytometry,
14. Nephelometry,
15. HLA typing.

SYLLABUS

The course contents are outlined below:

A. Cognitive Domain

Paper I

Biomolecules, Principles of Biophysics and its biomedical importance, Cell biology, Fluid, electrolyte and acid-base balance, Analytical techniques and instrumentation, Biostatistics and research methodology, Basics of medical education in teaching and assessment of Biochemistry.

BIOMOLECULES

Ionization of water, the concept of acid and base, weak acids and bases, pH, pK, Henderson-Hasselbalch equation, buffer and buffering capacity.

Proteins:

- Classification, structure, properties and functions of amino acids and peptides, biologically important peptides,
- Classification, biological significance and structural organization of proteins,
- Structure-function relationship of proteins (haemoglobin, myoglobin, collagen and immunoglobulins),
- Fractionation, purification, structural analysis and characterization of proteins,
- Protein folding and its associated disorders,
- Protein denaturation,
- Protein degradation – lysosomal and proteosomal,
- Plasma proteins.

Carbohydrates:

- Classification, biomedical importance, functions, properties and reactions of carbohydrates,
- Structural aspects of monosaccharides, disaccharides and polysaccharides,
- Mucopolysaccharides/glycosaminoglycans, glycoproteins and glycolipids,
- Glycation, glycosylation and role of carbohydrates in blood group substances.

Lipids:

- Types, properties and biomedical importance of lipids,
- Fatty acids - nomenclature, classification, properties, reactions including essential fatty acids, polyunsaturated fatty acids and trans fatty acids,
- Mono, di- and triacylglycerols,
- Trans fats,
- Cholesterol - structure, properties and biomedical importance,

- Phospholipids – classification, properties, composition, and biomedical importance of various phospholipids,
- Glycolipids – classification, properties, composition, and biomedical importance,
- Lipoproteins – classification, properties, composition, and functions of various lipoproteins including the role of apoproteins, their importance in health and disease,
- Role of lipids in the structure and function of biological membranes,
- Structure, properties, and biomedical applications of micelles and liposomes.

Nucleotides and nucleic acids:

- Purine and pyrimidine bases in DNA and RNA,
- Nucleosides and nucleotides,
- Biologically important nucleotides (including synthetic analogs of purine/pyrimidine bases and nucleosides used as therapeutic agents),
- Structure, functions, properties, and types of DNA and RNA.

PRINCIPLES OF BIOPHYSICS AND ITS BIOMEDICAL IMPORTANCE

- Diffusion, osmosis, dialysis, surface tension, viscosity, colloids, crystalloids, and suspensoids.

CELL BIOLOGY

- Structural organization and functions of a biological cell and different subcellular organelles along with their marker enzymes,
- Molecular organization, functions, and structure-function relationship of a cell membrane,
- Solute transport across biological membranes with related disorders,
- Cell fractionation and separation of organelles,
- Disorders related to cell membrane and subcellular organelles,
- Intracellular traffic and sorting of proteins,
- Intracellular signaling pathways, membrane receptors and second messenger,
- Intercellular junctions, cellular adhesion molecules, intercellular signaling and communication,
- Extracellular matrix: composition, and biomedical importance,
- Components of the cytoskeleton, and their role in muscle contraction and cell motility,
- Cell cycle, its regulation, and mechanism of cell death,
- Structure and functions of specialized cells.

FLUID, ELECTROLYTE, AND ACID-BASE BALANCE

- Fluid, electrolyte, and acid-base balance, mechanism of regulation and associated disorders.

ANALYTICAL TECHNIQUES AND INSTRUMENTATION

- Colorimetry,
- Spectrophotometry,
- Atomic absorption spectrophotometry,
- Flame photometry,
- Fluorometry,
- Turbidimetry and nephelometry,
- Gravimetry,
- Electrochemistry (pH electrodes, ion-selective electrodes, gas-sensing electrodes, enzyme electrodes),
- Chemical sensors (biosensors),
- Osmometry,
- Chemiluminescence,
- Water quality testing (TDS, pH, fluoride) for autoanalyzer,
- Electrophoresis (principle, types, applications; isoelectric focusing, capillary electrophoresis; 2-D electrophoresis),
- Chromatography [principle, types (including high-performance liquid chromatography and gas chromatography)],
- Mass spectrometry,
- Immunochemical techniques,
- Techniques in molecular biology,
- Nanotechnology and microfabrication,
- Techniques to study *in vivo* metabolism (NMR, SPECT, PET scan, etc.),
- Radioisotope-based-techniques and their applications (permissions, precautions, management of radioactive waste),
- Automation,
- Point-of-care testing.

BIOSTATISTICS AND RESEARCH METHODOLOGY

- Basic concepts of biostatistics as applied to health science,
- Statistical tests: t-test, analysis of variance, chi-square test, non-parametric tests, correlation and regression,
- Statistical methods of validation of diagnostic tests,
- Types of study designs and sampling methodologies,
- Meta-analysis and systematic reviews,
- Planning and management of research,
- Electronic search of the literature,
- Ethical aspects related to research and publication,
- Brief introduction of software for data analysis,
- Essentials of intellectual property rights, patents and copyrights.

BASICS OF MEDICAL EDUCATION IN TEACHING-LEARNING AND ASSESSMENT OF BIOCHEMISTRY

- Group dynamics,
- Principles of adult learning, the taxonomy of learning,
- Curriculum planning,
- Educational objectives,
- Developing a lesson plan (appropriate to the objective and teaching learning method),
- Interactive and innovative teaching methods for large and small groups,
- Use of appropriate media (for a learning session),
- Principles of self-directed learning and giving feedback,
- Framing appropriate essay questions, short answer questions and multiple-choice questions,
- Item analysis and preparation of question bank,
- Principles and types of assessment,
- Methods of assessing cognitive skills, psychomotor skills, communication skills, and professionalism (including viva voice and OSPE),
- Developing a plan for internal assessment and formative assessment,

- Preparation of blueprint and setting of question paper,
- Microteaching,
- Reflection writing.

Paper II

Enzymes, Bioenergetics, Biological oxidation, Intermediary metabolism and inborn errors of metabolism, Nutrition, Vitamins and Minerals, Detoxification and metabolism of xenobiotics, Free radicals and anti-oxidant defense systems

ENZYMES

- Properties, classification, mechanism of action, coenzymes and cofactors, proenzymes, ribozymes, nanozymes, catalytic antibodies,
- Factors affecting the rate of enzyme-catalyzed reaction,
- Kinetics of enzyme activity, regulation of enzyme activity,
- Isoenzymes and isoforms, role in metabolic regulation,
- Enzyme inhibition,
- Principles of enzyme assays,
- Applications of enzymes: diagnostic, therapeutic and commercial uses of enzymes,
- Enzymes as targets for drug development.

BIOENERGETICS

- Basic concepts of thermodynamics and its laws, as applicable to living systems,
- Exergonic and endergonic reactions and coupled reactions, redox potential,
- High energy compounds,
- Enzymes of biological oxidation,
- Cytochromes.

BIOLOGICAL OXIDATION

- Components, complexes and functioning of the respiratory chain including inhibitors,
- Process and regulation of oxidative phosphorylation including uncouplers,
- Mechanisms of ATP synthesis and regulation,
- Mitochondrial transport systems and shuttles,
- Mitochondrial diseases.

INTERMEDIARY METABOLISM AND INBORN ERROR OF METABOLISM

Metabolism of carbohydrates:

- Digestion and absorption including associated disorders,
- Glycolysis and TCA (Kreb's cycle), including regulation,
- Glycogen metabolism and its regulation,
- Cori cycle, gluconeogenesis,
- Metabolism of fructose and galactose and their clinical significance,
- Pentose phosphate /HMP shunt pathway and uronic acid pathways and their clinical significance,
- Polyol/sorbitol pathway,
- Regulation of blood glucose, hyperglycemia, hypoglycemia and their clinical significance,
- Glucose tolerance test and its interpretation,
- Diabetes mellitus – classification, pathogenesis, metabolic derangements and complications, diagnostic criteria and laboratory investigations, principles of treatment (including diet and lifestyle modification),
- Inborn errors and disorders of carbohydrate metabolism.

Metabolism of Lipids:

- Digestion and absorption and associated disorders,
- Metabolism of fatty acids, regulation and related disorders,
- Metabolism of eicosanoids and their clinical significance,
- Metabolism of triacylglycerol, storage and mobilization of fats,
- Metabolism of adipose tissue and its regulation,
- Metabolism of cholesterol including its transport and hypercholesterolemia,
- Metabolism of lipoproteins, atherosclerosis, fatty liver and lipid profile,
- Metabolism of methanol and ethanol,
- Role of liver in lipid metabolism,
- Metabolism of phospholipids and associated disorders,
- Metabolism of glycolipids and associated disorders,

- Inborn errors of lipid metabolism.

Metabolism of amino acids and proteins:

- Digestion, absorption and associated disorders,
- Deamination, transamination, disposal of the amino group, catabolism of the carbon skeleton of amino acids,
- Formation and disposal of ammonia (including urea cycle) and related disorders, ammonia toxicity,
- Metabolism of individual amino acids and associated disorders,
- One carbon metabolism,
- Biogenic amines,
- Inborn errors of amino acid metabolism.

Metabolism of nucleotides:

- Metabolism of purines and pyrimidines and their associated disorders.

Metabolism of haem:

- Metabolism of haem and associated disorders.

Interorgan and intraorgan interrelationships and integration of metabolic pathways:

- Metabolic adaptation in starvation, diabetes mellitus, obesity, and during exercise.

NUTRITION

- Calorific value, Basal Metabolic Rate (BMR), Specific dynamic action (SDA) of food.
- Nutritional importance of proximate principles of food including sources and RDA.
- Glycemic index.
- Biological value of proteins and nitrogen balance.
- Thermogenic effect of food.
- General nutritional requirements.
- Balanced diet, diet formulations in health and disease, mixed diet.
- Calculation of energy requirements and prescribing diet.
- Nutritional supplements and parenteral nutrition.
- Food toxins and additives.

- Disorders of nutrition, obesity, protein energy malnutrition, under-nutrition and laboratory diagnosis of nutritional disorders.
- National Nutrition Programme.

VITAMINS AND MINERALS

- Structure, functions, sources, RDA, and metabolism of vitamins and minerals and their associated disorders.

DETOXIFICATION AND METABOLISM OF XENOBIOTICS

FREE RADICALS AND ANTI-OXIDANT DEFENSE SYSTEMS

- Free radicals and anti-oxidant defense systems in the body.
- Associations of free radicals with disease processes.
- Oxygen toxicity.
- Oxidative stress markers in blood, urine, and other biological fluids.

Paper III:

Molecular biology, Molecular and genetic aspects of cancer, Immunology, and Environmental Biochemistry

MOLECULAR BIOLOGY

Structure and organization of chromosomes and chromatin re-modeling

DNA replication:

- DNA replication in prokaryotes and eukaryotes (including important differences between the two).
- End replication problem: Telomere, telomerase and their role in health and disease.
- DNA repair mechanisms and their associated disorders.
- Inhibitors of DNA replication and their clinical significance.
- DNA recombination.
- DNA protein interaction.

Transcription:

- Structure of a gene - exons and introns, promoter, enhancers/repressors and response

elements.

- Process of transcription in prokaryotes and eukaryotes.
- Post-transcriptional modifications.
- Inhibitors of transcription.
- RNA editing and stability.

Genetic code, gene polymorphism, and mutation:

- Characteristics of the genetic code.
- Molecular basis of the degeneracy of the genetic code (Wobble hypothesis).
- Mutation and gene polymorphism.
- Mutagens- examples of physical, chemical, and biological mutagens.
- Types of mutations.
- Mutation in health and disease.

Translation:

- Basic structure of prokaryotic and eukaryotic ribosomes.
- Process of protein synthesis (translation) in prokaryotes and eukaryotes.
- Post-translational modifications.
- Protein sorting, protein targeting, protein folding and related disorders.
- Inhibitors of translation in prokaryotes and eukaryotes, and their clinical significance.

Regulation of gene expression in prokaryotes and eukaryotes

Recombinant DNA technology and its applications in modern medicine

Overview of human genome project

Basics of bioinformatics

Principles of human genetics:

- Alleles, genotypes and phenotypes.
- Patterns of inheritance: monogenic and polygenic inheritance.
- Population genetics.
- Genetic factors in causation of diseases.
- Types of genetic diseases: Chromosomal, monogenic and polygenic disorders,

mitochondrial disorders, nucleotide repeat expansion disorders, imprinting disorders.

- Screening for genetic diseases and prenatal testing.
- Ethical and legal issues related to medical genetics.

Stem cells and regenerative medicine:

- Basic concepts regarding stem cells
- Types of stem cells: embryonic and induced pluripotent stem cells (iPSC)
- Application in regenerative medicine and disease therapeutics
- Ethical and legal issues related to use of stem cells in medicine.

MOLECULAR AND GENETIC ASPECTS OF CANCER

- Biochemical characteristics of a cancer cell
- Biochemistry of carcinogenesis
- Carcinogens
- Role of oncogenes and tumor suppressor genes
- Genetic alterations and adaptations in cancer
- Tumor markers, cancer risk assessment, and community screening
- Biochemical basis of cancer chemotherapy and drug resistance
- Anti-cancer therapy.

IMMUNOLOGY

- Organization and components of the immune system
- Innate and adaptive immunity- components and functions
- Antigens, immunogens, epitopes and haptens, carriers, adjuvants
- Immunoglobulin: structure, types, and functions
- Mechanism of antibody diversity: organization and expression of immunoglobulin genes, immunoglobulin gene rearrangement, class switching
- Humoral and cell-mediated immunity, regulation of immune responses, immune response to infections
- Major histocompatibility complex, antigen processing, and presentation
- Antigen-antibody interaction, immune effector mechanisms
- Complement system

- Hypersensitivity reactions
- Tolerance, autoimmunity
- Immunodeficiency, immune unresponsiveness, and their clinical implications
- Vaccines
- Immunology of chronic diseases
- Transplantation immunology
- Immunodiagnostics and immunotherapy.

ENVIRONMENTAL BIOCHEMISTRY

Health and pollution

Effects of environmental pollutants on the body

Paper IV

Basic principles and practice of clinical biochemistry, Biochemical analytes, Assessment of organ system functions, and Recent advances in biochemistry

BASIC PRINCIPLES AND PRACTICE OF CLINICAL BIOCHEMISTRY

- Units of measurement, reagents, clinical laboratory supplies, basic separation techniques, laboratory calculations, specimen collection, transport and processing, safety in the laboratory,
- Essentials of clinical investigations in Biochemistry, the clinical utility of laboratory tests (including accuracy, precision, sensitivity, specificity, ROC curves, etc), analysis in the laboratory, and selection and evaluation of methods (including statistical techniques),
- Evidence-based laboratory medicine, establishment and use of reference values, pre-analytical, analytical, and post-analytical variables and biological variations, total quality management (TQM), clinical laboratory and hospital informatics, concepts and reporting of critical values.

BIOCHEMICAL ANALYTES

Biochemical analyses and their clinical significance:

- Amino acids, peptides and proteins; non-protein nitrogenous compounds
- Enzymes

- Carbohydrates
- Lipids, lipoproteins and apolipoproteins and other cardiovascular risk markers
- Electrolytes
- Blood gases and pH
- Hormones
- Catecholamines, serotonin, and other neurotransmitters
- Vitamins, minerals, trace and toxic elements
- Hemoglobin, and bilirubin
- Porphyrins
- Bone markers
- Tumour markers.

Body fluid analysis

Stone analysis

Therapeutic drug monitoring

Clinical toxicology

Pharmacogenomics

Pediatric and geriatric biochemical investigations

- Biochemistry of aging

ASSESSMENT OF ORGAN SYSTEM FUNCTIONS

Hematopoietic disorders:

- Hemostasis and thrombosis-biochemical mechanism, related laboratory tests, antiplatelet therapy anticoagulant therapy, and fibrinolytic therapy
- Anemia- classification, etiology, laboratory investigations, and management
- Hemoglobinopathies - sickle cell anemia, methemoglobinemia, thalassemia syndromes
- RBC membrane, metabolism, inherited defects in RBC membrane, and enzymes
- ABO blood group system – the biochemical basis of incompatibility and transfusion

biology

- Plasma cell disorders
- Other disorders of hematopoietic cells and their progenitors.

Endocrine system:

- Classification and general mechanism of action of hormones
- Biosynthesis, secretion, regulation, transport, and mode of action of hypothalamic peptides, adenohipophyseal and neurohypophyseal hormones, thyroid and parathyroid hormones, calcitonin, pancreatic hormones, adrenocortical and medullary hormones, gonadal hormones, gastrointestinal hormones, opioid peptides, parahormones
- Neuro-modulators and their mechanism of action and physiological significance
- Biochemical aspects of diagnosis and treatment of endocrinal disorders
- Endocrinology of conception, reproduction, and contraception
- Antenatal testing, newborn screening, and inborn errors of metabolism.

Cardiovascular system:

- Atherosclerosis - pathogenesis, risk factors, prevention and treatment
- Biochemistry of cardiac failure, acute coronary syndrome, cardiomyopathies, and cardiac arrhythmias
- Cardiac biomarkers.

Respiratory system:

- Pulmonary gaseous exchanges in health and disease
- Biochemistry of respiratory disorders.

Renal system:

- Biochemistry of kidney functions
- Pathophysiology, biochemistry, laboratory findings and management in acute and chronic kidney diseases
- Nephrolithiasis, biochemical aspects of renal stones
- Biochemistry of renal transplant.

Gastrointestinal system:

- Biochemistry of gastric functions
- Regulatory peptides in the gut
- Digestion and absorption of nutrients, evaluation of malabsorption
- Biochemical aspects of- Peptic ulcer diseases, Zollinger-Ellison syndrome, Celiac disease, Inflammatory bowel disease, Protein losing enteropathy and Neuroendocrine tumors.

Hepato-biliary and pancreatic system:

- Biochemistry of hepato-biliary and pancreatic functions
- Formation, composition and functions of bile
- Pathophysiology, biochemistry, laboratory findings and management in acute and chronic hepato- biliary and pancreatic disorders.

Skeletal system:

- Bone structure, metabolism, associated disorders and markers
- Bone mineral homeostasis.

Nervous system:

- Neurotransmitters and their receptors
- Ion channels and channelopathies
- Neurotrophic factors
- Infective and inflammatory diseases of nervous system (meningitis, encephalitis etc.)
- Protein aggregation, neurodegeneration and related disorders (Alzheimer's disease, Parkinson's disease, Huntington's disease, and others)
- Prions and prion diseases
- Ischemic and hemorrhagic neuro disorders
- Neuro-immune disorders (Guillain-Barre syndrome, Myasthenia gravis, multiple sclerosis and others)
- Pathophysiology and biochemistry of psychiatric disorders
- ***Recent advances in Biochemistry.***

B. Psychomotor Domain

The course contents are mentioned under Subject/domain-specific competencies.

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skill oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real-time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below-mentioned teaching-learning methods can vary based on the subject's requirements, competencies, workload, and overall working schedule in the concerned subject.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per subject requirements.

All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. Salient features of Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3,4,5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum-once every 1-2 weeks.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform),

simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during laboratory work.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main department and other department/s on topics of current/common interest or clinical cases.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines.

Suggested departments and duration of rotational postings:

- **General Medicine** - 1 month (includes Endocrinology, **Pediatrics**, and ICU posting)
 - ✓ Endocrinology [Focus: Clinical correlation and important investigations related to diabetes mellitus and other diseases, dietary advice, point-of-care testing]
 - ✓ ICU/ICCU [Focus: ABG analysis and correlation, electrolyte imbalances, cardiac biomarkers and correlation, markers of septicemia and its management, basics of ventilation]
 - ✓ **Pediatrics** [Focus: Inborn errors of metabolism and other common diseases, nutritional disorders, and dietary advice]
- Hematology - 15 days
- Immunohematology and blood transfusion (**Transfusion Medicine**)/Blood bank - 15 days
- **Microbiology**- 15 days
- Medical Education Unit (MEU) or Department of Medical Education (DOME) - one week/ shall attend a specific workshop or a training course [Focus:

Principles of teaching-learning-assessment and other important aspects of Medical Education].

G.b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MD/MS in broad specialties in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in the District Hospital/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate program and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists/clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as a guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a logbook indicating the duration of the postings/work done in wards, OPDs, casualty, and other areas of the posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The logbook entries must be done in real-time. The logbook is thus a record of various activities by the student like (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the logbook is to:

- a) help maintain a record of the work done during training,
- b) enable faculty/consultants to have direct information about the work done and intervene, if necessary,
- c) provide feedback and assess the progress of learning with experience gained periodically.

The logbook should be used in the internal assessment of the student, and should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce a completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate

from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in the logbook particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and atleast two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the NMC (Erstwhile MCI) Logbook Guidelines uploaded on the website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learned initially on the models, and later to be performed under supervision followed by independent performance. For this purpose, the provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

**The assessment for postgraduate student in Biochemistry will be of two types;
Formative and Summative**

FORMATIVE ASSESSMENT

Formative assessment is the assessment conducted during the training with the primary purpose of providing feedback for improving learning. It should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning, and ability to practice in the system. The formative assessment will be used to determine the existing knowledge base and future needs, and identify priority areas.

General Principles

The Internal Assessment will include both theory and practical examination. It should be frequent, cover all domains of learning, and should be used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Formative assessment during the MD training should be based on:

- Case presentation/case work up : once a week
 - The student will present a case from ward/lab along with investigations done in the clinical laboratory
- Laboratory performance : once a week
 - The student will analyze an unknown sample on an autoanalyzer, starting with calibration, quality control of the machine, and then loading the sample. He/she will do the reporting and interpret the results and will be evaluated the next day.
 - He/she will be evaluated separately for practicals listed in the undergraduate syllabus.
 - He/she will be evaluated at the end of each postgraduate practical session as listed under the psychomotor domain.

- Journal club : once a quarter

- The student will present and critically evaluate an original research article. The article should be preferably from outside his/her area of work so that he/she can learn newer techniques. The focus should be on understanding the research question and evaluating whether appropriate study design, methodology, and statistical tools were used to find answers to the same.
- Seminar : once a fortnight
 - The student will present a topic from the syllabus and will try to research and include recent advances on that topic. He/she will also present recent advances (not included in the syllabus) periodically.
- Micro-teaching : Once a week
 - The teaching skills of the student will be evaluated. Special topics can be given, and the student will teach that topic to the evaluators or he/she may be evaluated during pre-practical briefing of undergraduate students.
- Interdepartmental case or seminar : once in 3 months
 - This should be organized at the institute level and appropriate vertical and horizontal integration should be ensured.

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.
- AETCOM : Once in every six months
 - The postgraduate student can be evaluated during the AETCOM sessions of the undergraduates.
 - Case scenarios should be provided and the postgraduate will be asked to demonstrate how he/she will respond to the situation.
- Attendance at Scientific meetings, CME programmes (at least 02 each during the course)

The student is to be assessed periodically as per categories listed in the appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training to evaluate whether the student has acquired sufficient knowledge and skills to be awarded MD degree

Essential pre-requisites for appearing for examination include:

1. **Logbook** of work done during the training period including rotational postings, departmental presentations, and reports of the internal assessment conducted during the training period should be submitted.
2. At least **two presentations** at national-level conferences. One research paper should be under submission for publication/ accepted for publication/ published in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the clinical and practical examination so that the answer books can be assessed and evaluated before the commencement of the clinical/practical and oral examination.

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and certify post-graduate student's level of knowledge, skill, and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL

EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing the examination as a whole. The examination for M.D./ M.S shall be held at the end of the 3rd academic year.

There shall be four theory papers (as per PG Regulations):

Paper I:

Biomolecules, Principles of Biophysics and its biomedical importance, Cell biology, Fluid, electrolyte and acid-base balance, Analytical techniques, and instrumentation, Biostatistics and research methodology, Basics of medical education in teaching and assessment of Biochemistry.

Paper II:

Enzymes, Bioenergetics, Biological oxidation, Intermediary metabolism and inborn errors of metabolism, Nutrition, Vitamins and Minerals, Detoxification and metabolism of xenobiotics, Free radicals, and anti-oxidant defense systems

Paper III:

Molecular biology, Molecular and genetic aspects of cancer, Immunology, and Environmental Biochemistry

Paper IV:

Basic principles and practice of clinical biochemistry, Biochemical analytes, Assessment of organ system functions, and Recent advances in biochemistry

3. Practical/clinical and Oral/viva voce examination

Practical examination

The practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain. One day should be for conducting practical examination including table viva that will focus on the nuances of laboratory techniques and quality assurance.

The practical examination should include:

1. One Clinical / Paper case: An unknown sample will be analyzed by the student, and he/she will have to prepare the report along with the interpretation of the same. It should include both serum and urine analysis.
2. One practical exercise on any molecular biology technique.

3. One practical exercise on immunology technique.
4. OSPE: It shall be conducted on various topics which have not been covered in the above-mentioned practical and should include, if possible, evaluation of AETCOM (Attitude, Ethics, and Communication) skills of the students.
5. Evaluation of laboratory management skills.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. The oral examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject focusing on the psychomotor and affective domains.

The **Oral/Viva-voce examination shall be conducted on the second day and should include:**

1. Thesis presentation
The ability of the student to justify the methodology, and findings with interpretation, should be evaluated.
2. Micro-teaching
The essentials of classroom teaching skills should be evaluated.
3. Grand viva voce

Recommended Reading:

Books (latest edition)

1. Lehninger Principles of Biochemistry, David L. Nelson, Michael M. Cox. W H Freeman & Co (Sd).
2. Biochemistry (Stryer), Jeremy M. Berg , John L. Tymoczko , Lubert Stryer, W. H. Freeman.
3. Biochemistry (Voet & Voet), Donald Voet , Judith G. Voet, John Wiley & Sons Inc.
4. Textbook of Biochemistry with Clinical Correlations, Thomas M. Devlin, John Wiley & Sons.
5. Kuby Immunology, Judy Owen, Jenni Punt , Sharon Stranford, W. H. Freeman.
6. Principles and Techniques of Biochemistry and Molecular Biology. Wilson/Walker; Cambridge University Press

7. Clinical Chemistry: Principles, Techniques, and Correlations, Michael L Bishop, Edward P Fody, Larry E Schoeff, Lippincott Williams and Wilkins.
8. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, Carl A. Burtis, Edward R. Ashwood , Saunders.
9. Harpers Illustrated Biochemistry, Victor W. Rodwell , David Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil , McGraw-Hill Education / Medical.
10. Biochemistry (Lippincott's Illustrated Reviews), Denise R Ferrier, Lippincott Williams and Wilkins.
11. Harrison's Principles of Internal Medicine, Dennis L. Kasper, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, Joseph Loscalzo, McGraw-Hill Education / Medical.
12. Davidson's Principles and Practice of Medicine, Walker, Elsevier Health Sciences – UK.
13. Clinical Biochemistry: Metabolic and Clinical Aspects, William J. Marshall & Márta Lapsley & Andrew Day & Ruth Ayling, Imprint - Churchill Livingstone.
14. Biochemistry: A Case-oriented Approach, Rex Montgomery, Thomas W. Conway, Arthur A. Spector, David Chappell, Mosby.
15. Interpretation of Diagnostic tests, Jacques Wallach, Lippincott Williams & Wilkins.

Journals

03-05 international Journals and 02 national (all indexed) journals.

Annexure 1

National Medical Commission

Student appraisal form for MD in Biochemistry

	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic aptitude and learning										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	Work related to training										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality										

	improvement process at the work environment										
2.5	Ability to record and document work accurately and appropriate for level of training										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethically appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment pattern been discussed with the trainee?	Yes	No								
	If not explain.										
	Name and Signature of the assessee										
	Name and Signature of the assessor										
	Date										

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12.11.2022

Date of submission:

National Medical Commission

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN COMMUNITY MEDICINE

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Community Medicine is an academic subject, a branch of Medicine which deals with promotion of health and prevention of diseases, involving people's participation, utilizing professional management skills. The Community Medicine specialist, will inculcate a holistic view of health and medical interventions primarily focused on Community Health/Population Health. Thus, he/she should be equipped with the knowledge, skills, competencies in primary, secondary & tertiary care, control and prevention of outbreaks/epidemics, community diagnosis, health needs assessment, epidemiological assessment, research and planning evidence-based health policies and programmes.

The Guidelines for teaching Community Medicine, therefore, should be designed to create a cadre of professionals who are competent to meaningfully contribute their expertise in planning, implementation, co-ordination, monitoring, evaluation of Primary Health Care Programs based on scientific evidence. The competencies must cover a wide spectrum of skills viz., technical, managerial, administrative, organizational skills, applied skills in Health Information Management, software application and soft skills of communication, motivation, decision-making, team building, training in scientific communication and medical writing.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

SUBJECT SPECIFIC OBJECTIVES

1. To create a skilled cadre of medical professionals having expertise in application of principles of Public Health, Community Medicine and applied epidemiology, contributing meaningfully in formulating National Health Policies & Programmes with a systems approach for overall human development.
2. To standardize the teaching & training approaches at post- graduate level, for Community Medicine

3. Research: To formulate research questions, do literature search, conduct study with an appropriate study design and study tool; conduct data collection and management, data analysis and report.

SUBJECT SPECIFIC COMPETENCIES

At the end of the course the student should be able to acquire the following competencies under the three domains, Cognitive, Affective and Psychomotor:

A. Cognitive domain (The student should be able to:)

1. Describe conceptual (and applied) understanding of Public Health, Community Medicine, clinical and disease-oriented approach, preventive approach & health promotion, disease control & promotion.
2. Have knowledge about communicable and non-communicable diseases, emerging and re-emerging diseases, their epidemiology, control and prevention.
3. Apply the principles of epidemiology, health research and Bio-statistics, application of qualitative research methods
4. Calculate Odds Ratio, Relative Risk, Attributable risk and other relevant health and morbidity indicators.
5. To describe nutritional problems of the country, role of nutrition in health and disease and to describe common nutritional disorders
6. Develop nutrition plan for an individual based on his requirements and with concerns to special situations if applicable
7. Plan comprehensive programme to address issue of malnutrition in a given area for a specific group
8. To describe the concept of Environmental Health and its various determinants.
9. Identify environmental health issues in a given area/community
10. Assess impact of adverse environmental conditions on health of human beings
11. Plan awareness programmes at various levels on environmental issues and mobilize community resources and participation to safeguard from local adverse environmental conditions
12. Should be able to provide technical advice for water purification, chlorination, installing go-bar gas plant, construction of soakage pits etc.
13. Be a technical expert to advice on protection measures from adverse environmental exposure
14. To describe the working of Primary Health Care system, Panchayat Raj system, National Health Programmes, urban/rural differences, RCH, Demography and Family Welfare.
15. Do orientation of the inter-linkage of health sector and non-health sector for promotion of Health & control and prevention of diseases.
16. Have familiarity with administrative procedures and protocols
17. Have knowledge about role of media and its use in health.

18. Have knowledge of Health Care Administration, Health Management and Public Health Leadership
19. To describe Health Policy planning, Medical Education technology, Information Technology and integration of alternative Health system including AYUSH.
20. To describe the intricacies of Social & Behavioral sciences and their applications.
21. To describe Public Health Legislations
22. To understand and describe International Health & Global Diseases surveillance.
23. To relate the history of symptoms with specific occupation, diagnostic criteria, preventive measures, identification of various hazards in a specific occupational environment and legislations.
24. To keep abreast of recent advances in Public Health & formulate feasible, optimal, sustainable, cost effective strategies in response to the advances in public health & development.
25. To describe the principles of Health Economics and apply it in various public health settings.
26. To explain and correlate common health problems (medical, social, environmental, economic, psychological) of urban slum dwellers, organization of health services in urban slum areas
27. Develop workable interventions for control and prevention of emerging and re-emerging diseases at local, national and global level.
28. Identify behavior pattern of individual or group of individuals detrimental or adversely affecting their health
29. Define and identify vulnerable, under-privileged high risk communities and their special needs
30. To create awareness about various public health laws
31. Evaluate cost effectiveness and cost benefits of a Health Program
32. Understand and express implications of 'Poverty Line', 'Social Inclusion', 'Equity', 'taxations', 'Insurance' on Health care management.
33. To categorize hospital waste and be able to guide for proper disposal.
34. To provide a comprehensive plan for disaster management and mitigation of sufferings.

B. Affective domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

A. C. Psychomotor domain: ((The student should be able to:))

The student should be able to perform independently the following :

- Conduct community surveys for assessment of health & morbidity profile, epidemiological determinants, assessment of health needs, disease surveillance, evaluation of health programmes and community diagnosis
- Conduct epidemic investigations, spot maps, predict disease trends, preparation of reports, planning and implementation of control measures
- Demonstrate clinical skills of preparing case history, examination, provisional diagnosis, treatment and clinical case management and interpretation of laboratory findings. Conduct common procedures such as incision, drainage, dressings & injections.
- Do data collection, compilation, tabular and graphical presentation, analysis and interpretation, applying appropriate statistical tests, using computer-based software application for validation of findings
- Conduct epidemiological research studies to establish cause-effect relationships in elaborating the epidemiology of diseases and health events
- Develop appropriate IEC Material, assessment of community communication needs, training skills, counseling skills, conduct Health Education Programmes in urban and rural settings
- Conduct dietary surveys, assessment of nutritional status, nutritive values of common food menus, detection of food adulterants, use of lactometer, recording and interpretation of growth and development charts.
- Use and apply various instruments and processes concerned with environmental health and biological waste management eg. waste collection, segregation and disposal as per protocols, needle-disposers, disinfection procedures. Also use of Dosi-meters, Kata / Globe Thermometer, Slings Psychrometer, Gobar Gas Plant, Soakage pit, Solar Energy, functioning of ILRs, Deep Freezers, Cold Boxes, Vaccine Carriers.
- identify different types of mosquitoes, detect vector breeding places and orientation of the methods of elimination of breeding places and placement of a mosquito-proof water tank.
- Conduct clinical screening of various diseases and organize community health camps involving community participation in urban and rural settings. Use of Snellen charts for vision, Ishihara's chart for colour blindness, tourniquet tests for dengue diagnosis in fever, BMI and other physical measurements of infants, children and adults etc., copper-T insertions and preparation of pap smear.
- Conduct tests for assessment of chlorine demand of water (Horrock's Apparatus), procedure of well-water and urban water-tank chlorination, assessment of chlorination levels, physical examination of water, methods domestic water purification, oriented in use of water filters.
- Prepare health project proposals with budgeting based on the project objectives.

Miscellaneous skills: (The student should be able to)

1. Devise appropriate health education messages for public health awareness using various health communications strategies.

2. Identify family level and community level interventions and facilitate the implementation of the same e.g. food hygiene, food storage, cooking demonstrations, community kitchen, kitchen garden, empowerment of women for promoting nutritional health etc.
3. Demonstrate counselling skills for family planning services.
4. Plan and execute BCC strategy for individuals.
5. Conduct measurement of occupational exposure to harmful influences.
6. Diagnose occupational hazards and undertake surveys to identify occupational exposures as and when necessary.
7. Elicit appropriate response at individual and community level to prevent occupational hazards including IEC activities at different levels.
8. Use modern IT applications especially internet & internet-based applications.

Syllabus

Course contents:

- 1. Conceptual (and applied) understanding of Public Health, Community Medicine, clinical disease-oriented approach, Preventive approach & Health promotion, disease control & promotion.**

Learning objectives:

At the end of this course topic, the student should be able to:-

- i. Understand and explain the concept & application and give suitable analogies/examples related to Public Health/Community Medicine (with differences), Disease-oriented v/s Preventive approach, health promotion disease control & prevention.
- ii. Explain correlation between health and human development with analogies/ examples.
- iii. Explain concept of Primordial, Primary, Secondary and Tertiary prevention with examples.
- v. Evolutionary History and mile-stones in Public Health – National and International levels.

- 2. Communicable and Non-Communicable diseases, emerging and re-emerging diseases**

Learning objectives:

At the end of this course, the student should be able to:-

- i. Understand and explain Epidemiology of Communicable/Non-communicable diseases- its causes, precipitating factors, social & other non- health causes, mechanisms of transmission, signs/systems, management, control & prevention measures, related national Health Programmes & national Guidelines, Directives, special projects, if any.
- ii. Explain application of Disease surveillance system in control of Communicable/Non-communicable diseases.
- iii. Explain & undertake steps to investigate & control outbreaks, epidemics and take measures to prevent the same.
- iv. Evolve prevention & control measures based on local & regional epidemiological funding, synchronizing with National guidelines.

3. Applied Epidemiology, Health research, Bio-statistics

Learning objectives:

At the end of this course, the student should be able to:-

- i. Explain the concept & application of Epidemiology of Disease and Health giving suitable examples.
- ii. Explain Epidemiological approach, the terms Distribution & Determinants, uses, types of Epidemiological studies, interpretation, merits/demerits and limitations, odds ratio, relative risk, attributable & population attributable risks, Hybrid designs (with examples), validity of Epidemiological Data and application in practice at field level.
- iii. Explain Epidemiological Research methods, Research related protocols, Literature review, estimating sample size, data collection/ compilation/Analysis/ Research, interpretation.
- iv. Develop Health interventional programs based on Epidemiological Finding & create evidence for Public Health action.
- v. Understand difference between data, information & intelligence, types of data, survey methods, formulating questionnaires, interview schedule, data presentation types & analysis.
- vi. Apply computer based software application for data designing, data management & collation analysis e.g. SPSS, Epi-info, MS office and other advanced versions.

4. Nutrition

Learning objectives:

At the end of this course, the student should be able to:-

- i. Identify various nutritional problems in the region, state and country and contributing factors for the same, with due emphasis on ecology perspectives.
- ii. Explain importance of various nutrients (including micronutrients) in health, their sources, requirements and problems associated with their deficiencies as well as over consumption.
- iii. Plan balanced diet and dietary requirements of various age and sex groups.
- iv. Dietary/nutritional concerns of vulnerable groups – young children, adolescents, ANC/PNC/Lactating mothers/senior citizens/individuals with various health problems e.g hypertension, diabetes, renal problems etc.
- v. Classification of food, food additives, food fortification, food enrichment, food toxins and food adulteration.
- vi. Explain Food production, Food hygiene and safety, food storage, food preparation, food wastage and feeding practices.
- vii. Assessment of nutritional status of a community by adopting different methodologies.
- viii. Nutritional supplementation, surveillance, education and rehabilitation.
- ix. National programmes in nutrition and their evaluation
- x. National nutrition policy.

5. Environmental health

Learning objectives:

At the end of this course, the student should be able to:-

- i. Highlight importance of external environment (air, water, noise, radiation, temperature, ventilation, solid waste disposal, insects and vectors, domestic and country yard pests, industrial waste disposal etc. and its impact on ecology and human health.
- ii. Elaborate on health issues related to housing, air, water, noise, radiation pollution i.e. size of problems, area and specific groups affected, measurement of pollution levels and health impact of the same, corrective measures
- iii. Elaborate on requirements of water, water chlorination and household purification measures, measurement of chlorine demand, Break-point chlorination levels, water quality.
- iv. Assessment of quality of water and air, control of air pollution
- v. Explain environmental sanitation and control measures (including appropriate technologies) – modern methods of sewage disposal, mechanical ventilation, soakage pits, gobar gas plants, smokeless Chula, solar energy, rainwater harvesting, sewage water recycling plants at society level etc.
- vi. Explain global warming and its health impact.
- vii. Elaborate on forest reserves, social forestry and health
- viii. Study vectors of medical importance and integrated control measures against them.
- ix. Explain dynamics of transmission of vector borne diseases
- x. Explain pest control measures
- xi. Explain environmental health issues in urban and rural areas
- xii. Understand functioning of public sector measures to safeguard environmental health e.g water purification plant
- xiii. Explain Legislative measures for protection of environmental health

6. Primary Health Care System, Panchayat Raj, National Health Programmes including RCH, Demography & Family Welfare:

Learning Objectives

At the end of this course, the student should be able to:-

- i. Explain the meaning of Primary Health Care with suitable analogies with reference to India, and be able to define the systems approach for implementation of Primary Health Care.
- ii. Enumerate the elements, principles, population coverage norms, staff patterns, day to day activities, programme schedule, stakeholders at PHC level.
- iii. Explain the scope and implications of 3-tier system of Primary Health Care.
- iv. Understand functioning of Rural Panchayat Raj system of development and its co-relation with health.
- v. Promote community participation in Primary Health Care programme and motivate various stakeholders for the same.
- vi. Understand and comply with medico-legal procedures related to Primary Health Care activities.
- vii. Integrate, coordinate both health and non-health sectors for implementing various national health programmes.

- viii. Deliver the provisions of various health schemes to eligible beneficiaries such as Janani Suraksha Yojana, Rashtriya Swasthya Beema Yojana, Rajiv Gandhi Jeevandayi Arogya Yojana etc.
- ix. Impart training in health programmes for paramedical workers, lab technicians, community health volunteer's, interns and provide health education in the community.
- x. Implement Public Health Skills for investigations and containment of outbreaks & epidemics.
- xi. Understand history of evolution of public health, important milestones in the world and in India.
- xii. Enumerate the various health committees established and their major recommendations since 1947-48 to till date.

7. Health Care Administration, Health Management and Public Health Leadership

Learning Objectives:

At the end of this course, the student should be able to:-

- i. Explain the conceptual difference between Administration and Management, Power and Authority with reference to health care.
- ii. Explain the role of fundamental principles of constitution, principles of Democracy and its correlation with health care administration.
- iii. Explain the role of Bureaucracy, Technocracy, Political system, Judiciary, Media and people in health care administration.
- iv. Explain and identify the key positions and their role in health administration at State, District, Taluka (Tehsil block) and village level.
- v. Explain the frame work of health care system at State, District, Taluka & village level and understand the mechanism of coordination between bureaucrats, technocrats, political, judiciary and media at each of these levels.
- vi. Enumerate functions of a manager, explain concepts of management and leadership styles, various management techniques, planning process, monitoring & evaluation skills.
- vii. Should be sensitive to quality issues in health care management and comply with relevant quality management techniques.
- viii. Formulate and manage team approach for implementing health programmes.
- ix. Apply skills of effective human resource management and identify relevant roles, responsibilities and duties of functionaries.
- x. Implement skills of motivation, communication, negotiation and conflict management at PHC level.
- xi. Develop budgetary statements based on evidence of needs assessment and be able to maintain account of expenditure as per norms.
- xii. Undertake community health needs survey, conduct training & communication needs assessment of paramedical and health workers, identify vulnerable, underprivileged communities, implements high risk approach.

8. Health Policy, Medical Education, Integrating Alternative system of Medicine

Learning Objectives

At the end of this course, the student should be able to:-

- i. Understand and elaborate implications of the policy provision with reference to the current health scenario in the country.
- ii. Explain the role of health policy in promotion of Primary Health care, ensuring equity, inter-sectoral co-ordination, appropriate technology and community participation.
- iii. Explain the various provisions for promotion of preventive and curative health services including National Health Mission, National Health Programs, Quality Hospital based services, Medical Education and AYUSH.
- iv. Critically appreciate merits and demerits of the Health Policy.
- v. Explain SWOT analysis of the policy and debate on evidence based recommendations, additions, deletions.
- vi. Debate on suggestions or recommendations for future inclusions.

9. Social and behavioral sciences

Learning objectives:

At the end of this course, the student should be able to:-

- i. Understand influence of social and behavioral practices on health.
- ii. Understand principles of behavior change of an individual and community. Clearly understand difference between knowledge, attitude and practices..
- iii. Understand importance of social medicine and health.
- iv. Importance of behavior change communication (BCC).
- v. Socio-cultural factors influencing behavior change.
- vi. Formal and informal organizations in the community.
- vii. Influence of peer pressure.
- viii. Know the health problems, where BCC interventions are necessary.
- ix. Understand factors promoting and detrimental to BCC.

11. Public Health Legislations

Learning objectives:

At the end of this course, the student should be able to:-

- i. Explain public health legislations and need for the same.
- ii. Know in detail each public health law – when, why, implementation, impact, issues etc.
- iii. Enforcement of various public health laws.
- iv. Judiciary mechanism for ensuring proper implementation of public health laws.
- v. Scope for integrated approach for implementation of public health laws.

12. International Health

Learning Objectives:

At the end of this course, the student should be able to:-

- i. Understand the need and scope for international health measures.
- ii. Enlist and understand functioning of various UN agencies (including WHO) playing key role in international health.
- iii. Enlist and understand functioning of bilateral vs multilateral international donor agencies.
- iv. Provide advice to international travelers and vaccination requirements,
- v. Understand International health control measures e.g. quarantine, airport management etc.
- vi. Understand the management of international ports from health perspectives.

13. Occupational Health

Learning Objectives:

At the end of this course, the student should be able to:-

- i. Understand the concept of occupational health and its importance, Occupational environment and work dynamics.
- ii. Know different types of occupational exposures at various settings.
- iii. Enlist various occupational hazards and their relative magnitude.
- iv. Understand measurement of exposure levels to harmful influences during occupation.
- v. Understand preventive and control measures against various occupational hazards – global, national and local level measures.
- vi. Understand individual and community responses towards preventing exposure to occupational hazards.
- vii. Understand and advise occupational safety measures.
- viii. Understand legislative measures to prevent exposures to occupational hazards.
- ix. Advise compensation provisions to persons exposed to various occupational hazards.
- x. Understand occupational health problems amongst people in unorganized sector
- xi. Understand and advise social security and welfare provisions for workers – ESIS, Factory's Act, Role of ILO, Ministry of Labor, DGFASLI.

14. The recent advances in Public Health & miscellaneous issues

Learning Objectives:

At the end of this course, the student should be able to:-

- i. identify & enlist events at local, district, national & global levels influencing or adversely affecting health /medical issues of the population.
- ii. Adopt & practise skills related to utilization of modern technology, software, IT application in the interest of health promotion & disease prevention.

15. Health Economics

Learning Objectives:

At the end of this course, the student should be able to: -

- i. Describe the scope of health economics.

- ii. Understand health market & its characteristics.
- iii. Understand & apply economic evaluation techniques.
- iv. Assess the mechanism of Funding Health Care services, especially health insurance.
- v. Advise on allocation of resources appropriately in their work area.

TEACHING AND LEARNING METHODS

Teaching methodology

The following is a rough guideline to various teaching/learning activities that may be employed:

- **Journal Club** : Critical appreciation and discussion of research articles in indexed journals
- **Seminar**
- **Lecture/Discussion** : Lectures on newer topics by faculty
- **Case presentation** : Communicable disease case presentation (focus on epidemiology, control, prevention) or Family case (focus on health needs assessment, SWOT analysis of family, social determinants and social empowerment, community management, role of primary health care and mobilizing resources for empowerment of the family). PG students will present the cases in presence faculty and discuss various modalities of management.
- **Public Health Management training** in Immunization clinics, Disease Surveillance Units, General Preventive OPD, hands-on training in management of national health programs at urban health centre and rural health centre along with orientation in health administrative system.
- The PG student shall be required to participate in the teaching and training programme of Undergraduate students and interns.
- The PG student must have attended Mandatory training in Research Methodology during his tenure.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Special Seminars / Workshops:** conducted by External Faculty on cross-cutting subjects directly or indirectly concerned with Health. eg. Critical appreciation of National Developmental Budget, delivered by prominent Economist.
- **Log Book:** Postgraduate students shall maintain a log book of the work carried out by them and the training programme undergone during the period of training including details of work experience during their postings, including programs implemented under supervision and those performed independently. The log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.
- **Postings are given below:**

Recommended schedule for three years training:

**Orientation Training/Field postings
for students of MD Community Medicine**

No.	Field Posting and work	Duration
01	Posting at Sub-centers & PHCs Under & at RHTC and UHTC attached to Dept of Community Medicine as per MCI norm	Total period of ONE year during the 3 year period of PG course. Posting at RHTC should be residential.
02	Posting in the teaching hospital for exposure to clinical departments namely Pediatrics, OBGY & General medicine to acquire clinical skills for diagnosis and management of Communicable and Non-Communicable Diseases	Total - One month General Medicine-2 wks Pediatrics -1 wk Ob. & Gy. -1 wk Time of posting shall be at the discretion of local feasibility
03	Work attachment to gain hands- on skills based, training in public health department & orientation in Health Administration and Management of various National Health Programmes and aspects of public health management at the offices of the DHO/DHS/THO/DTO/DMO/CDPO/MOH of Local Civic Body or district health authorities.	Total - One month Place & time of 2 postings of 2 wks each shall be at discretion of local feasibility.
04	Short duration posting in various camps, melas, public health emergencies, investigation of epidemics, implementation of NHP, linen dept of hospital, Hospital kitchen, Hospital record section, central drug store, Medical Supdt. Office, blood bank, casualty dept., CCL, Hospital waste management, ART-VCTC, Matron Office (HRD), HMIS etc.	Total - one month Minimum of four postings of 1wk duration each shall be done subject to local feasibility.
05	Visits to various institutions of Public Health Importance	Subject to local feasibility

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., during the training may be as follows:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

Quarterly assessment during the MD training should be based on:

- 1. Journal based / recent advances learning**

2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination:

The Post Graduate examination shall be in three parts: -

1. **Thesis:** It should be submitted to the University by each post graduate student at least 6 months before the theory and clinical/practical examination. The thesis shall be examined by a minimum of three examiners, one internal and two external examiners, appointed by the university and who shall not be the examiners for theory and practical. A post graduate student shall be allowed to appear for the theory and practical/clinical examination only after the acceptance of the thesis by two examiners.

2. Theory:

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student 's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers as follows:

- Paper I :** Conceptual (and applied) understanding of Public Health, Community Medicine, Communicable and Non- Communicable diseases, emerging and re-emerging diseases, Applied Epidemiology, Health research, Bio-statistics.

- Paper II:** Nutrition, Environmental Health, Primary Health Care system, Panchayat Raj system, National health Programs, RCH, Demography and Family Welfare, Health Care Administration, Health Management and Public Health Leadership.
- Paper III:** Social & Behavioral sciences- applied aspects, Scientific communications & Medical writing, Research Methodology, Public Health Legislations, International Health & Global Diseases surveillance.
- Paper IV:** Health Policy planning, Medical Education technology, Information Technology, Integration of alternative Health system including AYUSH, Occupational Health, Recent advances in Public Health & Miscellaneous issues, Health Economics.

Practical/Clinical and oral examination:

The practical examination should be conducted over two days, not more than 8 post graduate students per batch, per day as follows :

1. One long Family case from the community:

Socio-economic, demographic, cultural and holistic history taking, of the family to understand the various risk factors affecting health and quality of life, assessment of social support system, assessment of present morbidity and its implications, evolve interventions for medical relief and social empowerment and role of family, community and primary health care system in resolving family issues. This shall be conducted preferably in the community setting.

2. One long Case (30 minutes), 2 short cases (20 minutes each) – Cases with Communicable Diseases

Students will elaborate on clinico-epidemiological case history to assess the epidemiological factors, precipitating factors, probable source of infection and evolve measures for diagnosis, treatment, management with reference to the case as well as major public health concerns, i.e. Control, prevention of the diagnosed disease and interventions in case of eminent outbreak / epidemic situations. Short cases may be assessed without presentation of detailed history, beginning with Differential Diagnosis in the given time.

3. Epidemiology and Statistics problem-solving exercises (5):

(Epidemiological – 3, Statistical – 2)

4. Public Health Spots (5) : including interpretation of analytical reports of water, food, environmental assessment and public health micro-biology

5. Viva-voce Examination

Oral/ Viva-Voce Examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

Recommended reading:

A. Books (latest edition)

1. *Public Health and Preventive Medicine* (Maxcy-Rosenau-Last Public Health and Preventive Medicine) by Robert B. Wallace
2. *Basic Epidemiology*. R Bonita, R Beaglehole, T Kjellstrom. World Health Organization Geneva.
3. *Epidemiology*, by Leon Gordis.
4. *Oxford Textbook of Public Health*. Holland W, Detel R, Know G.
5. *Practical Epidemiology*, by D.J.P Barker
6. *Park's Textbook of Preventive and Social Medicine*, by K.Park
7. *Principles of Medical Statistics*, by A. Bradford Hill
8. *Interpretation and Uses of Medical Statistics*, by Leslie E Daly, Geoffrey J Bourke, James MC Gilvray.
9. *Epidemiology, Principles and Methods*, by B. MacMahon, D. Trichopoulos
10. *Hunter's Diseases of Occupations*, by Donald Hunter, PAB Raffle, PH Adams, Peter J. Baxter, WR Lee.
11. *Epidemiology and Management for Health Care*, by Sathe PV and Doke PP.
12. *Vaccines*, by Stanley A. Plotkin.
13. All reports and documents related to all National Programmes from the Ministry of Health and Family Welfare.

B. Journals

03-05 international Journals and 02 national (all indexed) journals



Postgraduate Students Appraisal Form

Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks*

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN DERMATOLOGY, VENEREOLOGY & LEPROSY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training should be able to recognize the health needs of community, should be competent to handle effectively the medical problems and aware of recent advances pertaining to the discipline. The PG student should acquire basic skills in teaching medical/para-medical students. The student should be able to counsel patients and relatives in infectious diseases like HIV/AIDS, STDs, cutaneous tuberculosis, leprosy and any event of serious illness or death.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC OBJECTIVES

At the end of 3 years of post graduate training in Dermatology, Venereology & Leprosy:

- Student should have knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to dermatology. The student should acquire in-depth knowledge of his subject including recent advances. The student should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.
- Student should have acquired practical and procedural skills related to the subject.
- Critically evaluate, initiate investigation and clinically manage cases in Dermatology, Venereology and Leprosy with the help of relevant investigations.

- Should plan and advise measures for the prevention and rehabilitation of patients with various dermatological conditions.
- Able to ensure the implementation of National Health Programmes, particularly in sexually transmitted diseases (STD) and leprosy.
- Acquire training skills in research methodology, professionalism, attitude and communication skills, as below:
 - Student must know basic concepts of research methodology, plan a research project, consult library and online resources, has basic knowledge of statistics and can evaluate published studies.
 - Should be able to practice the specialty of dermatology ethically.
 - Recognize the health needs of patients and carry out professional obligations in keeping with principles of National Health Policy and professional ethics.
- Teaching skills in the subject
 - Student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.
- Should have acquired Problem Solving skills

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

At the end of the course, the student should have acquired following theoretical competencies:

- Describe structure, functions and development of human skin.
- Describe ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Describe basic pathologic patterns and reactions of skin.
- Demonstrate the knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.
- Describe the basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Describe papulosquamous and vesiculobullous disorders.
- Describe disorders of epidermal appendages and related disorders.
- Describe inflammatory and neoplastic disorders of dermis.
- Describe skin lesions in nutritional, metabolic and heritable disorders.

- Describe pharmacokinetics and principles of topical and systemic therapy.
- Describe drug reaction, its diagnosis and management.
- Describe cutaneous manifestations of systemic disorders.
- Describe anatomy of male and female genitalia, epidemiological transmission, clinical aspects and management of STDs and HIV.
- Describe clinical features, reactions, treatment and rehabilitation in leprosy.
- Describe etiology, pathophysiology, principles of diagnosis and management of common problems in dermatology including emergencies in adults and children.
- Describe indications and methods for fluid and electrolyte replacement therapy including blood transfusion in dermatological conditions.
- Describe common dermatological malignancies in the country and their management including prevention.
- Should be expert in evaluation of ECG, chest X-ray (CXR), biochemical, haematology and immunology reports related to dermatology.
- Acquire knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immuno-fluorescence, immuno-peroxidase and other related techniques.
- Acquire knowledge of the basics of laser operation and precautions which needs to be taken.
- Demonstrate competence in basic concepts of research methodology and interpretation of data in medical literature/publications.
- Skilled as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant published literature in order to practice evidence-based dermatology;
- Should also have a broad idea how to approach an uncommon dermatological disease.

B. Affective Domain

At the end of the course, the student should have acquired the following attitudinal competencies:

- Demonstrate self-awareness and personal development in routine conduct.
- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations and shows positive approach.
- **Motivation and Initiative:** Is innovative, enterprising, does not shirk duties or leave any work pending and motivates team members.
- **Honesty and Integrity:** Is truthful, admits mistakes, does not cook up information, has ethical conduct and exhibits good moral values.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

- Should be able to maintain confidentiality with regards to history, physical examination and management of patients.
- Identify social, economic, environmental, biological and emotional determinants of patients, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to patients at individual and community level against skin, venereal disease and leprosy.
- Recognize the emotional and behavioral characteristics of patients and keep these fundamental attributes in focus while dealing with them.
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities.
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.
- Organize and supervise the desired managerial and leadership skills.
- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

C. Psychomotor Domain

A student at the end of training of 3 years of MD programme, must acquire the following practical skills:

- General medical skills as learnt in MBBS to be maintained:
 - Should be able to provide basic life support (BLS).
 - Should be expert in blood pressure measurement, intravenous access, blood sampling, fluid electrolytes therapy, pleural and cerebrospinal; fluid (CSF) fluid examination.
 - Should be able to provide basic and advanced life-saving support services in emergency situations.
 - Should be able to undertake complete monitoring of the patient and identify social, economic, environmental and emotional determinants in a given case and take them into account for planning therapeutic measures.
- Recognize conditions that may be outside the area of his specialty/competence and refer them to the proper specialist.

Dermatology, Venereology and Leprosy, HIV/AIDS Skills

The student should:

- Acquire skills in history taking, physical examination, diagnosis and management of patients in dermatology, venereology and leprosy.
- Be able to identify, classify and differentiate cutaneous findings in dermatological terms in a systematic way.
- Be able to perform systemic examination (chest, cardiac, abdomen, neurological, genitals, oral, eye and gynaecological examination) relevant to dermatologic condition.
- Be competent to manage dermatologic emergencies like angioedema, toxic epidermal necrolysis (TEN), Stevens-Johnson syndrome (SJS), pemphigus, drug reaction and necrotic erythema nodosum leprosum (ENL).
- Be able to plan and deliver comprehensive treatment for diseases using principles of rational drug therapy.
- Be able to plan and advice measures for the prevention of infectious disease.
- Be able to plan rehabilitation of patient suffering from chronic illness and disability and those with special needs like leprosy.
- Demonstrate skills in documentation of case details and of morbidity/mortality data relevant to the assigned situation.

Laboratory Skills

The student:

- Should be able to perform common laboratory procedures like potassium hydroxide (KOH) mount, Gram stain, Giemsa stain, acid fast bacilli (AFB) stain, Woods lamp examination, stains, culture media etc. related to the cutaneous diagnosis independently.
- Should be able to order relevant investigations and interpret them to reach to a diagnosis.
- Should be familiar with other recent investigations.

Dermatopathology - Student should be competent enough to:

- To interpret histopathology of common skin diseases.
- To diagnose common skin diseases by examining slides under microscope.

Surgery in dermatology

At the end of training following skills should be performed independently by the student:

1. Should able to give incisions, take stitches and sutures.
2. Should be trained in taking skin biopsy and nail biopsy.
3. Should be able to perform chemical peels, manual dermabrasion, skin punch grafting and wound dressing independently.

4. Should be able to perform cryosurgery, nail surgery and acne surgery.
5. Able to perform chemical cauterization, cryotherapy, patch and photopatch test, slit smears and tissue smears.

Venereology

1. Should be competent in the clinical approach to the patient of STDs and HIV/AIDS.
2. Should be able to interpret the histopathological diagnosis including laboratory aids related with venereology.
3. Able to perform dark ground illumination, gram stain, Bubo aspiration and tissue smear.
4. Able to manage the patient according to syndromic approach for treatment of STDs.

Leprosy

The student should be:

1. Able to diagnose and approach the case of leprosy.
2. Perform AFB smear.
3. Able to manage cases of lepra reaction.
4. Identify, judge and decide when to refer the patients at appropriate level for surgery or rehabilitation. Should be able to manage pediatric cases with skin diseases.

Syllabus

Course contents

Topics related to allied basic sciences

- The structure, functions and development of human skin.
- Ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Immunology, molecular biology and genetics in relation to the skin.
- Epidermal cell kinetics and keratinization.
- Lipids of epidermis and sebaceous glands.
- Percutaneous absorption.
- Skin as an organ of protection and thermoregulation.
- Biology of eccrine and apocrine sweat glands.
- Biology of melanocytes and melanin formation.
- Biology of hair follicles, sebaceous glands and nails.
- Epidermal proteins.
- Dermal connective tissue: collagen, elastin, reticulin, basement membrane and ground substance.
- Metabolism of carbohydrates, proteins, fats and steroids by the skin.
- Cutaneous vasculature and vascular reactions.

- Mechanism of cutaneous wound healing.
- Cellular and molecular biology of cutaneous inflammation and arachidonic acid metabolism.
- Immunologic aspects of epidermis.
- Human leukocyte antigen (HLA) system.
- Immunoglobulins.
- Cytokines and chemokines.
- Lymphocytes, neutrophils, eosinophils, basophils and mast cells.
- Complement system.
- Hypersensitivity and allergy.
- Cutaneous carcinogenesis (chemical, viral and radiation).
- Basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Common laboratory procedures, stains, culture media etc. related to the cutaneous diagnosis.
- Basic pathologic patterns and reactions of skin.
- Common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.

Clinical dermatology

- Epidemiology of cutaneous disease.
- Psychologic aspects of skin disease and psycho-cutaneous disorders.
- Pathophysiology and clinical aspects of pruritus.

Papulosquamous diseases

- Psoriasis, pityriasis rubra pilaris, pityriasis rosea.
- Parapsoriasis, lichen planus, lichen nitidus.
- Palmo-plantar keratodermas, Darier's disease, porokeratosis.
- Ichthyoses and ichthyosiform dermatoses.
- Kyrle's disease and other perforating disorders.

Vesiculo - bullous disorders

- Erythema multiforme, Stevens-Johnson syndrome, Toxic epidermal necrolysis.
- Bullous pemphigoid, Pemphigus.
- Chronic bullous disease of childhood.
- Herpes gestationis (pemphigoid gestationis).
- Hereditary epidermolysis bullosa.
- Epidermolysis bullosa acquisita.
- Dermatitis herpetiformis.
- Familial benign pemphigus.

- Subcorneal pustular dermatoses.
- Pustular eruptions of palms and soles.

Disorders of epidermal appendages and related disorders

- Disorders of hair and nails.
- Disorders of sebaceous glands.
- Rosacea, Perioral dermatitis, acne.
- Disorders of eccrine and apocrine sweat glands.
- Follicular syndromes with inflammation and atrophy.

Epidermal and appendageal tumours

- Precancerous lesions, squamous cell carcinoma and basal cell carcinoma
- Keratoacanthoma, benign epithelial tumours, appendageal tumours
- Merkel cell carcinoma, Paget's disease

Disorders of melanocytes

- Disorders of pigmentation, albinism, benign neoplasia and hyperplasias of melanocytes, dysplastic melanocytic nevi, cutaneous malignant melanoma.

Inflammatory and neoplastic disorders of the dermis

- Acute febrile neutrophilic dermatosis (Sweet's syndrome)
- Erythema elevatum diutinum
- Cutaneous eosinophilic diseases
- Granuloma faciale
- Pyoderma gangrenosum
- Erythema annulare centrifugum and other figurate erythemas
- Granuloma annulare
- Malignant atrophic papulosis (Dego's Disease)
- Neoplasms, pseudoneoplasms and hyperplasias of the dermis
- Vascular anomalies
- Kaposi's Sarcoma
- Anetoderma and other atrophic disorders of the skin
- Ainhum and pseudoainhum
- Neoplasias and hyperplasias of neural and muscular origin
- Elastosis perforans serpiginosa and reactive perforating collagenosis

Lymphomas, pseudolymphomas and related conditions

Disorders of subcutaneous tissue

- Panniculitis

- Lipodystrophy
- Neoplasms of the subcutaneous fat

Disorders of the mucocutaneous integument

- Biology and disorders of the oral mucosa
- Disorders of the anogenitalia of males and females

Cutaneous changes in disorders of altered reactivity

- Genetic immunodeficiency diseases
- Urticaria and Angioedema
- Disorders associated with complement abnormalities
- Graft-versus-host Disease
- Muco-cutaneous manifestations in immunosuppressed host other than HIV-infection
- Contact dermatitis
- Auto-sensitization dermatitis
- Atopic dermatitis (atopic eczema)
- Nummular eczematous dermatitis
- Seborrhoeic dermatitis
- Vesicular palmoplantar eczema

Skin changes due to mechanical and physical factors

- Occupational skin disease
- Radiobiology of the skin
- Skin problems in amputee
- Sports dermatology
- Skin problems in war field
- Decubitus ulcers

Photomedicine, photobiology and photo immunology in relation to skin

- Acute and chronic effects of ultraviolet radiation and sun light on the skin
- Narrow-band ultraviolet B (NBUVB) therapy, phototherapy, photochemotherapy

Disorders due to drugs and chemical agents

- Cutaneous reactions to drugs
- Mucocutaneous complications of anti-neoplastic therapy
- Cutaneous manifestations of drug abuse

Dermatology and the ages of man

- Neonatal dermatological problems
- Pediatric and adolescent dermatological problems

- Ageing of skin
- Geriatric dermatological problems

Skin lesions in nutritional metabolic and heritable disorders

- Cutaneous changes in nutritional disease
- Acrodermatitis enteropathica and other zinc deficiency disorders
- Cutaneous changes in errors of amino acid metabolism: Tyrosinemia II, phenylketonuria, arginine succinic aciduria, and alkaptonuria
- Amyloidosis of the skin
- The porphyrias
- Xanthomatosis and lipoprotein disorders
- Fobry's Disease; galactosidase - a deficiency (Angiokeratoma corporis diffusum universale)
- Lipid proteinosis
- Cutaneous mineralisation and ossification
- Heritable disorders of connective tissue with skin changes
- Heritable disease with increased sensitivity to cellular injury
- Basal cell Naevus syndrome

Skin manifestations of hematologic disorders

- Skin changes in hematological disease
- Langerhans cell and other cutaneous histiocytoses
- The Mastocytosis syndrome

Skin manifestations of systemic disease

- The skin and disorders of the alimentary tract
- The hepatobiliary system and the skin
- Cutaneous changes in renal disorders, cardiovascular, pulmonary disorders and endocrinal disorders
- Skin changes and diseases in pregnancy
- Skin changes in the flushing disorders and the carcinoid syndrome

Skin manifestations of rheumatologic disease

- Lupus Erythematosus
- Dermatomyositis
- Scleroderma
- Systemic Necrotizing Arteritis
- Cutaneous Necrotising venulitis
- Cryoglobulinemia and Cryofibrinogenemia
- Relapsing Polychondritis
- Rheumatoid Arthritis, Rheumatic Fever and Gout

- Sjogren's syndrome
- Raynaud's phenomenon
- Reiter's syndrome
- Multicentric Reticulohistiocytosis

Cutaneous manifestations of disease in other organ systems

- Sarcoidosis of the skin
- Cutaneous manifestations of Internal Malignancy
- Acanthosis Nigricans
- Scleredema
- Papular Mucinosis
- Neurocutaneous disease
- Tuberous Sclerosis Complex
- The Neurofibromatosis
- Ataxia Telangiectasia
- Behcet's disease

Bacterial diseases with cutaneous involvement

- General considerations of bacterial diseases
- Pyodermas: Staphylococcus aureus, Streptococcus, and others
- Staphylococcal Scalded-Skin syndrome
- Soft Tissue Infections: Erysipelas, Cellulitis, Septicemia and Gangrenous Cellulitis
- Gram-Negative Coccal and bacillary infections
- Bartonellosis
- Miscellaneous bacterial infections with cutaneous manifestations
- Tuberculosis and other mycobacterial infections
- Actinomycosis, Necardiosis, and Actinomycetoma
- Lyme Borreliosis
- Kawasaki Disease

Fungal diseases with cutaneous involvement

- Superficial fungal infection: Dermatophytosis, Tinea Nigra, Piedra
- Yeast Infections: Candidiasis, Pitryiasis (Tinea) Versicolor
- Deep Fungal Infections

Viral and ricketisial disease

- Viral Diseases: general consideration
- Rubella (German Measles)
- Measles
- Hand, Foot and Mouth Disease
- Herpangina

- Erythema Infectiosum and Parvovirus B 19 infection
- Herpes simplex
- Varicella and Herpes Zoster
- Cytomegalovirus Infection
- Epstein - Barr Virus Infections
- Human Herpes virus 6 & 7 infections and Exanthem subitum (Roseola Infantum or Sixth Disease)
- Smallpox and Complications of small pox vaccination
- Contagious Pustular Dermatitis, Contagious Ecthyma: Orf virus infection
- Milluscum Contagiosum
- Miller's Nodules
- Warts
- Human Retroviral Disease: Human T-Lymphotropic Virusviruses

Therapeutics

Topical therapy

- Pharmacokinetics principles intopical applications of drugs.
- Principles of topical therapy.

Topical agents

- Glucocorticoids, Acne therapies, Analgesics, Anesthetics, Anti-inflammatory, Anti hair loss, Anti-microbial, Anti-parasitic, Anti-perspirants, Anti-pruritic, Anti-viral, Astringents, Bleaching agents, Keratolytics, Psoriasis therapies, Wart therapies, Topical Retinoids, Topical Antibiotics, Topical Anti-fungal Agents, Sun-protective Agents, Keratolytic Agents, Topical Cytotoxic Agents, Cosmetics and Skin care in practice.

Systemic therapy

- Systemic glucocorticoids, Sulfones, Aminoquinolines, Cytotoxic and Antimetabolic Agents, Oral Retinoids, Antihistamines, Antibiotics, Antiviral Drugs, Oral Antifungal Agents, Immunosuppressive and Immunomodulatory drugs, Thalidomide, photo-chemotherapy and photo-therpay, electric cautery, cryotherapy, electrolysis, tattooing, intra-lesional injections etc.

Surgery in dermatology

- Dermatologic Surgery: Introduction and Approach
- Skin Resurfacing: Chemical Peels
- Skin Resurfacing: Dermabrasion
- Skin Resurfacing: Laser
- Skin punch grafting
- Wound Dressings
- Cryosurgery

- Nail Surgery

Venereology

- Clinical approach to the patient of sexually transmitted disease
- Anatomy of male and female genitalia
- Epidemiological aspects of STDs
- Viral STDs including HIV, Herpes, Human Papilloma virus (HPV), Molluscum contagiosum, Espirito Santo virus (ESV) etc.
- Bacterial STD's: Syphilis, Gonorrhoea, Chancroid, Donovanosis
- Chlamydial infections: Lymphogranuloma venereum, urethritis, cervicitis, nongonococcal urethritis (NGU), non-specific vaginitis etc.
- Fungal: Candidiasis
- Protozoal: Trichomoniasis
- Ectoparasitic: Scabies, Pediculosis infestations.
- Syndromic management of STDs
- HIV/AIDS - Epidemiology, transmission, patient load, High risk groups, cutaneous manifestations of HIV, treatment of opportunistic infections, antiretroviral therapy, management of STDs in HIV positive cases
- STDs in reproduction health and Pediatrics
- STDs and HIV
- Prevention, counselling and education of different STDs including HIV
- National Control Programmes of STDs and HIV infection
- Medico-legal, social aspects of STDs including psychological and behavioural abnormalities in STD patients

Leprosy

- Approach to the patient with leprosy
- Epidemiological aspects
- Structure, biochemistry, microbiology of Mycobacterium leprae
- Animal models
- Pathogenesis
- Classification
- Immunology and molecular biological aspects
- Histopathology and diagnosis including laboratory aids
- Clinical features
- Reactions
- Systemic involvement (Ocular, bone, mucosa, testes and endocrine etc.)
- Pregnancy and leprosy
- HIV infection and leprosy

TEACHING AND LEARNING METHODS

A post graduate student pursuing the course should work in the institution as a full time student. No candidate should be permitted to run a clinic/laboratory/nursing home while studying postgraduate course. Each year should be taken as a unit for the purpose of calculating attendance. Every student shall attend teaching and learning activities during each year as prescribed by the department and should not be absent from work without valid reasons.

Teaching methodology:

A list of teaching and learning activities designed to facilitate students acquire essential knowledge and skills outlined is given below.

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.

a) **Didactic Lectures:** Few topics are suggested as examples:

- 1) Bio-statistics
- 2) Use of library
- 3) Research Methodology
- 4) Medical code of Conduct and Medical Ethics
- 5) National Health and Disease Control Programmes
- 6) Communication Skills

These topics may preferably be taken up in the first few weeks of the first year.

b) **Integrated Lectures:** Some of the topics may be taken up by multidisciplinary teams eg. Jaundice, Diabetes mellitus, Thyroid etc.

2. **Journal Club & Subject seminars:** Both are recommended to be held once a week. All PG students are expected to attend and actively participate in discussion and enter relevant details in the Log Book. Further, every post graduate student must make a presentation from the allotted journal(s), selected articles at least four times a year. The presentations would be evaluated and would carry weightage for internal assessment.

3. **Student Symposium:** Recommended as an optional multi-disciplinary programme. The evaluation may be similar to that described for subject seminar.

4. **Ward Rounds:** Ward rounds may be service or teaching rounds.

a) **Service Rounds:** Post graduate students and Interns should be responsible for everyday care of the patients. Newly admitted patients should be worked up by the PGs and presented to the seniors the following day.

b) **Teaching Rounds:** Every unit should have 'grand rounds' for teaching purpose. A diary (log book) should be maintained for day to day activities by the students.

Entries of (a) and (b) should be made in the Log book. Log books shall be checked and assessed periodically by the faculty members imparting the training.

5. **Clinical Case Presentations:** Minimum of 5 cases to be presented by every post graduate student each year. They should be assessed using check lists and entries made in the log book
6. **Clinico-Pathological Conference (CPC):** Recommended once a month for all post graduate students. Presentation is to be done by rotation. If cases are not available, it could be supplemented by published CPCs.
7. **Inter-Departmental Meetings:** Strongly recommended particularly with Departments of Pathology and Radio-Diagnosis at least once a week. These meetings should be attended by post graduate students and relevant entries must be made in the Log Book.

Pathology: A dozen interesting cases may be chosen and presented by the post graduate students and discussed. The staff of Pathology department would then show the slides and present final diagnosis. In these sessions, the advances in immuno-histochemical techniques can be discussed.

Radiodiagnosis: Interesting cases and imaging modalities should be discussed.

8. **Teaching Skills:** The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
9. The post graduate students should undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing the work and presenting the same at various scientific fora.
10. **Continuing Medical Education Programmes (CME):** At least two CME programmes should be attended by each student during the MD programme.
11. **Conferences:** The student should attend courses, conferences and seminars relevant to the speciality.
12. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
13. Department should encourage e-learning activities.
14. Rotation:

Clinical Postings

A major tenure of posting should be in the Department of Dermatology. It should include care of in-patients, out-patients, special clinics like STD clinic, leprosy clinic, vitiligo clinic and maintenance of case records for both in- and out-patients.

A short posting for 2-4 weeks in the Department of Medicine is to be arranged for exposure to Emergency Medicine and Resuscitation.

15. Clinical meetings:

There should be intra - and inter- departmental meetings for discussing uncommon / interesting medical problems. Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. These should be entered in a Log Book; log books should be checked and assessed periodically by the faculty members imparting the training.

16. Thesis writing:

Thesis writing is compulsory. All MD students are required to carry out work on a selected research project under the guidance of a recognized post graduate teacher, the result of which shall be written up and submitted in the form of a Thesis.

During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i.e., during the training may be as follows:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

Quarterly assessment during the MD training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

SUMMATIVE ASSESSMENT, i.e., at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination:

There shall be four papers each of three hours duration. Each paper shall consist of two long essay questions, three short essay questions and four short notes. These are:

Paper – I Basic Science as applied to Dermatology, STDs and Leprosy

Paper – II Dermatology

Paper – III STD & Leprosy

Paper – IV Recent advances in field of Dermatology, Applied Sciences pertaining to skin /VD & internal medicine and skin

3. Clinical / Practical and viva voce Examination

Practical examination should be taken to assess competence and skills of techniques and procedures and should consist of two long cases, two short cases and 10 spots.

During oral/viva voce examination, student should be evaluated for Interpretation of data, instruments, clinical problems, radiological and biochemical investigations, slides, drugs, X-rays etc.

Recommended Reading:

Books (latest edition)

- Sexually Transmitted Diseases - Sharma V K
- IADVL Text book of Dermatology - R G Walia
- IAL Textbook of Leprosy - H Kar
- Bologna "Textbook of Dermatology"
- Text Book of Dermatology, Wilkinson/Ebling/Rook, 4 Volumes, Oxford
- Text Book of Dermatology, Samuel L. Moschelia M.D. Harry J. Hurllay M.D., 2 Volumes
- Histopathology of the Skin, Walter - F. Lever- Gundula Schaumburg Lever
- Atlas of Dermatology, 2 Volumes, Bhalani Publishing House, Dadar, Mumbai.
- Diseases of the skin, I Iarry L Arnold Richard 13-Dom William D. James, Andrews
- Differential Diagnosis in Dermatology, Satish S. Savant, Radha Atalshah, Deepak Gore, Richard Ashan, Barbara Lepdard

- Leprosy, Dharmendra, 2 Volumes, Samant and Company, Mumbai.
- Recent Advances in Dermatology, Champion, R.H. Pye, R.J. 8th Volumes.
- Venereal Diseases, Amborse King Claude Nicol Philip Rodin, ELBS English Language Book Society/ Baillere Tindal, East Sussex.
- Sexually Transmitted Diseases, King K Holmes, McGraw-Hill Health profession
- Hand Book of leprosy, Jopling W.H, William Hethgunnah Medical Book Ltd., London.
- Dermatology in General Medicine, Thomas B. Fitzpatrick, McGraw Hill Book Company.
- Fundamentals of Pathology of skin, Mysore Venkataram

Journals

Three international and two national journals (all indexed)



**Postgraduate Students Appraisal Form
Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks*

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/09

Date: 01-08-22

**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR M.D. IN
GENERAL MEDICINE**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN GENERAL MEDICINE

Preamble:

The purpose of post graduate (PG) education in General Medicine is to create specialists who would provide appropriate health care to the community and advance the cause of science through research, training and teaching the medical fraternity.

The competency-based training programme aims to produce a postgraduate doctor who after required training should be able to deal effectively with the medical needs of the community. The postgraduate specialist is also expected to know the principles of research methodology and be able to update himself with advances and practice evidence-based medicine. They should be trained to work in synchrony with faculty in super-speciality courses of Medicine and to follow a holistic approach to medical care which would lead to the development of good quality teachers. This document has been prepared by subject-content specialists of the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies.”

SUBJECT SPECIFIC OBJECTIVES

Postgraduate training should enable the student to:

- Practice internal medicine with competence, with the help of scientific knowledge in an evidence based fashion.
- Conduct clinical examination and relevant investigations, diagnose medical conditions and refer early where indicated.
- Plan and deliver comprehensive treatment using the principles of rational drug therapy.
- Plan and advise measures for the prevention and rehabilitation of patients.

- Manage emergencies efficiently by providing Basic Life Support (BLS) and Advanced Life Support (ALS).
- Recognize conditions that may be outside of scope of general medicine and refer to an appropriate specialist.
- Exercise empathy and a caring attitude and maintain professional integrity, honesty and high ethical standards.
- Document case details including epidemiological data.
- Play the assigned role in the implementation of National Health Programs.
- Demonstrate competence in basic concepts of research methodology and clinical epidemiology; and preventive aspects of various disease states.
- Become a motivated 'teacher' - defined as one keen to share knowledge and skills with a colleague or a junior or any learner.
- Continue to evince keen interest in continuing education and use appropriate learning resources.
- Practice the medico-legal responsibilities.
- Undertake audit related to patient care, morbidity and mortality, use information technology tools and carry out research - both basic and clinical, with the aim of publishing the work and presenting the work at scientific forums.
- Participate in public health emergencies (arising in the community).
- Estimate the financial burden of care and practice health economics and rational approach to investigations.
- Communicate about the illness with patient's/relatives at all stages of care.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Predominant in Cognitive Domain:

1. Describe clinical features of diseases of various aetiology affecting all systems in the adult and geriatric population.

2. Apply the basic sciences knowledge in understanding and managing common diseases.
3. Describe the investigations to be undertaken at various levels like OPD, Ward, ICU etc. and choose them appropriately depending on the clinical features and epidemiologic principles.
4. Describe the pharmaco-therapeutics of various diseases and complications.
5. Describe and discuss the health issues related to environmental and ecological factors.
6. Describe and discuss the methods and mechanisms of rehabilitation following diseases.
7. Describe and discuss the issues related to palliative and terminal care.
8. Incorporate the national and international guidelines related to various diseases in day to day practice and teaching.
9. Describe and discuss the social and economic aspects of illnesses, outbreaks and epidemics.
10. Analyse the observations of disease patterns in patients and community and make suggestions for improvement in management and prevention.
11. Describe and discuss the National Health Programs.
12. Analyse and critique the publications related to various aspects of illnesses and evidence based medicine.
13. Describe and discuss the various levels of prevention in communicable and non - communicable diseases.
14. Describe and discuss various legislations related to organ transplant, brain death, informed consent, human rights etc.
15. Be updated on recent advances in internal medicine.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient, relatives, paramedical and medical colleagues to provide the best possible comprehensive care.
2. Always adopt ethical principles and maintain professional etiquette in dealing with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to interact with patients, relatives, peers and paramedical staff, with special emphasis on breaking bad news empathetically.
4. Should demonstrate equity and equality when dealing with individuals of special groups (differently abled and LGBTQIA+).

C. Predominant in Psychomotor domain:

The post graduate student, at the end of the course should be able to perform the following skills, independently (PI) or under supervision (PS):

Clinical Assessment Skills

- Elicit a detailed clinical history (PI)
- Perform a thorough physical examination of all the systems (PI)

Procedural skills

- Pleural tap (PI)
- Lumbar puncture (PI)
- Arterial puncture for ABG (PI)
- Bone marrow aspiration and biopsy (PI)
- Abdominal paracentesis - diagnostic (PI)
- Aspiration of liver abscess (PI)

DESIRABLE

- Ultrasound abdomen at point of care (PI)
- Fine needle aspiration cytology (FNAC) from palpable lumps (PI)
- Pericardiocentesis (PS)
- Joint fluid aspiration (PI)
- Liver biopsy (PI)
- Kidney biopsy (PS)
- Cardiac-TMT (PS)
 - Holter monitoring (PS)
 - Echocardiography (point of care) (PS)
 - Doppler studies (PS)

Respiratory management

- Non-invasive and mechanical ventilation (PI)

Critically ill person

- Monitoring a sick person (PI)

- Endotracheal intubation (PI)
- Cardio-pulmonary resuscitation(PI)
- Central vein cannulation and CVP monitoring (PI)
- Using a defibrillator (PI)
- Hemodialysis (PS)
- Certification of Brain death (PI)

Interpretation Skills

Interpretation of results of the following investigations, considering clinical data (history & examination findings).

- Treadmill testing (PI)
- ABG analysis (PI)
- Ultrasonography (PI)
- CT scan chest and abdomen (PI)
- CT scan head and spine (PI)
- MRI- Brain and spine (PI)
- Barium studies- desirable (PI)
- Pulmonary function tests (PI)
- Immunological investigations (PI)
- Nerve Conduction studies /EMG (PI)
- EEG (PI)
- Evoked Potential interpretation (PI)

Communication skills (PI)

While eliciting clinical history and performing physical examination, emphasize on:

- Communicating health and disease,
- Pre-test and post-test counseling for HIV,
- Pedagogy: teaching students, other health functionaries: lectures, bedside clinics, discussions,
- Health education: prevention of common medical problems, promoting healthy life-style, immunization, periodic health screening, counseling skills in risk factors for

common malignancies, cardiovascular disease, AIDS etc.

- Dietary counseling in health and disease,
- Linking patients with community resources,
- Providing referral,
- Genetic counseling,
- Communicating bad news to the patient and relatives.

Others

- **Demonstration of the following: (PI)**
 - professionalism
 - ethical behavior (humane and professional care to patients)
- **Utilization of information technology**
 - Medline search, Internet access, computer usage
- **Research methodology**
 - designing a study
 - interpretation and presentation of scientific data
- **Self-directed learning**
 - identifying key information sources
 - literature searches
 - information management
- **Therapeutic decision-making**
 - managing multiple problems simultaneously
 - assessing risks, benefits and costs of treatment options
 - involving patients in decision-making
 - selecting specific drugs within classes
 - rational use of drugs

Syllabus

Course contents:

A: Cognitive domain:

Basic Sciences

1. Basics of human anatomy as relevant to clinical practice:

- Surface anatomy of various viscera

- Neuro-anatomy
 - Important structures/organ's location in different anatomical locations in the body
 - Histology of organs
 - Blood supply, nerve supply to various organs
2. **Applied physiology of various organ systems:**
- Basic functioning of various organ-system, control of vital functions.
 - pathophysiological alteration in diseased states.
 - interpretation of symptoms and signs in relation to pathophysiology.
 - Physiology of temperature, sleep regulation.
3. **Applied biochemical basis of various diseases including fluid and electrolyte disorders:**
- Acid - base disorders, disorders of carbohydrate, fat, protein, calcium, phosphorous and iron metabolism.
 - Interpretation and clinical application of various biochemical tests.
4. **Applied pathology of different diseases.**
- Common pathological changes in various organs associated with diseases and their correlation with clinical signs.
 - Understanding of various pathogenic processes and possible therapeutic interventions, and
 - Preventive measures at various levels to reverse or arrest the progression of diseases.
5. **Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help:**
- Important organisms associated with tropical diseases, their growth pattern/life-cycles,
 - Levels of therapeutic interventions possible in preventing and/or eradicating the organisms,
 - Antimicrobial resistance,
 - Antibiotic stewardship,
 - Hospital infection control,
 - Biomedical waste management,
 - Vaccinology.

6. Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases of kidneys/liver/systemic disorders which may need alteration in doses due to abnormal metabolism/excretion of the drugs:

- pharmacokinetics and pharmaco-dynamics of drugs: principles and methodology
- Rational use of available drugs.
- Principles of drug therapy,
- Adverse drug reactions,
- Drug interaction,
- Pharmacovigilance,
- Drug abuse and addiction,
- Drug development,
- Pharmacoeconomics,
- Pharmacogenomics.

7. Research methodology, study designs, clinical epidemiology and biostatistics relevant to medical sciences.

8. National Health Programmes:

- investigation of community outbreak,
- public health policy,
- health promotion,
- prevention of communicable and non-communicable diseases.
- International health regulations,
- Travel medicine.

9. Knowledge about various poisons with specific reference to different geographical and clinical settings - their diagnosis and management.

- Knowledge about snake bite, other bites and stings,
- medicolegal aspects.

Systemic Medicine

10. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bioterrorism,

- Health tourism,

- Rehabilitation,
- Drowning,
- Heat and altitude related disorders.

11. Geriatric Medicine:

- Physiology and biology of aging and various organ changes in elderly.
- Principles of geriatric medicine and uniqueness of geriatric presentation.
- Physical examination of geriatric patient.
- drug metabolism, laboratory tests in elderly.
- Management of unique problems related to elderly such as nutrition, falls, gait disorders, neuro- psychiatric problems etc.
- Mental health disorders,
- Elderly neglect and abuse,
- Social and family support and rehabilitation of elderly.
- Assessment of functional and cognitive aspects, counseling and communication with elderly.
- Appropriate medication and avoidance of poly-pharmacy.

12. Genetics:

- Overview of the paradigm of genetic contribution to health and disease
- Principles of Human Genetics
- Genetic basis of medical disorders
- Single gene and chromosomal disorders
- Genetic counseling
- Prevention of genetic disorders
- Genetic analysis
- Gene therapy

13. Immunology:

- Innate and adaptive immune systems
- Mechanisms of immune mediated cell injury
- HLA system, primary and secondary immune-deficiency,
- Allergic disorders: urticaria, angioedema, anaphylaxis and other allergic disorders.
- Transplantation immunology, immunocomplex disorders, organ specific and multisystem immune disorders, monoclonal antibodies.

14. **Cardio-vascular diseases:**

- Approach to the patient with possible cardio-vascular diseases
- Investigative cardiology
- Heart failure
- Arrhythmias
- Hypertension
- Coronary artery disease
- Valvular heart disease
- Infective endocarditis
- Diseases of the myocardium and pericardium
- Diseases of the aorta and peripheral vascular system
- Congenital heart diseases
- Pulmonary arterial hypertension
- Cor pulmonale

15. **Respiratory system:**

- Approach to the patient with respiratory diseases
- Investigative pulmonology
- Disorders of ventilation
- Asthma
- Chronic Obstructive Pulmonary Disease (COPD)
- Bronchiectasis
- Occupational lung diseases
- Interstitial lung diseases
- Hypersensitivity Pneumonitis
- Pneumonia and suppurative lung diseases
- Pulmonary embolism
- Cystic fibrosis
- Obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum
- Pulmonary manifestations of systemic diseases

16. **Nephrology:**

- Approach to the patient with renal diseases
- Acute kidney injury

- Chronic kidney disease
- Glomerular diseases
- Nephrotic syndrome
- Reno vascular hypertension
- Cystic Diseases of the kidney
- Tubulo-interstitial diseases
- Nephrolithiasis
- Urinary tract infection and pyelonephritis
- Diabetes and the kidney
- Obstructive uropathy and treatment of irreversible renal failure
- Dialysis
- Renal involvement in systemic diseases

17. **Gastro-intestinal diseases:**

- Approach to the patient with gastrointestinal diseases
- Gastrointestinal endoscopy
- Motility disorders
- Diseases of the esophagus
- Acid peptic disease
- Functional gastrointestinal disorders
- Diarrhea
- Malabsorption syndromes
- Irritable bowel syndrome
- Inflammatory bowel diseases
- Mesenteric vascular insufficiency
- Diverticular disease
- Acute intestinal obstruction
- Peritonitis
- Diseases of the rectum and anus

18. **Diseases of the liver and gall bladder:**

- Approach to the patient with liver disease
- Interpretation of liver function tests
- Hyperbilirubinemia
- Acute viral hepatitis
- Drug induced /toxic hepatitis

- Chronic hepatitis
- Alcoholic and non-alcoholic steatohepatitis
- Cirrhosis and its sequelae/ complications
- Portal hypertension
- Budd Chiari syndrome
- Hepatic failure and liver transplantation
- Diseases of the gall bladder and bile ducts
- Disease of pancreas including pancreatitis

19. Haematologic diseases:

- Hematopoiesis
- Anemias
- Leucopenia and leukocytosis
- Myelo-proliferative disorders
- Bone marrow failure syndromes
- Plasma cell disorders
- Disorders of hemostasis and haemopoietic stem cell transplantation
- Platelet Disorders
- Hypercoagulable conditions
- Blood components and transfusion medicine

20. Oncology:

- Epidemiology
- Biology and genetics of cancer
- Approach to patient with cancer
- Early detection or prevention of cancer
- Infection in cancer patients
- Oncological emergencies
- Paraneoplastic syndromes and endocrine manifestations of tumours
- Metastatic cancer of unknown primary site
- Hematological malignancies
- Cancers of various organ systems and cancer chemotherapy
- Rehabilitation and palliative care in cancer patients.

21. Metabolic diseases - inborn errors of metabolism and disorders of metabolism:

- Hemochromatosis

- Wilson's disease
- Porphyrias
- Other inborn errors of metabolism.

22. Nutritional diseases:

- Nutritional assessment, Anthropometry
- Enteral and parenteral nutrition
- Obesity and eating disorders.
- Malnutrition
- Vitamin and trace element deficiencies and excess.

23. Endocrine diseases:

- Approach to patients with endocrine disorders
- Disorders of Pituitary
- Disorders of thyroid gland
- Disorders of adrenal cortex
- Pheochromocytoma
- Multiple endocrine neoplasia
- Autoimmune polyendocrine syndromes
- Reproductive endocrinology including menopause and postmenopausal hormone therapy
- Diabetes mellitus
- Hypoglycemia
- Metabolic Syndrome
- Dyslipidemia
- Disorders of parathyroid gland
- Disorders of bone and mineral metabolism in health and disease
- Osteoporosis

24. Rheumatic diseases:

- Approach to the patient with rheumatic diseases
- Osteoarthritis
- Rheumatoid arthritis
- Spondyloarthropathies
- Systemic lupus erythematosus (SLE)
- Sarcoidosis

- Sjogren's syndrome
- Systemic sclerosis
- Anti-phospholipid antibody syndrome
- Bechet's disease
- Vasculitis syndromes
- Acute rheumatic fever
- Inflammatory myopathies
- Arthritis associated with systemic diseases
- Gout and crystal associated arthritis
- Relapsing polychondritis
- IgG4 related disease
- Polymyalgia rheumatica
- Fibromyalgia
- Amyloidosis

25. Infectious diseases:

- Basic consideration in Infectious Diseases
- Clinical syndromes
- Community acquired clinical syndromes
- Nosocomial infections
- Infections in immunocompromised
- Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria, miscellaneous bacterial infections, Atypical bacterial infections - Mycobacterial diseases, Spirochetal diseases, Rickettsial disease, Mycoplasma and Chlamydia.
- Viral diseases - DNA viruses, RNA viruses, HIV infection, Emerging viral diseases - Coronavirus, Nipha virus, H1N1 virus, Hantavirus.
- Fungal infections,
- Protozoal infections,
- Helminthic infections.

26. **Neurology**

- Approach to the patient with neurologic diseases,
- Diagnostic neurology,
- Localization of neurological disease/s,

- Headache,
- Seizure disorders and epilepsy,
- Coma,
- Disorders of sleep,
- Cerebrovascular diseases,
- Cranial neuropathy,
- Dementias and neurodegenerative diseases,
- Brain abscess,
- Demyelinating diseases,
- Parkinson's disease and other movement disorders,
- Motor neuron diseases,
- Ataxic and gait disorders,
- Meningitis and encephalitis,
- Prion diseases,
- Peripheral neuropathies,
- Muscle diseases,
- Diseases of spinal cord
- Diseases of neuromuscular transmission,
- Autonomic disorders and their management.

27. **Psychiatric disorders**

Common psychiatric disorders in adult & geriatric population:

- Mood (affective) disorders,
- Anxiety disorders,
- Schizophrenia,
- Organic mental disorders,
- Eating disorders,
- Sexual disorders,
- Personality disorder and suicide and self-harm,
- Autistic disorders,
- Functional and psychosomatic disorder,
- Somatoform disorder,
- Dissociative/ conversion disorder.
- Substance use disorders.

28. **Dermatology:**

- Structure and functions of skin.
- Infections of skin.
- Papulo-squamous and inflammatory skin rashes.
- Photo-dermatology.
- Erythroderma.
- Cutaneous manifestations of systematic diseases.
- Bullous diseases.
- Drug induced rashes.
- Disorders of hair and nails.
- Principles of topical therapy.

29. **Critical care medicine**

- Approach to patient with critical illness.
- Acute respiratory distress syndrome.
- Mechanical ventilatory support.
- Approach to patient with shock.
- Sepsis and septic shock.
- Cardiogenic shock and pulmonary edema.
- Cardiovascular collapse and cardiac arrest.
- Cardiopulmonary resuscitation.

30. **Miscellaneous**

- Medical illnesses in pregnancy
- Peri-operative evaluations

B: Psychomotor domain: Detailed guidelines on this section are given under Subject specific competencies.

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed,

and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.**

Self Directed Learning (SDL) is an extension of the role of lifelong learner envisaged in the goals of the Indian Medical Graduate. All postgraduate students are expected to learn through Problem Based Learning, SDL, Project Based learning etc. Various forms of self-learning including those mediated through IT - enhanced methodologies must be adopted. Specific hours need not be ear-marked, but these should be integrated into day to day practice.

Post graduates in all specialities are expected to learn through work-based discussions and experiential learning. Beyond documentations in logbook, they should demonstrate competency related to patient care, interpretation and communication skills during the routine work in wards, OPD, ICUs, district residency postings etc. They should be involved in teaching of Undergraduate (MBBS) students also.

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics are to be selected as per subject

requirements. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. **Salient features of** Undergraduate/Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum - once every 1-2 weeks.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skills lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases.

G. (a). Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

- Broad specialty departments
- Emergency/Casualty department
- Super specialty departments e.g. Cardiology / Endocrinology / Nephrology / Medical Oncology etc.
- Laboratory-based specialty units/departments e.g. Biochemistry/Microbiology/ Infection control unit/Laboratory Medicine etc.

G. (b). Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MS/MS in broad specialties in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Participation & performance, (2) attendance, (3) participation in sessions, (4) completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

- a) help maintain a record of the work done during training,
- b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
- c) provide feedback and assess the progress of learning with experience gained periodically.
- d) Documentation of acquisition required competencies

The Log Book should be used in the internal assessment of the student; should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

The student to be assessed periodically as per categories listed in appropriate (non-clinical/clinical) postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. **Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory examination**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject

Paper II: Therapeutics & Tropical Medicine

Paper III: Systemic Medicine of all organ systems

Paper IV: Recent advances in the subject.

3. **Practical/clinical and Oral/viva voce examination**

Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

The final clinical examination in broad specialty clinical subjects should include:

- Cases pertaining to major systems (eg. one long case and three short cases)
- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- It is emphasized that Oral/viva voce examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

Recommended Reading:

Text Books (latest edition)

1. API Text book of Medicine
2. Davidson's Principles and Practice of M
3. Harrison's Principles & Practice of Medicine
4. Oxford Text book of Medicine
5. Kumar & Clark: Book of Clinical Medicine
6. Cecil: Text Book of Medicine
7. Current medical diagnosis and treatment
8. Washington manual of medical therapeutics
9. Krishnadas. K.V: Text Book of Medicine

Journals

03-05 international Journals and 02 national (all indexed) journals.

Student appraisal form for MD in General Medicine											
	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence										
	(eg Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										

2.6	Participation and contribution to health care quality improvement																					
3	Professional attributes																					
3.1	Responsibility and accountability																					
3.2	Contribution to growth of learning of the team																					
3.3	Conduct that is ethical appropriate and respectful at all times																					
4	Space for additional comments																					
5	Disposition																					
	Has this assessment been discussed with the trainee?	Yes	No																			
	If not explain																					
	Name and Signature of the assessee																					
	Name and Signature of the assessor																					
	Date																					

National Medical Commission

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**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

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**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR MD IN
PHARMACOLOGY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHARMACOLOGY

Preamble

The purpose of the postgraduate (PG) education is to create specialists who would provide high quality education, health care and advance the cause of science through research and training.

Pharmacology consists of both experimental and clinical sciences. The experimental component is essential in understanding the drug action in diseases as well as for the research in drug discovery and development. Clinical application of pharmacology concepts is essential for rational prescribing practices, rational therapeutics, clinical trials, rational use of drugs including antimicrobials, pharmacovigilance and pharmacology consults.

The job prospects for a medical pharmacologist have evolved over time along with a congruent rise in the demand for trained pharmacologists in India, both in academics as well in other areas such as pharmacovigilance centres, regulatory bodies, national research institutes, pharmaceutical industry and as scientific writers or science managers. Hence, a PG student in Pharmacology should be competent to meet the growing challenges in job requirements at all levels in various fields and organizations.

Considering the emerging trends in pharmacology & therapeutics, clinical applications of the subject, its role in national programs, evolving integrated course schedules while broadening the subject scope and number of students seeking to join the PG degree in pharmacology, there is huge demand to standardize and update PG curricular components including competencies, teaching learning methods and assessment methods in the MD pharmacology course in India. This requires integration of pharmacology with other sciences including basic, para-clinical and clinical disciplines.

A pragmatic approach to postgraduate pharmacology teaching in India is a key step towards addressing the aforesaid challenges and facilitating a fresh curriculum design. The purpose of this document is to provide teachers and learners comprehensive guidelines to achieve the defined competencies through various teaching-learning and assessment strategies. This document was prepared by various subject and education experts of the national Medical Commission. The subject Expert Group has attempted to render uniformity without compromising the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES (GOALS)

At the end of the MD training programme in Pharmacology, the student should meet the following goals:

1. Acquisition of knowledge

The student should be able to clearly explain concepts and principles of pharmacology and therapeutics, drug development processes, the drugs and cosmetics act, rational use of drugs, antimicrobial resistance, pharmacovigilance, pharmacy, health economics, clinical trial processes and relevant national programs.

2. Acquisition of Skills

The student should be able to develop and apply skills in pharmacology-based services (e.g. rational prescribing), in self-directed learning for evolving educational needs and scientific information, in conduct of research and in managerial assignments in the department/institution.

3. Teaching and training

The student should be able to effectively teach and assess undergraduate medical students (MBBS) and allied health science courses (Dentistry, Nursing, Physiotherapy) so that they become competent healthcare professionals and are able to contribute to training of undergraduates (UG) and postgraduates.

4. Research

The student should be able to conduct a research project (in both basic and clinical pharmacology) from the planning to the publication stage and be able to pursue academic interests and continue life-long learning to become a more experienced teacher & mentor in all the above areas and to eventually be able to guide postgraduates in their thesis, research work and all other academic activities.

5. Professionalism, Ethics and Communication skills

The student should be able to learn and apply principles of professionalism, ethics and effective communication in conduct of research, pharmacology-based services, educational activities and day to day work.

SUBJECT SPECIFIC COMPETENCIES

The competencies will have a judicious mix of all domains of learning and usually are predominant in one domain. The postgraduate student during the training program should acquire the following competencies to achieve the defined five goals:

A. Predominant in Cognitive domain

The MD Pharmacology student after training in the course should be able to:

General Pharmacology:

1. Demonstrate an understanding of the basic principles of Pharmacology including molecular pharmacology.
2. Demonstrate an awareness of the historical journey and contributions of scientists in the drug development process.
3. Describe the process of new drug development including preclinical and clinical phases.
4. Describe principles of pharmacokinetics of drugs and apply these to prescribe medicines for individualization of pharmacological therapy, including use of medicines in special categories (Pediatrics, Geriatrics, Pregnancy and Pathological states).

5. Explain the principles of pharmacodynamics and apply these in different therapeutic situations.
6. Describe mechanisms of drug-drug interactions and their clinical importance.
7. Describe the principles of pharmacogenomics and its clinical significance.
8. Describe pharmacological principles underlying the effects of drugs used in diagnosis, prevention and treatment of common systemic diseases in man.
9. Demonstrate an understanding of the factors that modify drug action.
10. Define Therapeutic Drug Monitoring (TDM), describe the methods of TDM and importance in therapeutic decision making.
11. Describe the principles and importance of Pharmacoeconomics in healthcare delivery. Describe the methods in pharmacoeconomic studies and the economic considerations in the use of medicines in individuals and in the community.
12. Describe the principles, methods and importance of pharmacoepidemiology, including drug utilization studies.
13. Define pharmacovigilance. Describe the importance of pharmacovigilance in ensuring patient safety and the various methods/procedures in pharmacovigilance.
14. Describe the role of Essential Medicines in rational therapeutics. Describe principles for selecting Essential Medicines for a defined healthcare delivery system.
15. Demonstrate an understanding of principles of rational prescribing.
16. Demonstrate an understanding of prescription analysis and be able to conduct prescription analysis in a healthcare facility.
17. Demonstrate an understanding of antimicrobial resistance, antibiogram, antimicrobial stewardship program and strategies for containment of antimicrobial resistance.

Systemic Pharmacology:

1. Apply and integrate knowledge of pathophysiology of diseases and pharmacological principles underlying the effects of drugs, for the purpose of diagnosis, prevention and treatment of common systemic diseases in man including disorders of:
 - a. Synaptic & neuroeffector junctional sites of the autonomic nervous system
 - b. Neuromuscular junction

- c. Central nervous system
- d. Cardiovascular system
- e. Endocrine system
- f. Gastrointestinal system
- g. Respiratory system
- h. Renovascular system
- i. Hematological system
- j. Immunological system
- k. Autacoids

(Note: The above is only an indicative list).

2. Describe the mechanism of action, pharmacological effects and therapeutic status of drugs used for prevention and management of microbial and parasitic infections/infestations and neoplastic disorders.
3. Describe the pathophysiological basis and management of common poisonings.
4. Demonstrate an awareness about the recent advances in pharmacology and therapeutics.
5. Demonstrate an understanding of the special considerations in pharmacokinetics, mechanism of action, pharmacological effects and therapeutic status of drugs used for dermatological and ocular disorders.

Research:

1. Demonstrate an understanding of the importance and ethical considerations of biomedical research in animals and man.
2. Describe the principles and methods of biomedical research in animals and man.
3. Describe the current principles of Good Clinical Practice (GCP) and Good Laboratory Practice (GLP) guidelines, as applicable.
4. Demonstrate an understanding of the different tools and methods for literature search.
5. Describe and apply the principles of biostatistics in the evaluation and interpretation of efficacy and safety studies of drugs in man. Apply and interpret the various statistical tools in biomedical research.
6. Demonstrate an understanding of the principles of Good Publication practices as applicable to publication of research studies.

7. Describe different methods of drug assays - biological, chemical, immune-assay including knowledge of analytical techniques like HPLC, TLC etc. and their applications in therapeutics.
8. Describe the methods for screening/evaluation of analgesics, antipyretics, anticonvulsants, anti-inflammatory drugs, antidepressants, antianxiety and antipsychotics, sedatives, muscle relaxants, antihypertensives, hypocholesterolemic agents, antiarrhythmic drugs, diuretics, adrenergic blocking drugs, drugs affecting learning and memory in animals and man. (*Note: This is only an indicative list*).
9. Describe the regulatory and ethical issues involved in drug development and research.

Teaching and Assessment:

1. Demonstrate an awareness about the salient features of Undergraduate Medical Education Curriculum in India.
2. Demonstrate an awareness about Postgraduate Medical Education Curriculum and Guidelines in India.
3. Describe the principles of teaching-learning technology and apply these to conduct classroom lectures, self-directed learning (SDL) sessions, Case-Based Learning (CBL), case discussions, integrated teaching, small group discussions, seminars, journal club and research presentations.
4. Describe the principles of assessment of learning and be able to use the different methods for assessment of undergraduate students in pharmacology.
5. Demonstrate knowledge about the utility of computer assisted learning and be able to use them efficiently to promote learning of pharmacology.

Note: The list mentioned above is indicative. A postgraduate student is expected to be knowledgeable about all aspects of the subject and be updated about the contemporary advances and research in the subject.

B. Predominant in Affective Domain

The students after training in the MD (Pharmacology) course should be able to:

1. Effectively explain to patients, the effects, appropriate use and adverse effects of drugs, including drug interactions and the need for medication adherence.
2. Communicate effectively with students, peers, staff, faculty and other members of the health care team about rational use of medicines and improving spontaneous reporting of adverse drug reactions, with pharmacological reasoning
3. Demonstrate respect in interactions with peers, patients and other healthcare professionals.
4. Demonstrate professionalism, ethical behavior and integrity in one's work.
5. Demonstrate ability to generate awareness about the use of generic drugs in various conditions.
6. Acquire skills for self-directed learning to keep up with advances in the subject and to improve the skills and expertise towards continuous professional development.

C. Predominant in Psychomotor Domain

a. Mandatory

i. The students after training in the MD (Pharmacology) course should be able to perform the following procedures independently or as a part of a team and/or interpret the results:

1. Predict, report, monitor and participate in the management and causality assessment of adverse drug reactions associated with use of drugs, as per national program.
2. Demonstrate skills for writing rational prescriptions and prescription analysis.
3. Demonstrate proper use of equipment following the SOPs e.g. organ bath, analgesiometer, physiograph, convulsiometer, plethysmograph, equipment for testing/measuring learning and memory, affective disorders, muscle relaxants, blood pressure, ECG, respiration and pain.
4. Prepare drug solutions of appropriate strength and volume.
5. Determine EC_{50} , ED_{50} , pD_2 and pA_2 values of drugs.
6. Demonstrate presentation skills in a classroom setting as well as in academic meetings at local and national levels.
7. Provide critical appraisal of a research paper.

8. Perform experiments to demonstrate and interpret the dose response curve and effect of agonists (in the presence or absence of an antagonist) on simulations.
9. Perform the following:
 - Design protocol for evaluation of a given drug for various phases of clinical trials.
 - Prepare Informed Consent Form and Participant Information Sheet for clinical trials/research.
 - Administer Informed Consent Form
 - Evaluate promotional drug literature
 - Prepare “Package insert”
 - Calculate and interpret pharmacokinetic parameters of a drug from a given data
 - Demonstrate skills to prepare material for teaching-learning and assessment.
- ii. The students after training in the MD (Pharmacology) course should be able to ***do/perform following procedures under supervision:***
 10. Test and predict efficacy of drugs following appropriate guidelines and regulations e.g. drugs affecting memory and psychomotor functions (e.g. critical flicker fusion tests in human volunteers), pain, cardiovascular functions, respiratory functions etc.
 11. Observe and understand basic principles of working of important contemporary drug analytical techniques, interpret the observations about the drug levels and their therapeutic applications.
 12. Demonstrate skills for contributing to antibiotic stewardship program of the institute to manage antimicrobial resistance.
 13. Demonstrate Standard Operating Procedures (SOPs) for various methods and techniques used in pharmacology including SOPs in clinical trials and research.
 14. Administer drugs by various routes (subcutaneous, intravenous, intraperitoneal) in simulations and hybrid models.
 15. Demonstrate acquisition of writing skills for scientific publications and research projects for funding agencies and approval by Ethics Committee.
 16. Demonstrate scientific writing skills.

b. Desirable: The students after training in the MD (Pharmacology) course should be able to:

17. Collect blood samples and oral gavage from experimental animals.
18. Administer drugs by various routes (subcutaneous, intravenous, intraperitoneal) in experimental animals.
19. Perform *in vivo* and *in vitro* animal experiments or simulated experiments, interpret the observations and relate these to potential clinical applications of the experimental drug:
 - e.g. - effect of mydriatics and miotics on rabbit eye,
 - effect of anti-epileptic drugs using appropriate animal models of epilepsy,
 - effect of analgesics using appropriate animal models of analgesia, and
 - effect of drugs on learning, memory and motor coordination and effect of local anesthetics.

These are examples, but the list is not limited to this only.

20. Perform experiments to demonstrate and interpret the dose response curve and effect of agonists (in the presence or absence of an antagonist) on various biological tissues.

Animal Experiments: All animal experiments must be compliant with the Regulations of Government of India, notified from time to time. Amphibian/Dog/Cat experiments should be conducted by computer assisted simulation models/facilities. Other experiments can be performed, but as permissible by existing 'Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA)' guidelines and other Government regulations.

SYLLABUS

The course contents should cover the following broad topics:

1. History of Pharmacology and medicine
2. Basic and molecular pharmacology
3. Drug receptors and Pharmacodynamics
4. Pharmacokinetics (Absorption, Distribution, Biotransformation, Excretion & kinetic parameters)

5. Therapeutic Drug Monitoring
6. Drugs acting on synaptic and neuroeffector junctional sites
7. Autonomic pharmacology
8. Drugs acting on central nervous system
9. Drugs modifying renal functions
10. Drugs acting on cardiovascular system and hemostatic mechanisms
11. Reproductive Pharmacology
12. Agents affecting calcium homeostasis
13. Autacoids and related pharmacological agents (analgesics) and drugs used in Rheumatoid arthritis and Gout
14. Drugs acting on Gastrointestinal system
15. Pharmacology of drugs affecting the respiratory system
16. Chemotherapy- General principles and various antimicrobials
17. Chemotherapy of neoplastic disease
18. Drugs used in Autoimmune disorder and Graft versus Host Disease
19. Dermatological pharmacology
20. Ocular pharmacology
21. Use of drugs in special population
22. Immunomodulators - immunosuppressants and immunostimulants
23. Pharmacology of drugs used in endocrine disorders
24. Drug delivery systems
25. Heavy metal poisoning
26. Non-metallic toxicants - air pollutants, pesticides etc.
27. Research methodology and biostatistics
28. Pharmacogenomics, pharmacovigilance, pharmacoeconomics and pharmacoepidemiology
29. Over the counter drugs, essential medicines, P-drug, commonly used Over-The-Counter (OTC) drugs, generic drugs, drugs banned in India
30. Principles of rational use of drugs and rational prescribing
31. Dietary supplements and herbal medicines
32. Pathophysiological basis and management of common poisonings
33. National programmes for infectious and vector borne diseases including the regimes.
34. Professionalism & ethics

35. Clinical pharmacology

- Functioning of the Drugs and Therapeutics Committee.
- Hospital formulary development.
- Drug information services.
- Medication error detection and mitigation advice.
- Antimicrobial resistance and antibiotic stewardship.
- Prescription auditing
- Drug counseling - explain to patients, the effects and adverse effects of drugs, including the need for medication adherence
- Emergency drugs used in crash cart/ resuscitation

36. Drug development research and Regulations

- Principles of Good Clinical Practice (GCP) and Good Laboratory Practice (GLP) guidelines, and Good publication practices
- Recent regulatory guidelines for drugs/research and clinical trials
- Drug development and research and ethical issues involved in it
- Research protocol development, research study conduct, experimental observations, analysis of data using currently available statistical software
- Emergency use authorization for drugs eg., vaccine development

37. Pharmacometrics - methods of drug evaluation.

38. General screening and evaluation of:

- analgesics, antipyretics, anticonvulsants, anti-inflammatory drugs, antidepressants, antianxiety and antipsychotics, sedatives, muscle relaxants, antihypertensives, hypocholesterolemic agents, anti-arrhythmic drugs, diuretics, adrenergic blocking drugs, local anaesthetics, antifertility agents, antidiabetics, drugs used in peptic ulcer diseases and drugs affecting learning and memory in animals and man.

39. Experimentation

- Bioassay methods
- Animal experiments: Ethical considerations, ethical approval, applicable Regulatory Guidelines, humane animal research (principles of 3Rs) and alternatives to animal experimentation. General and statistical considerations

- Anesthetics used in laboratory animals
- Principles of EC50, ED50, pD2 and pA2 values of drugs
- Describe methods of bioassay for estimation of:
Acetylcholine, skeletal neuromuscular junction blockers, adrenaline, noradrenaline, histamine, 5 HT, hormones, insulin, vasopressin/oxytocin, estrogen, progestins, ACTH
- Competitive antagonism - pA2 values
- Immunoassays: Concept, types of bioassays and their application/s
- Animal experiments: Ethical consideration, Ethics Committee and ethical approval
- Regulatory Guidelines and alternatives to animal experimentation.

40. Biochemical Pharmacology

- Basic principles and applications of simple analytical methods
- Principles of quantitative estimation of drugs, endogenous compounds and poisons using Colorimetry, Spectrophotometry, flame photometry, High Performance Liquid Chromatography (HPLC) and enzyme-linked Immunosorbent assay (ELISA).

41. Education

- Salient features of Undergraduate Medical Education Curriculum in India.
- Postgraduate Medical Education Curriculum and Guidelines in India.
- Principles of teaching - learning methods and technology
- Principles of assessment of learners

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussions, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used.

The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule of the department.

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per subject requirements. All postgraduate trainees will be required to attend these lectures.

Lectures can cover topics such as:

1. Subject related important topics
2. Recent advances
3. Research methodology and biostatistics
4. Salient features of Undergraduate/postgraduate medical curriculum
5. Teaching and assessment methodology
6. Toxicity studies
7. Screening for pharmacological activity of drugs
8. Technical and ethical issues in clinical research and practice
9. Good laboratory practice
10. Good manufacturing practice
11. Health economics

No 3, 4, 5 can be done in the course of research/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students during moderation. It should aim at complete evidence-based review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum - once every 1-2 weeks.

Laboratory work/clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the Department of Pharmacology and another department or departments on topics of current/common interest or clinical cases.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments.

The postings schedule with duration is given below:

- Medicine -2 weeks
- Anesthesia -2 weeks
- Dermatology -1 week
- Medical oncology -2 weeks (if available)
- Microbiology/ Infection control unit or dept -2 weeks
- Biochemistry -2 weeks
- Hospital Pharmacy -1 week (if available)
- Clinical trial unit/Research unit/
Pharmaceutical industry -2-8 weeks (as per availability)
- Medical Education Unit (MEU) or
Department of Medical Education (DOME) -1 week (optional)

G b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MD in Pharmacology in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different

hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

Medical Education Unit (MEU)/ Department of Medical education (DOME) should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on teaching skills to the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

- a) help maintain a record of the work done during training,
- b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,

- c) provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

L. Other aspects

- The postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The postgraduate trainees must undergo compulsory training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The postgraduate trainees must undergo training in information technology and use of computers.

- The postgraduate trainees should preferably undergo training in Good Clinical Practice (GCP)

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, i. e., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should include quarterly assessment.

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management : once a week
- Laboratory performance : twice a week
- Journal club : once a week
- Seminar : once a fortnight
- Case discussions : once a fortnight/month
- Interdepartmental case or seminar : once a month

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

Important instructions:

- The feedback should be given to students timely and frequently so that they get a chance to improve.
- All teachers of the Department should be involved in assessment.
- The records and Log book shall be checked and assessed periodically by the faculty members imparting the training.

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to Pharmacology

Paper II: Systemic Pharmacology

Paper III: Clinical Pharmacology, Experimentation, Research, Biostatistics and Education

Paper IV: Recent advances in the Pharmacology

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

Practical Examination Exercises:

a) long exercises:

- Protocol design for a given scenario
 - Case audit for a given case
 - Perform experiments or simulated experiments (as per PG Regulations)
- The exercises should be observed, response of student noted and assessed. The question related to these exercises can be asked

b) short exercises:

- Interpretation of results of a previous tracing - Table exercise

- Demonstration of effects of drugs/interpretation of results in human
- Demonstration of effects of drugs/interpretation of results in small, animals - optional (as per Regulations notified)

The exercises should be observed and assessed.

c) OSPE exercises: Objective Structured Practical Examination (OSPE)

OSPE should have 10-15 stations. Stations should be mixture of observed (observer present) and unobserved stations (without an observer). Few examples are given below:

- Various drug delivery systems
- Calculating pharmacokinetic parameters
- Pharmaceutical calculations
- Statistical exercise
- Pharmacoeconomics
- Critical appraisal of a published paper
- Abstract writing of a published paper
- Evaluation of drug promotional literature.
- Adverse Drug Reaction (ADR) reporting and causality assessment
- Assessment of preclinical toxicity data
- Analysis of rational and irrational formulations
- Selecting a P-drug and writing rational prescriptions
- Analytical instruments - use and interpretation
- Identifying ethics related dilemmas / mistakes in clinical trial documents

d) Assessment of teaching/presentation skills

- e.g., presentation of a UG lecture, making Question paper, Learning Objectives
- Discussion on dissertation

Recommended Readings

Books:

1. Brunton LL, Hilal-Dandan R, Knollmann BC. Goodman and Gilman's The Pharmacological Basis of Therapeutics, 13th edition, Mc Graw Hill Education, 2018.

2. Katzung BG. Basic & Clinical Pharmacology, 14th edition, McGraw Hill Education, 2018.
3. Papadakis MA, Mcphee SJ. Current Medical Diagnosis & Treatment. 60th edition New York. McGraw Hill Education.2021.
4. Ritter M, Flower R, Henderson G, Loke YK, MacEwan D, Rang HP. Pharmacology. Elsevier, 9th edition, 2020.
5. Tripathi KD. Essentials of Medical Pharmacology, 8th edition. Jaypee Brothers Medical Publishers Private Ltd: New Delhi 2019.
6. M. N. Ghosh. Fundamentals of Experimental Pharmacology. 7th Edition. Hilton & Company, 2019.
7. Badyal D. Practical Manual of Pharmacology. Jaypee Brothers Medical Publishers; 3rd edition 2020.
8. Vogel HJ. Drug Discovery and Evaluation: Pharmacological Assays Springer; 3rd edition, 2007.
9. Sharma S, Velpandian T. Illustrated Reviews Pharmacology. Wolter Kluver, South Asian Edition, 2019.
10. Medhi B, Prakash A. Practical Manual of Experimental & Clinical Pharmacology. Jaypee Brothers Medical Publishers, 2nd edition, 2017.
11. Alldredge BK, Corelli RL, Ernst ME, Guglielmo Jr. BJ, Jacobson PA, Kradjan WA, Williams BA. Koda-Kimble and Young's Applied Therapeutics Lippincott Williams and Wilkins, 10th edition, 2012.
12. Cheston B Cunha, Burke A Cunha. Antibiotic essentials. Jaypee Brothers, Medical Publishers 17th edition, 2021.

Websites:

1. National Guidelines on national programs e.g.
<https://cdsco.gov.in/opencms/opencms/en/Home>
2. MOHFW Website <https://www.mohfw.gov.in/>
3. WHO Website <https://www.who.int/>

Journals:

03-05 international Journals and 02 national (all indexed).

Student appraisal form for MD in Pharmacology											
	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic aptitude and learning										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g., Posters, publications etc)										
1.4	Documentation of acquisition of competence (e.g., Log book)										
1.5	Performance in work-based assessments										
1.6	Self-directed Learning										
2	Work related to training										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										
2.3	Ability to work with other members of the team										
2.4	Participation and compliance with the quality improvement process at the work environment										

2.5	Ability to record and document work accurately and appropriate for level of training													
3	Professional attributes													
3.1	Responsibility and accountability													
3.2	Contribution to growth of learning of the team													
3.3	Conduct that is ethically appropriate and respectful at all times													
4	Space for additional comments													
5	Disposition													
	Has this assessment pattern been discussed with the trainee?	Yes	No											
	If not explain													
	Name and Signature of the assesse													
	Name and Signature of the assessor Date													

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NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board

D 11011/1/22/AC/Guidelines/21

Date: 07-11-2022

**GUIDELINES FOR COMPETENCY BASED
POSTGRADUATE TRAINING
PROGRAMME FOR MD IN
MICROBIOLOGY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN MICROBIOLOGY

Preamble

The aim of postgraduate education in Microbiology is to impart requisite clinical, diagnostic, teaching and research skills with appropriate attitude and communication competencies required in the field of Medical Microbiology.

Currently the postgraduate students of Microbiology are trained in the laboratory with minimal exposure to patient care, but with technological advances and automation in diagnostic microbiology and increasing threat of infections due to emerging & reemerging microbes, drug resistance and widening host range, a microbiologist needs to develop clinical expertise in addition to technical expertise and be available more at the bedside to develop partnership with clinician in diagnosis and management of infectious disease cases. To fulfill these expectations, the program of MD Microbiology needs to shift focus to clinical aspects of microbiology, where a student is trained in the clinical setting and is able to contribute in the clinical management along with diagnosis, prevention and control of infectious disease.

This document provides guidelines to standardize Microbiology teaching at the postgraduate level throughout the country and fulfill the expectations as a microbiologist. The new curriculum guide has given more emphasis on training in patient care setting with integration of concepts of microbiology in various clinical specialties through dedicated postings, ward rounds, case discussion etc. This document has been prepared by subject-content specialists for the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC OBJECTIVES (GOALS)

A postgraduate student upon successfully qualifying in the MD Microbiology examination should be able to:

1. Demonstrate competence in clinical aspects as a Microbiologist to improve patient care.
2. Demonstrate application of microbiology in different clinical settings to address diagnostic and therapeutic problems along with preventive measures.
3. Play an important role in hospital infection control by actively participating in activities of the Hospital Infection Control Committee as a team member.
4. Demonstrate competence in recording, advising and guiding use of antimicrobials judiciously for infectious diseases in routine and in special clinical situations and population.
5. Demonstrate competence in developing guideline for antibiotic usage, including formulation of antibiotic policy in hospital.
6. Demonstrate communication skills required for safe & effective laboratory practice and teaching of microbiology
7. Demonstrate skills in conducting collaborative research in the field of Clinical Microbiology and allied sciences which has significant bearing on human health and patient care.
8. Demonstrate ability to plan, execute and evaluate teaching and training assignments efficiently and effectively in Microbiology for undergraduate students as per Competency Based Medical Education (CBME).
9. Identify public health epidemiology, global health patterns of infectious diseases and effectively participate in community outreach and public health programs for investigation, prevention and control of infectious diseases.
10. Demonstrate ability to work as a member of the rapid response team and contribute to investigations of outbreaks of infectious diseases in the hospital and outbreak/epidemic/pandemic in the community.
11. Demonstrate self-directed learning skills and keep updated with recent advances in the field of clinical microbiology.

12. Demonstrate administrative and organizational skills to establish good clinical microbiological services in a hospital and in the community in the field of clinical microbiology
13. Demonstrate effective leadership and teamwork skills while working with other members of the health care team in hospital, laboratory and community settings.
14. Demonstrate attributes of professional behavior and uphold the prestige of the discipline amongst the fraternity of doctors.

Postgraduate training

The postgraduate training should include the following components for a holistic approach-

1. Clinical Microbiology including Antimicrobial Resistance (AMR)
2. Laboratory skills in diagnostic Microbiology
3. Infection Prevention and Control Skills
4. Teaching and learning Skills
5. Research Skills
6. Attitude, Ethics and Communication skills

The postgraduate student should develop and demonstrate competence in the above components as follows:

1. Clinical Microbiology including Antimicrobial Resistance (AMR)

- i. Should be able to elicit relevant history for optimum clinico-microbiological correlation with laboratory results.
- ii. Should be able to perform basic physical examination and assess the patients with any suspected infection including community acquired/ tropical infection/ sepsis/ imported infection/ hospital acquired infections and emerging and re-emerging infections.
- iii. Should be able to formulate and critique diagnostic algorithms and patient care plans.

- iv. Should be able to choose, interpret and communicate the results of appropriate microbiological investigation in a suspected infection.
- v. Should be able to suggest optimal antimicrobial therapy, based on results of antimicrobial susceptibility tests and other investigations.
- vi. Should be able to advocate antibiotic stewardship for prevention and control of AMR (detailed competencies under AMR are given in Annexure I),
- vii. Should be able to educate patients/ relatives/ community on various aspects of antimicrobial use, antimicrobial drug resistance, prevention and control of infections.

2. Laboratory skills in diagnostic Microbiology

- i. Should be able to demonstrate acquisition of pre-analytical, analytical and post-analytical laboratory skills to ensure quality of test results.
- ii. Should be able to perform tests pertaining to basic, diagnostic, clinical and applied Microbiology.

3. Infection Prevention and Control

- i. Should be able to demonstrate knowledge, skills & attitude required to detect, prevent and control health care associated infections of all types.
- ii. Should be able to set up and manage Central Sterile Services Department (CSSD) and prepare effective sterilization and disinfection policy for the hospital.
- iii. Should be able to demonstrate knowledge and skills about management of biomedical waste in health care setting as per recent guidelines and educate staff about risks, preventive measures and the management of occupational exposure to infectious agents.

4. Teaching and Learning Skills

- i. The Medical Education Department/Unit of the institution should be able to sensitize the postgraduate students in basic concepts of medical education technologies like domains of learning, teaching skills, teaching - learning methods, lesson planning, learning resource material, assessment techniques etc.

- ii. Should be able to demonstrate good teaching skills while conducting teaching/training sessions like tutorials, demonstrations and practical for undergraduate students, laboratory technicians etc. and participate actively in the planning and conduct of assessment of students learning at various stages of formative / summative assessment.
- iii. Should be able to learn by integrating with concerned subspecialty.

5. Research Skills

- i. Should be able to plan, design and conduct meaningful scientific research in microbiology in collaboration with allied subjects.
- ii. Should acquire expertise to write research protocol, thesis and present a research paper in the scientific forum.
- iii. Should follow guidelines on ethical conduct in research.
- iv. Should acquire proficiency and demonstrate ability to use biostatistics, data management.
- v. Should be able to critically appraise a scientific article and have knowledge of evidence-based practice.
- vi. Should acquire expertise in writing proposals for research grants and know the various sources of research funding.

6. Communication and attitudinal skills

- i. Should demonstrate the right kind of attitude, communication and ethics while dealing with clinical material and reports.
- ii. Should be able to work as an effective team member and leader.

SUBJECT SPECIFIC COMPETENCIES

The competencies will have a judicious mix of all domains of learning and may show predominance in one domain. The Post-Graduate student during the training

programme should acquire the following predominant domain specific competencies to achieve the defined goals:

A) Predominant in Cognitive Domain (Knowledge):

At the end of the course, the student should have acquired knowledge in the following competencies:

Paper I: General Microbiology (GM) & Immunology (IG)

General Microbiology (GM):

- i. Describe important historical events and developments in microbiology
- ii. Describe nomenclature, classification, morphology, growth requirements, pathogenesis and laboratory diagnosis of different bacteria, viruses, parasites and fungi.
- iii. Explain the importance of normal flora microbes, including Microbiome in health and disease.
- iv. Explain the factors influencing and significance of microbial environment in health care setup.
- v. Describe the epidemiology of common infectious diseases, host-parasite relationship and their significance.
- vi. Describe various types of microscopes and microscopic techniques used in diagnostic microbiology.
- vii. Explain various methods of isolation, identification and preservation of microbes in laboratory.
- viii. Explain the type, mechanism of action and applications of microbial toxins, other virulence factors & microbial products like Bacteriocins.
- ix. Explain the concept & application of various biosafety and biosecurity issues in laboratory and patient care including physical, biological containment and standard precautions.
- x. Discuss the various methods of sterilization and disinfection and apply them in the laboratory and in patient care.

- xi. Explain the basic principles of bacterial genetics and applications of molecular techniques in medical microbiology.
- xii. Explain the concept of microbiological surveillance including patient screening methods, organism typing and genome sequencing methodologies.
- xiii. Explain the concept and application of quality assurance, quality control and accreditation in diagnostic microbiology.
- xiv. Describe the significance and causes/reasons regarding emerging infectious diseases with strategies for their identification and control.
- xv. Explain the concept and application of molecular biology techniques in the laboratory diagnosis of infectious diseases.
- xvi. Explain the concept and use of information technology (LIS, WHO NET etc.) in microbiology laboratory effectively.
- xvii. Describe the principles & implementation of animal and human ethics involved in diagnostics and research in Microbiology
- xviii. Explain the principles and application of recent technological advances, automation, and application of Artificial Intelligence, nanotechnology, biosensors, bioinformatics, etc. in diagnosis & research in Microbiology.
- xix. Explain the importance and methods of testing microbiology of air, water and food in patient care both in community/ hospital setting.
- xx. Explain in detail about types & mechanism of action of Antimicrobial agents, their pharmacokinetics & pharmacodynamics, along with mechanism of drug resistance.
- xxi. Describe types and applications of Bacteriophages in diagnostic and therapeutic of infections

Immunology (IG)

- i. Describe the structure and function of the immune system, immunological mechanisms in health and response of the host immune system to infections. (Innate and acquired immunity, Cells involved in immune response, Antigens , Immunoglobulins, Mucosal immunity, Cell mediated immunity, Cytokines, MHC complex, Immune tolerance etc)
- ii. Explain the complement system and describe its role in health and disease.

- iii. Describe the mechanism/s in immunological disorders (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in their diagnosis including measurement of immunological parameters
- iv. Describe the types & principles of antigen and antibody reactions and immunological techniques used in diagnostic microbiology as well as in research.
- v. Describe the immunological mechanisms of transplantation and tumor immunity.
- vi. Describe the mechanism/s and significance of immune-potentiation and immune-modulation.
- vii. Describe various types, techniques and advances in the development and applications of vaccines including UIP and immunotherapy and reverse vaccinology.
- viii. Explain the role of animals in immunology.

PAPER II Clinical / Systemic Microbiology –I (CM –I)

- i. Discuss in depth about the etiological agents, source, transmission, host-parasite interaction, clinical manifestations, laboratory diagnosis, treatment, prevention, epidemiology, national, international guidelines in the situations/ scenario given below:

- **Infections of various organs and systems of the human body**

Microbiological basis of infective syndromes of various organs and systems of human body viz. CVS and blood, Respiratory Tract Infections, Urinary Tract Infections, Central Nervous System infections, Reproductive Tract Infections, Gastrointestinal Tract infections, Hepatobiliary System, Skin and Soft tissue infections, Musculoskeletal system, infections of Eye, Ear and Nose etc)

PAPER III: Clinical / Systemic Microbiology – II (CM-II)

- i. Discuss in depth about the etiological agents, source, transmission, host-parasite interaction, clinical manifestations, laboratory diagnosis, treatment, prevention, epidemiology, national, international guidelines in the situations/ scenario given below:
 - **Infectious diseases as per the source/risk**

- **Opportunistic Infections** in special and high risk host
- **Infections in special situations/ scenario.**

Microbiological basis of infective syndromes as per the source/risk e.g. Blood borne, sexually transmitted infections congenital, vector borne, food, air & water borne, zoonotic, laboratory acquired, occupational infections etc. Opportunistic Infections in special and high risk host eg Pregnancy, neonates, geriatrics, diabetics, immunocompromised host due to any reason, patients with Implants/Devices, dialysis etc, Infections in special situations/ scenario -Tropical, Travel related, Emerging/ Remerging Infectious diseases seen commonly, agents of bioterrorism etc.

- ii. Elicit relevant history, interpret laboratory results with clinic-microbiological correlation and develop diagnostic and treatment algorithms.

Following organisms (bacteria, fungi, virus and parasites) must be covered under clinical/systemic microbiology and the list must be updated to include newly identified microbes from time to time-

Bacteria:

1. Gram positive cocci of medical importance including *Staphylococcus*, *Micrococcus*, *Streptococcus*, *anaerobic cocci* etc.
2. Gram negative cocci of medical importance including *Neisseria*, *Branhamella*, *Moraxella* etc.
3. Gram positive bacilli of medical importance including *Lactobacillus*, *Coryneform organisms*, *Bacillus* and *aerobic bacilli*, *Actinomyces*, *Nocardia*, *Actinobacillus* and other *actinomycetales*, *Erysipelothrix*, *Listeria*, *Clostridium* and other spore bearing anaerobic bacilli etc.
4. Gram negative bacilli of medical importance including *Enterobacteriaceae*, *Vibrios*, *Aeromonas*, *Plesiomonas*, *Haemophilus*, *Bordetella*, *Brucella*, *Gardnerella*, *Pseudomonas* and other *non-fermenters*, *Pasteurella*, *Francisella*, *Bacteroides*, *Fusobacterium*, *Leptotrichia* and other anaerobic gram negative bacilli etc.

5. *Helicobacter, Campylobacter, Calymmatobacterium, Streptobacillus, Spirillum* and miscellaneous bacteria
6. *Mycobacteria*
7. *Spirochaetes*
8. *Chlamydia*
9. *Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.*
10. *Rickettsiae, Coxiella, Bartonella* etc.
11. Any newly emerging bacteria

Fungi:

1. Yeasts and yeast like fungi of medical importance including *Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces* etc.
2. Mycelial fungi of medical importance including *Dermatophytes, Aspergillus, Zygomycetes, Pseudallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes* etc.
3. Dimorphic fungi including *Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Talaromyces marneffeii* etc.
4. Fungi causing Mycetoma, Chromoblatomycosis, Occulomycosis Otomycosis, Phaeohyphomycosis etc
5. *Pythium insidiosum*
6. *Prototheca*
7. *Pneumocystis jirovecii*
8. *Lacazia loboi (Loboa loboi)*
9. Laboratory contaminant fungi
10. Fungi causing Mycetism and mycotoxicosis
11. Any newly emerging fungi

Virus:

1. DNA viruses of medical importance including Pox viruses, Herpes viruses, Adeno viruses, Hepadna virus, Papova and Parvo viruses etc.

2. RNA viruses of medical importance including Picorna viruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses, Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human immunodeficiency virus, Arbo viruses, Corona viruses, Calci viruses etc.
3. Oncogenic viruses
4. Bacteriophages
5. Slow viruses including prions
6. Unclassified viruses
7. Virioids
8. Any newly emerging virus

Parasite:

1. Protozoan parasites of medical importance including *Entamoeba*, *Free living amoebae*, *Giardia*, *Trichomonas*, *Leishmania*, *Trypanosoma*, *Plasmodium*, *Toxoplasma*, *Sarcocystis*, *Cryptosporidium*, *Cyclospora* *Iso spora*, *Babesia*, *Balantidium*, etc.
2. Helminths of medical importance including those belonging to Cestoda (*Diphyllobothrium*, *Taenia*, *Echinococcus*, *Hymenolepis*, *Dipylidium*, *Multiceps* etc.), Trematoda (*Schistosomes*, *Fasciola*, *Fasciolopsis*, *Gastrodiscoides*, *Paragonimus*, *Clonorchis*, *Opisthorchis* etc.) and Nematoda (*Ascaris lumbricoides*, *Ancylostoma duodenale*, *Enterobius vermicularis*, *Trichuris trichiura*, *Filariasis* etc.)
3. *Rhinosporidium seeberi*
4. Entomology: common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myiasis etc.
5. Neglected tropical parasitic diseases
6. Any newly emerging parasite

Paper IV: Applied Microbiology (AM) & Recent Advances:

Student should be able to apply knowledge & comprehension about following applied aspects:

- i. **Prophylaxis** - Basic Principles and applications of general, immune as well as chemo- prophylaxis of infections in various clinical situations / scenarios.

- ii. **Vaccinology:** types of vaccines, principles, methods of preparation of vaccines and administration of vaccines.
- iii. **Health care associated Infections** - types, pathogenesis, diagnosis, prevention, control and surveillance of health care associated infections.
- iv. Biomedical waste and its management.
- v. **Role of microbes in non-communicable diseases** - infectious agents in origin and progression of non-communicable diseases like cancer, diabetes, musculoskeletal disorder and influence of these microbes on mental health.
- vi. **Antimicrobial Resistance Detection and Prevention:** classification, mechanism of action, detection and reporting drug resistance to antimicrobials (antibacterial, antiviral, antifungal, antimycobacterial and antiparasitic agents).
- vii. Investigation of an infectious disease outbreak in hospital and outbreak/epidemic/pandemic in community.
- viii. Information technology (computers) in microbiology.
- ix. Automation in Microbiology.
- x. Molecular techniques in the laboratory diagnosis of infectious diseases.
- xi. Statistical analysis of microbiological data and research methodology.
- xii. Animal and human ethics involved in microbiological work.
- xiii. Laboratory safety and management.

B. Predominant in Affective Domain

- i. Communicate effectively & empathically with patients and their relatives during sample collection, history taking, counseling and reporting results.
- ii. Acquire Consent taking and counseling skills and demonstrate these to undergraduates.
- iii. Communicate effectively with peers, and consultants for better clinical correlation of laboratory findings as well as research.
- iv. Demonstrate effective communication and attitudinal skill while teaching undergraduate students.

- v. Function as an effective team member and leader with good conflict management skills.
- vi. Adopt ethical principles, particularly maintenance of confidentiality when dealing with laboratory reports.
- vii. Demonstrate ability to recognize and manage ethical and professional conflicts and abide by prescribed ethical and legal codes of conduct and practice.
- viii. Demonstrate altruistic professional behavior with respect, discipline, responsibility, accountability, punctuality and integrity at all times while dealing with patients and their relatives.

C. Psychomotor Domain: (Skills)

C1. The postgraduate student should be able to *perform the following and/or interpret the results independently or as a part of a team*:

➤ **Laboratory skills:**

- Collect, transport and store appropriate specimens for microbiological investigations.
- Receive and process clinical specimens after appropriate preparation of samples for the appropriate investigation (centrifugation, extraction, mincing concentration etc.)
- Processing of samples by various methods like:
 - Macroscopic/gross examination of samples.
 - Choose the most appropriate microscopic method for demonstration of pathogens.
 - Prepare, examine, and demonstrate microbes in direct smears for diagnosis of infectious disease/s.
 - Isolate and identify pathogenic microbe from clinical specimens (by conventional & automated methods).
 - Perform, interpret & record antimicrobial susceptibility testing of the isolate.
 - Perform rapid, conventional and automated serological techniques for diagnosis of infectious diseases and immunological diseases.
- Maintain records and ensure quality control in microbiology.

- Maintain and preserve microbial cultures.
- Operate and maintain instruments used in the laboratory for sterilization and disinfection and patient care with quality control.
- Operate and maintain common laboratory equipment like microscopes, water bath, centrifuge, incubator, automated culture system, micro-centrifuge, ELISA washer and reader etc.
- Perform and assess significance of microbial contamination of food, water and air.
- Biosafety measures - biosafety cabinets, chemical material safety data sheet (MSDS), fire safety, needle stick injury management.

Organisms (Bacteria, Fungi, Virus and Parasites) based Laboratory skills:

- **Direct microscopic methods for demonstration of infectious agents:**
 - a. Wet mount examination for - looking for cells and organisms (bacteria, fungi, parasite)
 - i. Saline mount stool sample - parasitic morphology
 - ii. Iodine mount-parasitic morphology
 - iii. KOH for fungi
 - iv. Negative staining
 - b. Staining methods
 - i. Preparation of stains & quality check
 - ii. Preparation of peripheral blood smears from various samples
 - iii. Staining techniques - simple, differential, special staining methods - capsule, spore, flagella etc.
 - iv. Gram Staining
 - v. Acid Fast staining (with modifications).
 - vi. Leishman & Giemsa for demonstration of intracellular pathogen bacteria, parasite, fungi etc.
 - vii. Albert staining.
 - c. Fluorescent staining
 - i. Auramine staining - Mycobacterium tuberculosis.

- ii. QBC – for malaria.
- iii. Calcoflor white staining for fungus
- d. Isolation of pathogens
 - i. Preparation of glass wares
 - ii. Sterilization procedures
 - iii. Media preparation-required for isolation & identification
 - iv. Quality check of all media - functional as well as sterility check and maintenance of the record
 - v. Inoculation methods of various samples – surface, streak, stab etc depending on sample
 - vi. Incubation methods aerobic, anaerobic, microaerophilic, capnophilic depending on the pathogens.
- e. Identification of pathogen
 - i. Colony characters – various characters to be noted in different media.
 - ii. Staining to identify – Gram’s / Alberts / Acid Fast/ Lactophenol cotton blue depending on pathogen.
 - iii. Motility by hanging drop preparation and other methods.
 - iv. Biochemical reactions - phenotypic-enzymatic, oxidative fermentative, sugar fermentation, other special tests helping to identify up to species level.
 - v. Serotyping.
- f. Antibiotic Susceptibility Testing
 - i. Selection of antibiotic disks as per CLSI/EUCAST based on the probable identification of organism - bacteria, fungi.
 - ii. Detection of drug resistant strains - MRSA, VISA, VRE, ESBL, MBL, CRE etc.
 - iii. Broth microdilution methods for bacteria and fungi.
- **Immunological tests**
 - i. i. Collection, preparation and storage of samples
 - ii. ii. Perform Rapid tests //Latex agglutination/ ICT/ELISA etc

- **Molecular tests**
 - i. PCR/RT-PCR – all steps till interpretation
 - ii. CBNAAT
- **Biomedical waste management skills.**
- **Quality control skills in all areas.**

➤ **Clinical Microbiology Skills**

(Infectious Disease Case Based Skill)

- i. Demonstrate ability to take and interpret the history of infectious disease case.
- ii. Be able to clinically examine the case and diagnose.
- iii. Take decision for choice of samples to be collected for diagnosis
- iv. Suggest optimum choice of antimicrobial agent to be prescribed with reasons.

➤ **Infection Prevention and Control Skills-**

- i. Hand hygiene skills
- ii. Donning and doffing of PPE
- iii. Transmission based precautions in patient care
- iv. Segregation and disposal of biomedical waste in laboratory and hospital
- v. Handling of sharps
- vi. Post-exposure prophylaxis when exposed to blood and body fluids
- vii. Spillage management
- viii. Sterilization policy of environment and devices in the hospital as per the latest guidelines.
- ix. Calculation of HAI infection rates.
- x. Plan & conduct HAI surveillance & infection control audits

C 2. Should be able to **perform under supervision** and/or interpret the results of *the following desirable procedures independently or as a part of a team*:

- Demonstration of microbe by:

- i. IF – autoimmune diseases
- ii. IF – antigen demonstration in fungi/viral infection /cellular changes
- Isolation & Identification using newer automated systems for bacterial identification, -Mycobacterial culture and Mycobacterial susceptibility
- Immunological test
 - i. Nephelometry/ turbidometry method for quantitative CRP/ASO/RA test
 - ii. Chemi-Luminescence Immuno Assay
- Perform molecular & newer diagnostic tests for diagnosis of infectious disease.

C 3. Should observe the following procedures independently or as a part of a team and/or interpret the results of* : (optional)

- Demonstration of microbes by Electron microscope
- Viral culture & identification of growth of viruses
- Immunological test
 - iii. Quantiferon
 - iv. Flowcytometry
- Molecular -
 - i. Genome Sequencing methods
 - ii. Molecular typing.

Note: If any of the above facilities are not available in the institute effort to collaborate and post the students in nearby laboratory to acquire the skills shall be made.

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and

emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a logbook for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.**

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected as per requirements of the subject. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. Salient features of Postgraduate medical curriculum
5. Teaching and assessment methodology.

Topic numbers 3, 4 & 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B. Journal club: Minimum of once in 1-2 weeks is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

C. Student Seminar: Minimum of once every 1-2 weeks is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics: Minimum- once every 1-2 weeks.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department where a student is posted should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases.

G. a. Rotational clinical / community / institutional postings (As per Table I)

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

- Broad specialty departments
- Emergency/Casualty department
- Super specialty departments e.g. Cardiology / Endocrinology / Nephrology / Medical Oncology etc.
- Laboratory-based specialty units/departments e.g. Biochemistry / Microbiology/ Infection control unit/Laboratory Medicine etc.
- Medical Education Unit (MEU) or Department of Medical Education (DOME)

Clinical / Practical Training Schedule in Microbiology

The three-year training programme in microbiology is arranged in the form of rotational postings to different sections/laboratories/departments/disciplines for specified periods. Providing a suitable learning environment to develop clinical insight and achieve the outcomes of a medical microbiologist must be the driving force while planning posting schedules, which may be modified depending on needs, feasibility and exigencies. Student must be posted for various duration in different sections of Microbiology (like Bacteriology, Serology, Virology, Parasitology, Immunology, Mycobacteriology, Mycology and Hospital infection control), patient care areas in hospital (like emergency, OPDs, critical care areas, surgical and medical wards etc) as well as in community outreach programs, so that they can learn specific requirements of each section and participate in patient care and prevention of infectious diseases in the hospital as well as community. These postings are meant to provide hands-on training and develop required skills in clinical and laboratory medicine of microbiology.

Table 1. Following is the suggested plan of Rotation for Postgraduate students Postings to Diagnostic Laboratories/Hospital/ Community-

Sr no	Schedule of Rotation	Duration	Suggested Specific Learning Objectives
1	Microbiology laboratory i. Different sections of Bacteriology ii. Media preparation iii. Mycobacteriology iv. Serology/Immunology v. Mycology vi. Virology vii. Parasitology viii. Molecular lab ix. Hospital Infection Control including BMW management	Distributed in various section depending upon training & departmental needs	<ul style="list-style-type: none"> As per the specific objectives in each section, a student is expected to acquire skills from basic to the most recent ones in diagnostic microbiology.
2	Sample Collection area	Two weeks	<ul style="list-style-type: none"> To learn pre-analytical parameters & procedures at sample collection area.

			<ul style="list-style-type: none"> • To communicate effectively with patients at sample collection area. • Learn to demonstrate respect, empathy & confidentiality when dealing with patients, samples and reports. • Demonstrate leadership skills in managing the functioning of the lab (staff management, preparing duty roster)
3	<p>Clinical Pathology</p> <ul style="list-style-type: none"> i. Hematology ii. Histopathology iii. Blood Bank 	Two weeks	<ul style="list-style-type: none"> • Basic knowledge of clinical pathology (as applied to Microbiology) • Inflammation and repair • Intercellular substances and reaction • Pathological changes in the body in bacterial, viral, mycotic and parasitic infections <p>Clinical Pathology skills:</p> <ul style="list-style-type: none"> • Peripheral smear examination • CBC interpretation • Urine examination • Pathological investigations and their significance in infectious disease diagnosis.

			<p>Blood Bank skills:</p> <ul style="list-style-type: none"> • Transfusion transmitted infection • Blood grouping • Screening of blood & blood donors • Counseling skills <p>Histopathology skills:</p> <ul style="list-style-type: none"> • Various stains and staining techniques used in histopathological examination of infectious agents • Identification of pathogen and/or pathological changes in tissue sections in infectious diseases.
4	Clinical Biochemistry	One week	<ul style="list-style-type: none"> • Basic understanding of biochemistry as applied to immunological/ molecular methods for study of microbial diseases and pathogenesis of infections. • Significance of biochemical markers/profile in diagnosis, prognosis and monitoring of infective syndromes like sepsis
5	ICTC /PPTCT/ART	Two weeks	<ul style="list-style-type: none"> • HIV counseling skills • HIV Testing strategies • HIV Surveillance strategies • Treatment regimens in HIV positive

			case, management of drug resistance, and prophylaxis PEP, prevention & management of opportunistic infection
6	Tuberculosis and RNTCP	Two weeks	<ul style="list-style-type: none"> • Diagnosis of Pulmonary and extra pulmonary TB • Fluorescent Microscopy for TB • Molecular diagnosis • National tuberculosis Elimination Program • Treatment regimens in susceptible and drug resistant TB cases
7	District hospital postings (mandatory) 3rd or 4th semester for 3 months	Three months*	<ul style="list-style-type: none"> • Identify types of infections seen in community • Identify lacuna in KAP in community that promote development of infections • Choice of antimicrobials and treatment plan for infections in community • Infection control in community • Should contribute to strengthen the services of the district health system, the diagnostic laboratory services. • Participate in public health programs & research activities

8	<p>Clinical locations –</p> <p>i. Medicine & allied (General Medicine, Respiratory Disease, Skin & Venereal Disease)</p> <p>ii. Pediatrics</p> <p>iii. Surgery & allied (General Surgery, Orthopedic)</p> <p>iv. Obstetric and Gynecology</p>	<p>Two months</p> <p>Posting to be done for morning half of the day</p>	<p>Depending on the area of posting-</p> <ul style="list-style-type: none"> • History taking and physical examination skills • Sample collection and transportation skills • Identification of common infections and make a differential diagnosis • Choose the appropriate laboratory investigations required for confirmation of diagnosis • Interpret the laboratory results and correlate them clinically. • Learn common treatment plan, particularly choice of antimicrobials and identify factors that influence choice of antimicrobials. • Acquire reasoning and critical thinking required in decision making when dealing with an infectious disease case • Infection control practices
9	<p>Critical care units-</p> <p>i. Medical ICU</p>	<p>Three weeks</p> <p>(in morning half day)</p>	<ul style="list-style-type: none"> • All above in a critical setting along with • Availability and choice of specialized investigations necessary for optimum

	ii. Surgical ICU iii. Neonatal/Pediatric ICU		management of a critical patient with ID. Significance and adherence to antibiotic policy and antibiotic stewardship program Infection control in ICU
10	Institutional Super specialty wing if available Dialysis, Oncology, Cardiology etc	One week (morning half day)	<ul style="list-style-type: none"> To study infections seen in special situations along with their management & prevention approach
	Total duration of posting outside microbiology laboratory	33 weeks	

***Posting under “District Residency Programme”**

Depending upon the objectives to be achieved, feasibility and availability of resources, the rotational postings can be within the hospital or outside the hospital.

During the clinical posting, opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with clinicians in different hospital setting must be scheduled.

The PG student must be tagged along with the resident of the clinical department for bedside case discussion, under the guidance of an assigned faculty. A minimum of five case histories shall be recorded by a student during course of study. The case history must be representative of different type of Infectious Disease (ID) cases likely to be encountered eg., those caused by different microbes in community and hospital setting, HAI, infections in critical care/ ward

setting, infection in different age groups, infections in special host like Immunocompromised host, traveler, specific occupations etc.

The process of recording case histories can begin in first half of 2nd year of PG program, after students have learnt about various infective syndromes. The severity and complexity of cases must progress gradually, with simple community-based infection to begin with. At least one fourth of the cases recorded must have been discussed with the ID specialist or a clinician and their feedback/remarks documented in log book/ portfolio with their signatures.

Documentation of students learning at the end of each posting is required.

Emergency duty

The student should also be posted for managing emergency laboratory services in Microbiology. He/she should deal with all emergency investigations in Microbiology.

G b. *Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MD/MS in broad specialties in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty. }

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching & learning skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The logbook is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

- a) Help maintain a record of the work done during training.

- b) Enable Faculty/Consultants to have direct information about the work done and intervene, if necessary.
- c) Provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in logbook particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty shall refer to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

Skills & performance

The student should be given graded responsibility to enable learning by apprenticeship. The faculty throughout the year should assess competence of the student in skills. Feedback must be given and area of improvement/remarks should be mentioned for the skill and student should be re-assessed for the skills which are not acquired. To go to the next level, it should be mandatory for the student to acquire lower level skills satisfactorily, i.e only on satisfactory completion of assisted/performed with assistance skills should the student be permitted to perform the skill independently.

ASSESSMENT

I. FORMATIVE ASSESSMENT, ie., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. At least five clinical cases shall be assessed through discussion of case histories recorded by the students while posted

in clinical setting and recorded along with feedback (preferably by ID specialist if available /clinician).

Quarterly assessment during the MD training should be based on:

- Case presentation, case work up, case handling/management
- Journal club- Paper presentation & discussion
- Seminar/Lecture/ group discussion
- Case based /Laboratory or Skill based discussions
- Interdepartmental case or seminars, clinical microbiology round/ grand round/ seminar-discussion

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes

The student is to be assessed periodically as per categories listed in the postgraduate student appraisal form (Annexure I1).

II. SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A postgraduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify postgraduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of **50% marks in 'Theory' as well as 'Practical' separately** shall be mandatory for passing examination as a whole. The examination for M.D shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I- General Microbiology and Immunology (GM & IG).

Paper II- Clinical / Systemic Microbiology (CM I).

Paper III- Clinical / Systemic Microbiology (CM II).

Paper IV- Recent Advances & Applied Microbiology (AM).

Universities shall prepare a blueprint for assessment of competencies and ensure 60-70% weightage is given to higher levels in Blooms taxonomy (application and above) in theory with more number of clinical scenario based questions. In **Paper II/III (CM – II/III) –distribution of Clinical Scenarios testing the ability of a student to deal with infections caused by**

various etiological agents is suggested to be 40-50% Bacterial, 20-30% Viral, 10-20 % each for Mycobacterial, Parasitic & Fungal pathogens.

3. Practical/Clinical and Oral/Viva Voce examination

Practical examination

Practical examination should be spread over two days and include various major components of the syllabus focusing mainly on the psychomotor & affective domain.

Type of Exercises for Practical Examination should include cases (actual or paper based depending on the feasibility) of infectious diseases for workup and evaluation of clinical microbiology competence along with exercises to test ability to perform bacteriology, virology, parasitology, mycology, mycobacteriology, immunology, serology with microscopic examination and antimicrobial susceptibility report,.

Oral/Viva voce examination: The simultaneous viva-voce on the clinical case & lab based practical exercise should be taken along with main viva by each examiner separately. Oral examination shall be comprehensive enough to test the postgraduate student's overall ability to apply knowledge of the subject to hospital/community/research areas focusing on psychomotor and affective domain skills.

Table 2. Suggested Day wise distribution of practical exercises:

Ex. No	Day -1	Ex. No	Day-2
1	Clinical Microbiology exercise (Give a real clinical case /paper based scenario addressing commonly seen cases in bacteriology/mycobacteriology/vir	1 cont	Clinical Microbiology exercise - Conclusion

	<p>ology/mycology/parasitology/HAI /AMR/out break /national project based etc of infectious diseases to the PG for workup and evaluation with respect to case history, basic physical examination, required investigations, interpretation of diagnostic test results, and therapeutic management decisions including prescription of antibiotics,, along with IC practices)</p>		
2	<p>Long Exercise- Bacteriology (Mixed culture given with a clinical history representing any specimen collected from respective systemic infection)</p>	2 cont	<p>Long Exercise - Bacteriology conclusion</p>
3	<p>Short Exercise – Bacteriology (Identification of a pure culture)</p>	3 cont	<p>Short Exercise - Bacteriology conclusion</p>
4	<p>Serology Exercise (In a clinical case, choice of test & technique with interpretation of test results)</p>	4 cont	<p>Serology cont. if required</p>
5	<p>Virology techniques (In a clinical case, choice of test & technique with interpretation of test results. Viral serology/ Molecular</p>	5 cont	<p>Virology cont. if required</p>

	techniques depending upon availability)		
6	Mycology (Identification of fungi in a clinical case)	6 cont	Mycology cont. if required
7	Parasitology (In a clinical case, choice of test & technique with interpretation of test results Stool examination, Examination of Peripheral blood smear etc)	9	Pedagogy (10-15minutes)
8	Slides (Slides including histopathology for microscopic identification & discussion	10	Log book, Dissertation Viva, Grand-Viva

National Medical Commission

Recommended Reading

Books (latest edition)

1. Forbes B, Sahm D, Weissfeld A. *Bailey and Scott's Diagnostic Microbiology*, Mosby, St. Louis.
2. Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Winn WC. *Color Atlas and Textbook of Diagnostic Microbiology*, J.B. Lippincott, Philadelphia.
3. Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover FC, Tenover FC, Yolken RH. *Manual of Clinical Microbiology*, American Society for Microbiology.
4. Garcia LS, Bruckner DA. *Diagnostic Medical Parasitology*, American Society for Microbiology.
5. Mackie & McCartney Practical Medical Microbiology by J.G. Collee, A.G. Fraser
6. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases: by John E. Bennett, Raphael Dolin, Martin J. Blaser
7. Manson's Tropical Diseases by Jeremy Farrar; Peter J. Hotez; Thomas Junghanss; Gagandeep Kang; David Lalloo; Nicholas J. Wh
8. Harrison's Infectious Diseases, by Dennis L. Kasper; Anthony S. Fauci
9. Hunter's Tropical Medicine and emerging infectious disease by Edward T. Ryan, David R. Hill, Timothy P. Endy
10. Clinical Immunology Principles and Practises by Robert Rich
11. Anaerobic Bacteriology, Clinical and Laboratory practice by A. Trevorwillis
12. Topley & Wilson, Principles of Bacteriology, Virology and Immunity by M.T. Parker and L.H. Collier

13. Topley and Wilson's Microbiology and Microbial infection by Brian W. J. Mahy, Graham Selby Wilson, and William Whiteman Carlton Topley
14. Text book of Medical Mycology by Jagadish Chandra
15. Atlas of Fungal infection by Carol A. Kauffman
16. Bennett and Brachman's Hospital Infection, 6th edition, William R Jarvis.

Journals

03-05 international Journals and 02 national (all indexed) journals.

National Medical Commission

Annexure I

Following are the competencies to be achieved under Antimicrobial Resistance Detection and Prevention:

1. Demonstrate in depth knowledge of classification, mechanism of action and drug resistance of antimicrobials (antibacterials, antiviral, antifungal, antimycobacterial and antiparasitic agents).
2. Explain various phenotypic and genotypic methods used in laboratory for detection of drug resistant strains and their implications in patient care.
3. Demonstrate skills in performing antimicrobial susceptibility testing with calculations of MIC/MBC by various phenotypic and genotypic methods and interpret results as per standard guidelines (CLSI, EUCAST etc).
4. Detect and report bacterial drug resistance by identification of the commonly isolated drug resistant strains (MRSA, VRSA, VRE, CRE, MBL, AMP-C etc) and choose the most appropriate agent for therapeutic use in a specific clinical scenario.
5. Explain the implications of AST result on antimicrobial therapy to clinicians/colleagues.
6. Communicate effectively with clinicians to guide and create an antimicrobial treatment plan based on organism identification and susceptibility test.
7. Explain the concept of narrow/broad spectrum of antimicrobials, PK/PD parameters and their significance on response to antimicrobial therapy.
8. Explain significance of monitoring of antimicrobial therapy in patient care.
9. Explain the concept of empiric, syndromic and culture-based treatment strategies for treating infections.
10. Explain the need to de-escalate from empirical broad-spectrum therapy to targeted narrow-spectrum therapy.
11. Explain the importance of appropriate use of antimicrobial agents, risk of antimicrobial resistance and spread of AMR in the health care environment and the community.
12. Explain the concept of normal microbial flora, colonization, contamination and infection with its role in deciding antimicrobial therapy.

13. Demonstrate knowledge about antimicrobial prophylaxis including peri-operative surgical prophylaxis regimens.
14. Describe the concept of first-, second- and third-line antimicrobial therapy for infections.
15. Explain the importance of restricted reporting of susceptibility data by the laboratory to control antimicrobial use.
16. Explain the concept and application of WHO tool for optimizing use of antimicrobial agents: Access, Watch and Reserve (AWaRe).
17. Explain the importance of antimicrobial formularies, consumption data and prescribing policies and processes to monitor use of antimicrobials in hospitals.
18. Effectively use information technology (LIS, WHO NET etc.) for data collection and surveillance of AMR in microbiology laboratory.
19. Explain significance of collecting local antimicrobial resistance data and its use in deciding direct empirical antimicrobial therapy.
20. Demonstrate knowledge and skills to develop antibiotic policy by using local AMR data in hospital.
21. Explain significance of adherence to antibiotic policy and antibiotic stewardship program.
22. Be a part of antimicrobial stewardship team for the institution.
23. Demonstrate knowledge about recent published guidelines that recommend antimicrobial treatment therapy in various clinical situations.
24. Effectively communicate with the patients/ relatives about the role of antimicrobial agents in their disease and advice on appropriate use.
25. Actively engage with patients, relatives and the community to advise on the role of antimicrobial agents in therapy and the threat of resistance.
26. Participate in clinical audit and quality improvement programmes relating to antimicrobial use.
27. Teach students, colleagues and other health professionals regarding antimicrobial use and resistance.

Student appraisal form for MD in Microbiology											
	Elements	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic aptitude and learning										
1.1	Has knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned(e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self-directed Learning										
2	Work related to training										
2.1	Practical skills that are appropriate for the level of training										
2.2	Respect for processes and procedures in the work space										

2.3	Ability to work with other members of the team											
2.4	Participation and compliance with the quality improvement process at the work environment											
2.5	Ability to record and document work accurately and appropriate for level of training											
3	Professional attributes											
3.1	Responsibility and accountability											
3.2	Contribution to growth of learning of the team											
3.3	Conduct that is ethically appropriate and respectful at all times											
4	Space for additional comments											
5	Disposition											
	Has this assessment pattern been discussed with the trainee?	Yes	No									
	If not explain.											
	Name and Signature of the assessee											
	Name and Signature of the assessor											
	Date											

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PULMONARY MEDICINE

Preamble

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Evolution of critical care medicine makes it imperative that the post graduates are trained in the basic principles of Pulmonary Medicine as applied to critical care. The person shall be abreast with the recent advances and developments in the specialty of Pulmonary Medicine. It is expected that the person will develop a spirit of enquiry and get oriented to apply recent advances and medical evidence to the practice of pulmonary medicine. He would also grasp the fundamentals of research methodology. Medical Science is dynamic with a continuous enhancement of knowledge. The process of acquiring knowledge and skills continues even after formal education. The syllabus to be covered during post graduate training in Pulmonary Medicine given below is designed to develop a sound and scientific foundation. It is intended to serve as a guide to impart basic knowledge and develop skills and does not impose any limits to expansion beyond the areas listed.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC OBJECTIVES

The primary **goal** of the MD course in Pulmonary Medicine is to produce post graduate clinicians able to provide health care in the field of pulmonary medicine. It is expected that a physician qualified in Pulmonary Medicine at the end of the course should be able to diagnose and treat pulmonary diseases, take preventive and curative steps for these diseases in the community at all levels of health care and qualify as a consultant and teacher in the subject.

Each student should obtain proficiency in the following domains during the period of training:

1. Theoretical knowledge of different aspects of Pulmonary Medicine including the status in health and disease.
2. Acquire clinical skills.
3. Acquire practical skills.
4. Management of emergencies including intensive care.
5. Preparation of thesis as per MCI guidelines.

These involve patient management in the outpatient, inpatient and emergency situations, case presentations, didactic lectures, seminars, journal reviews, clinico-pathological conferences and mortality review meetings and working in the laboratories.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

At the end of the MD course in Pulmonary Medicine, the students should be able to:

1. demonstrate sound knowledge of common pulmonary diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis. A comprehensive knowledge of epidemiological aspects of pulmonary diseases should be acquired.
2. demonstrate comprehensive knowledge of various modes of therapy used in treatment of pulmonary diseases.
3. describe the mode of action of commonly used drugs, their doses, side-effects / toxicity, indications and contra-indications and interactions.
4. describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of management inclusive of National tuberculosis Control Programme.
5. manage common pulmonary emergencies and understand the basic of intensive care in patients with pulmonary diseases.
6. practice the field of pulmonary medicine ethically and assiduously, show empathy and adopt a humane approach towards patients and their families.
7. recognize the national priorities in pulmonary medicine and play an important role in the implementation of National Health Programmes including tuberculosis.
8. demonstrate competence in medical management.
9. should inculcate good reading habits and develop ability to search medical literature and develop basic concept of medical research.

B. Affective Domain

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire following clinical skills and be able to:

1. interview the patient, elicit relevant and correct information and describe the history in chronological order.
2. conduct clinical examination, elicit and interpret clinical findings and diagnose common pulmonary disorders and emergencies.
3. perform simple, routine investigative and office procedures required for making the bedside diagnosis, especially sputum collection and examination for etiologic organisms especially Acid Fast Bacilli (AFB), interpretation of the chest x-rays and lung function tests.
4. interpret and manage various blood gases abnormalities in various pulmonary diseases.
5. develop management plans for various pulmonary diseases.
6. assist in the performance of common procedures, like bronchoscopic examination, pleural aspiration and biopsy, pulmonary physiotherapy, endotracheal intubation and pneumo-thoracic drainage / aspiration etc.
7. recognize emergency situations in intensive care, respond to these appropriately and perform basic critical care monitoring and therapeutic procedures.
8. collect, compile, analyse, interpret, discuss and present research data.
9. teach pulmonary medicine to undergraduate and postgraduate students.

To acquire the above skills, the student should be exposed and trained in the following tests and procedures:

1. Diagnostic tests: Performance and interpretation

- Sputum and other body fluids examination with ZN stain for AFB, culture methods for pathogenic bacteria, fungi and viruses
- Newer diagnostic techniques for tuberculosis including molecular techniques
- FNAC of lung masses (blind and image-guided)
- Arterial blood gas analysis and pulse oximetry
- Imaging: Interpretation of plain radiography, ultrasound examination, Computed tomogram, PET scan, MRI
- Sputum cytology
- Simple haematological tests
- Immunological and Serological tests
- Polysomnography (full-night and split-night studies) including CPAP titration; evaluation of daytime sleepiness
- Cardiopulmonary exercise testing
- Pulmonary function tests and interpretation (Spirometry, lung volume, diffusions, body plethysmography, other lung function tests)
- Bronchoprovocation tests
- BCG vaccination
- Mantoux testing; interferon gamma release assays
- Bronchoscopy: fiberoptic/rigid, diagnostic and therapeutic
- ECG, 2D and Doppler echocardiography
- Venous Doppler ultrasound
- Skin tests for hypersensitivity
- Sputum induction and non-invasive monitoring of airway inflammation
- Medical thoracoscopy

2. Therapeutic procedures

- Fine needle aspiration and other guided procedures
- Tube thoracostomy
- Cardiopulmonary rehabilitation exercises
- Postural drainage
- Pleural biopsy, lymph node biopsy
- Administration of inhalation therapy
- Administration of oxygen therapy
- Administration of continuous positive airway pressure (CPAP)/ Bilevel Positive Airway Pressure (BiPAP)
- Monitoring and emergency procedures in intensive care

Syllabus

Course contents:

The student should acquire knowledge in the following:

I. Basic Sciences**A. Anatomy and Histology of Respiratory System**

1. Development and Anatomy of Respiratory System
2. Applied embryology of lungs, mediastinum and diaphragm
3. Developmental anomalies

B. Physiology and Biochemistry

1. Assessment of pulmonary functions
2. Control of ventilation; pulmonary mechanics
3. Ventilation, pulmonary blood flow, gas exchange and transport
4. Non-respiratory metabolic functions of lung
5. Principles of electrocardiography
6. Inhalation kinetics and its implication in aerosol therapy, and sputum induction etc.
7. Acid-base and electrolyte balance
8. Physiology of sleep and its disorders
9. Pulmonary innervation and reflexes
10. Pulmonary defence mechanisms
11. Principles of exercise physiology and testing
12. Physiological changes in pregnancy, high altitude, aging
13. Physiological basis of pulmonary symptoms

C. Microbiology

1. Mycobacterium tuberculosis and other mycobacteria
2. Bacteria causing pulmonary diseases
3. Atypical organisms and respiratory tract infections
4. Anaerobes in pleuropulmonary infections
5. Laboratory diagnosis of non-tubercular infections of respiratory tract
6. Laboratory diagnosis of TB including staining, culture and drug sensitivity testing
7. Virulence and pathogenicity of mycobacteria
8. Respiratory viruses: Viral diseases of the respiratory system and diagnostic methods
9. Respiratory fungi: (i) Classification of fungal diseases of lung: candidiasis, Actinomyces, Nocardiosis, Aspergillosis, Blastomycosis etc. (ii) Laboratory diagnostic procedures in pulmonary mycosis
10. Opportunistic infections in the immuno-ompromised individuals
11. HIV and AIDS. Virological aspects, immuno-pathogenesis, diagnosis

12. Parasitic lung diseases

D. Pathology

1. Acute and chronic inflammation: Pathogenetic mechanisms in pulmonary diseases
2. Pathology aspects of Tuberculosis
3. Pathology aspects of Pneumonias and bronchopulmonary suppuration
4. Chronic bronchitis and emphysema, asthma, other airway diseases
5. Occupational lung diseases including Pneumoconiosis
6. Interstitial lung diseases including sarcoidosis, connective tissue diseases, pulmonary vasculitis syndromes, pulmonary eosinophilias
7. Tumours of the lung, mediastinum and pleura

E. Epidemiology

1. Epidemiological terms and their definitions
2. Epidemiological methods
3. Epidemiology of tuberculosis, pneumoconiosis, asthma, lung cancer, COPD and other pulmonary diseases
4. National Tuberculosis Control Programme and RNTCP; Epidemiological aspects of BCG
5. Epidemiological aspects of pollution-related pulmonary diseases
6. Research methodology, statistics and study designs

F. Allergy and Immunology

1. Various mechanisms of hypersensitivity reactions seen in pulmonary diseases
2. Diagnostic tests in allergic diseases of lung - *in vitro* and *in vivo* tests, bronchial provocation test
3. Immunology of tuberculosis, Sarcoidosis and other diseases with an immunological basis of pathogenesis

G. Pharmacology

1. Pharmacology of antimicrobial drugs
2. Pharmacology of antitubercular drugs
3. Pharmacology of antineoplastic and immunosuppressant drugs
4. Bronchodilator and anti-inflammatory drugs used in pulmonary diseases
5. Drugs used in viral, fungal and parasitic infections
6. Other drugs pharmacokinetics and drugs interaction of commonly used drugs in pulmonary diseases
7. Pharmacovigilance

II. Clinical Pulmonary Medicine

Clinical pulmonary medicine covers the entire range of pulmonary diseases. All aspects of pulmonary diseases including epidemiology, aetiopathogenesis, pathology, clinical features, investigations, differential diagnosis and management are to be covered.

A. Infections

1. Tuberculosis

1. Aetiopathogenesis
2. Diagnostic methods
3. Differential diagnosis
4. Management of pulmonary tuberculosis; RNTCP, DOTS, and DOTS-Plus; International Standards of TB Care
5. Complications in tuberculosis
6. Tuberculosis in children
7. Geriatric tuberculosis
8. Pleural and pericardial effusion and empyema
9. Mycobacteria other than tuberculosis
10. Extrapulmonary tuberculosis
11. HIV and TB; interactions of antitubercular drugs with antiretrovirals
12. Diabetes mellitus and tuberculosis
13. Management of MDR and XDR tuberculosis

2. Non-tuberculous infections of the lungs

- Approach to a patient with pulmonary infection
- Community-acquired pneumonia
- Hospital-associated pneumonia, ventilator-associated pneumonia
- Unusual and atypical pneumonias including bacterial, viral, fungal and parasitic and rickettsial, anerobic
- Bronchiectasis, lung abscess and other pulmonary suppurations
- Acquired immunodeficiency syndrome and opportunistic infections in immuno-compromised host
- Principles governing use of antibiotics in pulmonary infections
- Other pneumonias and parasitic infections, Zoonosis

B. Non-infectious Lung Diseases

3. Immunological disorders

- Immune defence mechanisms of the lung
- Sarcoidosis
- Hypersensitivity pneumonitis and lung involvement
- Eosinophilic pneumonias and tropical eosinophilia
- Pulmonary vasculitides
- Connective tissue diseases involving the respiratory system
- Interstitial lung disease of other etiologies
- Reactions of the interstitial space to injury, drugs
- Occupational and environmental pulmonary diseases

4. Other non-infectious disorders of the lungs and airways

- Aspiration and inhalational (non-occupational) diseases of the lung
- Drug induced pulmonary diseases
- Bullous lung disease
- Uncommon pulmonary diseases (metabolic, immunological, unknown etiology), pulmonary haemorrhagic syndromes
- Other pulmonary diseases of unknown etiology including PLCH, LAM, PAP, alveolar microlithiasis
- Cystic fibrosis and disorders of ciliary motility
- Obesity-related pulmonary disorders
- Upper airways obstruction syndromes
- Occupational lung diseases and pneumoconiosis
- Air-pollution induced diseases, toxic lung and other inhalational injuries
- Health hazards of smoking
- Drug-induced lung diseases

5. Pulmonary Circulatory disorders

- Pulmonary hypertension and cor pulmonale
- Pulmonary edema
- Pulmonary thromboembolic diseases and infarction
- Cardiac problems in a pulmonary patient and pulmonary complications produced by cardiac diseases

6. Obstructive diseases of the lungs

- Asthma including allergic bronchopulmonary aspergillosis, specific allergen immunotherapy and immunomodulation
- Chronic obstructive lung disease and diseases of small airways

- Special aspects of management including Long term oxygen therapy, Inhalation therapy and Pulmonary rehabilitation

7. Tumors of the lungs

- Comprehensive knowledge of neoplastic and non-neoplastic diseases of lung including epidemiology, natural history, staging, and principles of treatment (medical, surgical, and radiation)
- Solitary pulmonary nodule

8. Diseases of the mediastinum

- Non-neoplastic disorders
- Benign and malignant (primary and secondary) neoplasms and cysts

9. Disorders of the pleura

- Pleural dynamics and effusions
- Non-neoplastic and neoplastic pleural diseases
- Pneumothorax
- Pyothorax and broncho-pleural fistula
- Fibrothorax

10. Critical Care Pulmonary Medicine

- Management of emergency problems of different pulmonary diseases
- Adult respiratory distress syndrome
- Respiratory failure in the patient with obstructive airway disease
- Respiratory failure in other pulmonary diseases
- Management of sepsis
- Respiratory and haemodynamic monitoring in acute respiratory failure
- Non-invasive and Mechanical ventilation
- Principles of critical care, diagnosis and management of complications; severity of illness scoring systems
- Ethical and end-of-life issues in critical care

11. Extrapulmonary manifestations of pulmonary diseases

12. Sleep-related pulmonary diseases

- Polysomnography
- Sleep apneas

- Other sleep-disordered breathing syndromes

13. Miscellaneous aspects

- Diseases of the diaphragm
- Disorders of chest wall
- Obesity-related pulmonary disorders
- Oxygen therapy
- End-of-life care
- Aerospace Medicine
- Pulmonary problems related to special environments (high altitude, diving, miners)
- Assessment of quality of life using questionnaires
- Health impacts of global warming

14. Preventive Pulmonology

- Principles of smoking cessation and smoking cessation strategies
- Cardiopulmonary rehabilitation
- Preventive aspects of pulmonary diseases
- Vaccination in pulmonary diseases

III. Surgical aspects of Pulmonary Medicine

- Pre- and post-operative evaluation and management of thoracic surgical patients
- Chest trauma/trauma related lung dysfunction
- Lung transplantation

TEACHING AND LEARNING METHODS

Postgraduate teaching programme

General principles

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

Teaching methodology

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied

departments. The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision.

Formal teaching sessions

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the sessions, as given under formative assessment. Further, the student should:

- Attend accredited scientific meetings (CME, symposia, and conferences).
- Attend additional sessions on resuscitation, basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to medical practice are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Log book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The Log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.

Thesis

All MD (Pulmonary Medicine) post graduate students should carry out work on an assigned topic under the direct guidance of a recognised post graduate teacher. A written protocol of the proposed work should be submitted before the end of the first 6 months. Subsequently, the post graduate student should carry out the proposed work for at least 1 year (not inclusive of the period for submitting the protocol and writing-up the final thesis).

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment during training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post Graduate Examination shall be in three parts:

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination:

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

Paper I: General pulmonary medicine and basic sciences;

Paper II: Clinical pulmonary medicine including medical emergencies;

Paper III: Clinical pulmonary medicine including critical care medicine;

Paper IV: Recent advances in pulmonary medicine, and research methodology.

The final qualifying examination should include an assessment of clinical skills in the form of case presentations and discussions. Other rules laid down by the MCI regarding M.D. examinations shall apply here as well.

3. Practical/Clinical and Oral/viva voce Examination:

The post graduate students shall examine a minimum of one long and two short cases.

Oral/viva voce Examination

The oral examination shall be thorough and shall aim at assessing the knowledge and competence of the post graduate student on the subject, investigative procedures, therapeutic technique and other aspects of the specialty which form a part of the examination.

Recommended reading:

Books (latest edition)

1. Harrison's Principles of Internal Medicine ed. Petersdorf (McGraw Hill)
2. Cecil Text book of Medicine ed. Wyngaarden
3. Crofton & Douglas Respiratory diseases ed. Seaton et al (Oxford)
4. Pulmonary diseases & disorders by Fishman (McGraw Hill)
5. Textbook on Pulmonary disease by Fraser & Pare

- | | |
|-------------------------------------|------------------------------------|
| 6. Asthma | by Clarke et al |
| 7. Bronchoscopy | by Straddling |
| 8. Tuberculosis | by SK Sharma |
| 9. Lung diseases in the Tropics | ed. OP Sharma (Marcel Dekker) |
| 10. The Normal Lung | by Murray (Saunders) |
| 11. Pulmonary Function Testing | by Clausen (Academic Press) |
| 12. Respiratory Physiology | by J.B. West (Williams & Wilkins) |
| 13. Physiology of Respiration | by J.H. Comroe (Yearbook Med Pub.) |
| 14. Respiratory Function in disease | by Bates et al (Saunders) |

Journals

03-05 international Journals and 02 national (all indexed) journals



Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN RADIO DIAGNOSIS

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The Goal of this program is to impart training in conventional and modern radiology and imaging techniques so that the post graduate student becomes well versed and competent to practice, teach and conduct research in the discipline of radiology. The student should also acquire basic knowledge in the various sub-specialities of radiology. These Guidelines also would also help to standardize Radiodiagnosis teaching at post graduate diploma (DMRD) level throughout the country so that it will benefit in achieving competent radiologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SPECIFIC LEARNING OBJECTIVES

The objective of the program is to train a student to become a skilled and competent radiologist to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/intervention.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

A post graduate student on completing MD (Radiodiagnosis) should acquire knowledge in the following areas, and be able to:

1. Acquire good basic knowledge in the various sub-specialities of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascular-radiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women’s imaging.

2. Independently conduct and interpret all routine and special radiologic and imaging investigations.
3. provide radiological services in acute emergency and trauma including its medico-legal aspects.
4. Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and should be able to describe proper cost-effective algorithm of various imaging techniques in a given problem setting.
5. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.
6. Able to decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.
7. Able to formulate basic research protocols and carry out research in the field of radiology- related clinical problems.
8. Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.
9. interact with other specialists and super-specialists so that maximum benefit accrues to the patient.
10. Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.
11. Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.
12. Acquire knowledge of interventional radiology.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

Practical Training will include two major aspects:

- A) Interpretation of images, and
- B) Skill in performing a procedure.

A) Interpretation of images:

The student should be able to interpret images on all imaging modalities of diseases of following organs :

1. **Musculo-skeletal System** - Interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.
2. **Respiratory System** - Interpretation of diseases of the chest wall, diaphragm, pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.
3. **Cardiovascular System** - Interpretation of diseases and disorders of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.
4. **Gastro-intestinal tract and hepato-biliary pancreatic system** - Interpretation of diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas.
5. **Urogenital System** - Interpretation of various diseases and disorders of genitor-urinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.
6. **Central Nervous System (C.N.S.)** - Interpretation of diseases and disorders of the head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.
7. Imaging in Emergency Medicine.
8. Imaging in Obstetrics and Gynecology.
9. Imaging of Breast and interventional procedures.
11. ENT, EYE and Dental Imaging.
11. Imaging of endocrine glands and those involved with metabolic diseases.
12. Clinical applied radionuclide imaging.
13. Interventional Radiology

B) Skills in performing a procedure

The student should be able to perform the following procedures:

- 1) **GIT contrast studies:** Barium studies (swallow, upper GI, Follow through, enema);

- fistulogram; sialogram; cologram/ileostogram,
- 2) **GU:** Excretory urography, MCU, RGU, nephrostogram, genitogram,
 - 3) **Ultrasound:** Studies of whole body including neonatal transfontanell studies, Doppler studies,
 - 4) **CT scan:** should be able to position a patient, plan study as per the clinical indication, do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.
 - 5) **MRI:** plan and perform MRI studies of whole body
 - 6) **DSA:** should be able to describe the techniques, do (if available to student) transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional.
 - 7) **Radiography:** should be able to independently do radiography of common and some important uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.
 - 8) **Interventional radiology:** The student should be able to perform simple, common non-vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names of common catheters, handling of intravenous contrast reactions; techniques, indications and contraindications for various procedures;

Syllabus

Course contents:

Anatomy

Gross and cross sectional anatomy of all the body systems.

Pathology

Gross morphology of pathological conditions of systemic diseases affecting all organ systems.

Radiology Course

This would cover imaging and interventions of diseases affecting all the body systems:

- Chest
- Cardiovascular system
- Musculoskeletal including soft tissue
- Gastrointestinal system
- Hepato-biliary-pancreatic system
- Urogenital (genito-urinary) system

- CNS including head and neck
- Obstetrics and gynaecology
- ENT, eye, dental, breast
- Endocrine and metabolic system
- Clinically applied radionuclide imaging

Radiological Physics

1. Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity
2. Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
3. X-ray Generating Apparatus
4. Screen-film radiography
5. Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.
6. Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
7. Digital radiography: Computed Radiography, Flat panel radiography
8. Other equipments: Ultrasound including Doppler, CT, MRI and DSA
9. Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management
10. Nuclear Medicine: Equipments and isotopes in various organ systems and recent advances
11. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
12. Radiation protection, dosimetry and radiation biology
13. Image quality and Quality Assurance (QA)
14. Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field
- Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit
- Check linearity of mA
- Verification of inverse square law for radiation
- Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit
- Processor quality assurance test

- Radiological protection survey of an x ray unit
- Check compatibility of safe light
- Check performance of view box
- Effect of kVp on x ray output

Radiography and processing techniques

1. Processing techniques: includes dark room and dry processing.
2. Radiography of the musculo-skeletal system including extremities.
3. Radiography of the chest, spine, abdomen and pelvic girdle.
4. Radiography of the skull, orbit, sinuses.
5. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
6. Contrast techniques and interpretation of the Central Nervous system.
7. Contrast techniques and interpretation of the cardiovascular system including chest.
8. Contrast techniques and interpretation of the genito - urinary system including Obstetrics and Gynaecology.
9. Paediatric radiology including MCU, genitogram, bone age.
10. Dental, portable and emergency (casualty) radiography.

TEACHING AND LEARNING METHODS

The training is spread over 3 years and includes following components:

1. Physics related to imaging
2. Rotational posting in various sub-specialties.
3. Seminars, case discussion, journal club.
4. Research methodology and statistics.
5. A log book should be maintained by the student and will be checked and signed regularly by the faculty-in-charge during the training program.
6. The postgraduate students shall be required to participate in the teaching and training program of undergraduate students and interns.
7. The postgraduate student would be required to present one poster presentation, to read one paper at a national/state conference and to submit one research paper which should be published or accepted for publication or sent for publication to a peer reviewed journal, during the period of his/her postgraduate studies so as to make him/her eligible to appear at the postgraduate degree examination.
7. Department should encourage e-learning activities.

Rotations:

During the three-year course, suggested rotations are as follows:-

1. Conventional chest, abdomen, musculoskeletal including skull, spine, PNS and mammography etc 8 months
2. Contrast studies: G.U., GIT, Hepato-biliary, angiography etc including fluoroscopic guided interventions 8 months
3. US, Doppler and US guided interventions 8 Months
4. CT and CT guided interventions 6 Months
5. Emergency radiology 2 Months
6. M.R.I. 2 Month
7. Elective posting 2 Months

During each posting, post graduate student should be able to perform the procedures and interpret the findings.

PROPOSED SCHEDULE FOR ROTATION

1 ST Year (1/6)	Conventional Chest & abdomen	Conventional skull, spine, musculo-skeletal etc.	US	Contrast studies - GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US
	US & interventions	Conventional skull, spine, musculo-skeletal etc.	CT	Contrast studies -- GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US & interventions
2 nd Year (3/6)	Conventional Chest & abdomen	Contrast studies - GIT & other fluoroscopic investigations including angiography	Contrast studies - G.U. tract	US & interventions	Emergency	CT
	Conventional skull, spine, musculo-skeletal etc.	Contrast studies - G.U. tract including pediatric MCU/genitogram	US & interventions	US & Doppler	Emergency	MRI
3 rd year (5/6)	Conventional Chest & mammo-graphy	Contrast studies - GIT & other fluoroscopic investigations including angiography	US & Doppler	Emergency	CT & interventions	Elective
(6/6)	Conventional musculo-skeletal & mammo-graphy	Contrast studies - G.U. tract including pediatric MCU/genitogram	CT& interventions	CT & interventions	MRI	Elective

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

Quarterly assessment during the MD training should be based on:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, i.e., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

Postgraduate Examination

The Post Graduate Examination was conducted in three parts.

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical /

Practical examination. The thesis shall be examined by a minimum of two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

Paper I: Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).

Paper II: Chest, CVS, CNS including Head & Neck, Eye, ENT, musculo-skeletal, pediatric radiology and Mammography.

Paper III: Abdominal Imaging including GI, GU, Hepatobiliary, endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology

Paper IV: Recent advances, nuclear medicine; Radiology related to clinical specialties

All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

3. Practical/clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)

Practical Examination will have:

1. 3-4 Cases
2. Film Quiz (50 – 60 Spots)
3. To perform Ultrasound on a patient

Oral/Viva voce will include:

- Radiation Physics and quality assurance
- Implements, Catheters and contrast
- Cassettes, films, dark room, equipment
- Radiographic techniques, Radiological procedures,
- Gross pathology

Suggested Reading:

Books (latest edition)

1. Grainger & Allison's Text book of Diagnostic Radiology (Churchill Livingstone)
2. Textbook of Gastrointestinal Radiology- Gore and Levine (Saunders)
3. MRI of Brain and Spine - Scott Atlas (LWW)
4. Diagnosis of Diseases of the Chest -Fraser
5. Diagnostic Imaging Series: (Amirsys, Elsevier)
Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric Radiology Chest, Obstetrics, Breast
6. MRI in Orthopedics and Sport Injuries - Stoller
7. Skeletal Radiology - Greenspan
8. Abdominal-Pelvic MRI - Semelka (IWW)
9. Caffey's Pediatric Radiology
10. CTI and MRI of the whole body- John R. Haaga
11. Text Book of Radiology and imaging - Davod sulton
12. Diagnostic ultrasound - Carol C. Rumack
13. AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology, Volumes 1, 2, 3

Journals

03-05 international Journals and 02 national (all indexed) journals

1. ~~American Journal of Roentgenology~~
2. ~~Radiology~~
3. ~~Seminars in Ultrasound, CT, MRI~~
4. ~~Radiographies~~
5. ~~Clinical Radiology~~
6. ~~British Journal of Radiology~~
7. ~~Radiological Clinics of North America~~
8. ~~Pediatric Radiology~~
9. ~~Australasian Radiology~~
10. ~~Journal of Computerized Axial Tomography~~
11. ~~Clinical Imaging~~
12. ~~MR Clinics of North America~~
13. ~~Seminars in Roentgenology~~

Medical Council Of India



Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks*

***REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/17

Date: 29-08-2022

**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR MS IN
ORTHOPEDICS**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS

Preamble

Competency based training programme in Orthopaedics aims to create postgraduate student who, after undergoing the requisite training, should be able to serve the needs of the community and should be competent to solve the problems pertaining to the speciality of Orthopaedics and Trauma.

A postgraduate undergoing training MS in Orthopaedics should be trained to identify and recognize various congenital, developmental, inflammatory, infective, traumatic, metabolic, neuromuscular, degenerative and oncologic disorders of the musculoskeletal system. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/ secondary/tertiary healthcare centres. The PG should acquire knowledge, skill and attitude to provide healthcare and education to the patients and students.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by subject-content specialists. The Expert Group of the NMC had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies.

In order to achieve sustainable outcomes, certain competencies are essential to be achieved and assessed that will enable the qualified professional to perform the role in practice as an orthopaedic specialist. These roles would be to perform as a:

1. Clinical Expert
2. Professional
3. Scholar
4. Team Member

SUBJECT SPECIFIC OBJECTIVES

The goal of M.S. Orthopaedics is to produce a competent doctor who:

1. Is aware of contemporary advances & developments in medical sciences as related to Orthopaedics and Trauma.
2. Has acquired the competencies pertaining to the subject that are required to be practiced in the community and at all levels of health system.
3. Recognizes the health needs of the patient and family and carries out professional obligations in keeping with principles of the National Health Policy and professional ethics.
4. Is oriented to principles of research methodology.
5. Has acquired skills in educating medical and paramedical professionals.
6. Has acquired skills in effectively communicating with the person, family and the community.

There is need of competency based learning. Core competencies are the essential knowledge, values and skills vital to the successful performance of effective practice of Orthopaedic and Trauma care on patients. Competence-based training is distinctly different from traditional teaching process. Competence-based training focuses on learning by doing.

Competence in medicine has been defined as “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individuals and communities being served”. Competence is not an achievement but rather a habit of lifelong learning.

Ideally, the assessment of competence (what the student or physician is able to do) should provide insight into actual performance (what he or she does habitually when not observed), as a well as the capacity to adapt to change, find and generate new knowledge, and improve overall performance. The specific learning objectives based on core competence are common to all specialities. As an example of designing learning objectives in the seven domains of core competence are described below:

1. Professionalism
2. Patient care
3. Medical Knowledge
4. Practice-based learning and improvement
5. Interpersonal and Communication skills
6. Systems-based practice
7. Academic skills

The **Goal** of the MS Orthopedics course is to train a doctor to become a competent teacher, surgeon and researcher in who has acquired competence / skills as given below:

1. Professionalism

- 1.1 Accepts personal responsibility for care of one's patients, consistent with good work ethics and empathy.
- 1.2 Demonstrates appropriate truthfulness and honesty with colleagues.
- 1.3 Recognizes personal beliefs, prejudices, and limitations. His / her personal beliefs and prejudices should not come in the way of providing service.
- 1.5 Respects patient confidentiality at all times in verbal and written communication with others.

2. Patient Care

- 2.1 History of and physical examination
 - 2.1.1 Demonstrates ability to obtain a comprehensive and focused history of illness from patient/relatives.
 - 2.1.2 Demonstrates ability to perform a comprehensive and problem-focused physical examination of the concerned human organ.
- 2.2 Information Management
 - 2.2.1 Demonstrates mastery of the traditional organization of medical data in oral and written presentations.
 - 2.2.2 Demonstrates use and interpretation of diagnostic procedures and data.
 - 2.2.3 Demonstrate ability to use information to produce evidence for the diagnosis and treatment of relevant disease condition/s.
- 2.3 Procedural
 - 2.3.1 Demonstrates mastery of adequate medical record keeping.
 - 2.3.2 Demonstrates knowledge of accessing data and information systems.
 - 2.3.3 Demonstrates the ability to perform a specific set of procedures identified by the faculty.

3. Medical Knowledge

- 3.1 Core Discipline
 - 3.1.1 Competencies unique to the discipline,
 - 3.1.2 Competencies derived from the clinical, pre-clinical and para-clinical disciplines.
- 3.2 Problem Solving
 - 3.2.1 Demonstrates the ability to identify and find information relevant to a clinical problem, using consultation, texts, and the archival literature and electronic media.

- 3.2.2 Demonstrates the ability to generate an initial list of differential diagnoses given a specific chief complaint and patient characteristics.
- 3.2.3 Demonstrates the ability to re-rank the differential diagnoses based on information gathered from the history, physical, and auxiliary studies (investigations).
- 3.2.4 Demonstrates the ability to explain a mechanism for each aspect of a patient's problem, including biological, behavioural, and social aspects.
- 3.2.5 Demonstrates the ability to evaluate scientific / clinical information and critically analyze conflicting data and hypotheses.
- 3.2.6 Demonstrates an ability to counsel a patient providing an option of treatment, conservative or operative.

4. Practice-Based Learning and Improvement

4.1 Physician Scholar

- 4.1.1 Demonstrates the ability to analyze the quality and implications of medical literature and apply new knowledge in the delivery of health care.
- 4.1.2 Demonstrates an interest and ability to identify future areas of inquiry in medical research.
- 4.1.3 Demonstrates enthusiasm and positive attitude in the educational process and participates fully in educational activities.

5. Interpersonal and Communication Skills

5.1 Human Relationships

- 5.1.1 Demonstrates knowledge of or appropriate inquiry about family and support systems.
- 5.1.2 Demonstrates an effective system for identifying and addressing ethical, cultural, and spiritual issues associated with health care delivery.
- 5.1.3 Demonstrates knowledge or applies an understanding of psychological, social, and economic factors which are pertinent to the delivery of health care.
- 5.1.4 Accurately assesses a patient's expectations and assumptions in accessing the health care system.
- 5.1.5 Effectively engages the patient and / or family in verbal communications and counselling.

6. System – Based Practice

6.1 Health Care Management

- 6.1.1 Demonstrates a practical, efficient and cost effective approach to diagnosis and treatment planning and recognizes its social and economic impact.

- 6.1.2 Demonstrates the ability to engage the patient family in diagnosis and therapeutic treatment planning.
- 6.1.3 Demonstrates the ability to recognize and outline initial treatment for patient with life threatening emergencies regardless of aetiology.
- 6.1.4 Demonstrates knowledge of alternative medicine options and understands their role in health care delivery (AYUSH).

6.2 Health Service Delivery

- 6.2.1 Demonstrates knowledge of health care financing and applies it in assisting patient to access the best possible care.
- 6.2.2 Utilizes knowledge of population-based and evidence-based medicine in making patient management decisions.
- 6.2.3 Utilizes knowledge of managed care systems in making patient treatment plans and health care maintenance plans.

6.3 Health Care Team approach to health care delivery.

- 6.3.1 Demonstrates an understanding of the roles and competencies of other health care providers.
- 6.3.2 Demonstrates the ability to engage other health care professionals.
- 6.3.3 Demonstrates the ability to follow and lead in a team approach to health care delivery.

7. Academic Skills (Scholarly activity)

- 7.1 Familiarity with basic research methodology, epidemiology, basic information technology skills.
- 7.2 Planning the protocol of a thesis, its execution and final report.
- 7.3 Skills to review of relevant literature and asking relevant research question with hypothesis development.
- 7.4 Conducting clinical sessions for undergraduate medical students, nurses and paramedical workers.

SUBJECT SPECIFIC COMPETENCIES

1. Predominant in cognitive domain:

- 1.1. Describe the principles of injury and its mechanism and mode, its clinical presentation, plan appropriate investigations and interpret the results, and institute the management of musculoskeletally injured patient, different forces resulting in fractures, biomechanical principles of fracture fixation.
- 1.2. Identify and describe the surface anatomy and relationship within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck. Identify structural peculiarities of specific bony components and structural speciality of clinical importance during fixation.
- 1.3. Define and describe the pathophysiology of shock (circulatory failure), types of shock and principles of management.
- 1.4. Define and describe, types of respiratory failure, the pathophysiology of respiratory failure and management.
- 1.5. Describe the principles and stages of bone and soft tissue healing, types of bone healing and different intrinsic and extrinsic factors which influence fracture healing.
- 1.6. Understand and describe the metabolic, nutritional, endocrine, and social impact of trauma, critical illness and biomechanical principles involved in each.
- 1.7. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.
- 1.8. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.
- 1.9. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage and rationale for each management.
- 1.10. Describe the physiological coagulation cascade and its abnormalities.
- 1.11. Describe different techniques of pain management as well as recovery of function in specific disease and trauma scenario.
- 1.12. Describe the pharmacokinetics and pharmacodynamics of drug metabolism and excretion of analgesics, anti-inflammatory agents, antibiotics, disease - modifying agents and chemotherapeutic agents and biologicals.
- 1.13. Understand the principles of Early Total Care and Damage Control Orthopaedics and planning of definitive orthopaedic management.

- 1.14. Understand the principles of biostatistics and research methodology.
 - 1.15. Understand the principles of Angiography, CT/MR angiography, Doppler Ultrasound, Sinogram.
 - 1.16. Acquire the ability to order investigations.
2. Describe the clinical presentation, plan investigations, interpret results and institute steps for the management and prevention of the following disease conditions:
 - 2.1. Nutritional deficiency diseases affecting the bones and joints,
 - 2.2. Depositional arthropathies,
 - 2.3. Endocrine abnormalities of the musculoskeletal system,
 - 2.4. Metabolic abnormalities of the musculoskeletal system,
 - 2.5. Congenital anomalies of the musculoskeletal system,
 - 2.6. Developmental skeletal disorder of the musculoskeletal system,
 - 2.7. Bone and soft tissue tumours affecting the musculoskeletal system.
3. Describe the pathogenesis and clinical features of the following conditions in adults and children, plan appropriate investigations, interpret the results and institute appropriate management of:
 - 3.1. Tubercular infections of bone and joints (musculoskeletal system),
 - 3.2. Pyogenic infections of musculoskeletal system,
 - 3.3. Mycotic infections of musculoskeletal system,
 - 3.4. Autoimmune disorders of the musculoskeletal system (HIV),
 - 3.5. Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy.
 - 3.5.1. Osteoarthritis and spondylosis
4. Describe the pathogenesis and clinical presentation, plan and interpret results of investigations and institute appropriate treatment in the following conditions:
 - 4.1. Post-polio residual paralysis
 - 4.2. Cerebral palsy
 - 4.3. Muscular dystrophies and myopathies
 - 4.4. Nerve injuries
 - 4.5. Entrapment neuropathies
 - 4.6. Spinal dysraphism
 - 4.7. Spinal anomalies.

5. Diagnose musculoskeletal manifestation of AIDS and HIV infection and its management.
6. Describe the aetiopathogenesis and clinical presentation, plan and interpret results of investigations and institute appropriate treatment for the management of osteonecrosis of bones.
7. Identify situations requiring rehabilitation services, prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care.
8. Identify and manage emergency situation in disorders of the musculoskeletal system.
9. Understand the basics of diagnostic imaging in orthopaedics like how and when to order and how to interpret the results of:
 - 9.1. Plain x-ray
 - 9.2. Ultrasonography
 - 9.3. Computerised axial tomography
 - 9.4. Magnetic resonance imaging
 - 9.5. PET scan
 - 9.6. Radio Isotope bone scan
 - 9.7. Digital Subtraction Angiography (DSA)
 - 9.8. Dual energy x-ray Absorptiometry
 - 9.9. Arthrography.
10. Describe the aetiopathogenesis, clinical presentation, identification, plan investigation/s and institute appropriate treatment for oncologic problems of musculoskeletal system (both benign and malignant: primary and secondary).
11. Understand the basics and principles of biomaterials and orthopaedic metallurgy.
12. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.
13. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.
14. Identify a research problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings

II. Predominant in the Psychomotor domain

- 1. At the end of the first year of M.S. Orthopaedics programme, the student should be able to:**

- 1.1. Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis. (Records of all competencies achieved should be documented in log book/E-Portfolio)
- 1.2. Impart wound care, where applicable, including different types of wound, and different chemotherapeutic agents for wound care, including VAC application and its care, and local antibiotic delivery system.
- 1.3. Apply all types of POP casts/slabs, splints and tractions as per need. Learn different types of bandaging.
- 1.4. Identify shock and provide resuscitation.
- 1.5. Perform aspiration of joints and local infiltration of appropriate drugs.
- 1.6. Perform appropriate wound debridement.
- 1.7. Perform arthrotomy of knee joint and also assist in arthrotomy of hip, ankle and shoulder.
- 1.8. Perform incision and drainage of abscess.
- 1.9. Perform split thickness skin grafting.
- 1.10. Perform fasciotomies.
- 1.11. Apply external fixators.
- 1.12. Apply skeletal tractions including skull tongs.
- 1.13. Triage a disaster situation and multiple trauma patients in an emergency room.
- 1.14. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating.
- 1.15. Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
- 1.16. Perform on a cadaver standard surgical approaches to the musculo-skeletal system.

2. At the end of the second year of M.S. Orthopaedics course, the student should be able to:

- 2.1. Take an informed consent for standard orthopaedic procedures.
- 2.2. Perform closed/open biopsies for lesions of bone, joints and soft tissues.
- 2.3. Perform split thickness skin grafting and local flaps.
- 2.4. Perform on bone models, internal fixation with k-wires, screws, plates, Dynamic hip/condylar screws/nailing.
- 2.5. Perform sequestrectomy and saucerisation.
- 2.6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow.
- 2.7. Perform repair of open hand injuries including tendon repair.

- 2.8. Perform arthodesis of small joints.
- 2.9. Perform diagnostic arthroscopy on models and their patients.
- 2.10. Perform carpal tunnel/tarsal tunnel release.
- 2.11. Apply Ilizarov external fixator.
- 2.12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities.
- 2.13. Perform amputations at different levels.
- 2.14. Perform corrective surgeries for Congenital talipes equino-varus (CTEV), DDH, Perthes/ skeletal dysplasia.
- 2.15. Perform cadaver based procedures, arthroscopy, arthrotomy.

3. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:

- 3.1. Assist in the surgical management of poly trauma patient.
- 3.2. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle.
- 3.3. Assist in spinal decompressions and spinal stabilizations.
- 3.4. Assist in operative arthroscopy of various joints.
- 3.5. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow.
- 3.6. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes.
- 3.7. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
- 3.8. Assist in open reduction and internal fixations of complex fractures of acetabulum, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand.
- 3.9. Assist in spinal deformity corrections.
- 3.10. Independently perform closed/open reduction and internal fixation with DCP, LCP, intra- medullary nailing, LRS.
- 3.11. Assist in limb lengthening procedures.
- 3.12. Assist in revision surgeries.
- 3.13. Provide pre- and post- OP care. This care should be exercised from first year.
- 3.14. Perform all clinical skills as related to the speciality.

III. Predominant in Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

- 1.1. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- 1.2. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

IV. Attitudes including Communication skills and Professionalism

1. Communication skills: The PG student should:

- 1.1. Exhibit participation in honest, accurate health related information sharing in a sensitive and suitable manner.
 - 1.2. Recognize that being a good communicator is essential to practice effectively.
 - 1.3. Exhibit effective and sensitive listening skills.
 - 1.4. Recognise the importance and timing of breaking bad news and know how to communicate.
 - 1.5. Exhibit participation in discussion of emotional issues.
 - 1.6. Exhibit leadership in handling complex and advanced communication.
 - 1.7. Recognize the importance of patient confidentiality and the conflict between confidentiality and disclosure.
 - 1.8. Be able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication.
 - 1.9. Able to obtain comprehensive and relevant history from patients/relatives.
 - 1.10. Able to counsel patients on their condition and needs. Add counselling of diagnosis, prognosis, complications as well as planning for the management.
2. **Team work:** Seek cooperation. Coordination and communication among treating specialties and paramedical staff.
 3. **Counselling of relatives:** regarding patient's condition, seriousness, bereavement and counselling for organ donation in case of brain stem death.
 4. **Leadership:** Trauma prevention, education of the public, paramedical and medical persons.
 5. **Advocacy:** with the government and other agencies towards cause of trauma care.
 6. **Ethics:** The Code of Medical Ethics as proposed by National Medical Commission of India will be learnt and observed.

**SUBJECT SPECIFIC PRACTICE-BASED OR PRACTICAL
COMPETENCIES**

Name/ Description of practice based competencies	Expected quantum
<p>1. Taking a Clinical History from a patient with appropriate physical exam</p> <ol style="list-style-type: none"> a. Hip-pain, Limp, Deformity, Instability, Both in child and adult b. Knee-pain, Deformity, Instability in child and adult c. Ankle, Foot d. Shoulder e. Elbow f. Wrist g. Head h. Spine 	<p>At least 3 clinical encounters in each region</p>
<p>2. In the Bone Skills Lab</p> <p><u>Basic</u></p> <ol style="list-style-type: none"> 1. Introduction and tension band wiring 2. Lag screw interfragmentary compression 3. Broad plating 4. Narrow plating 5. Ex-Fix 6. Cancellous screw fixation 7. Umex <p><u>Intermediary</u></p> <ol style="list-style-type: none"> 1. DHS 2. DCS 3. Tibia nailing 4. Femur nailing 5. Tibia condyle 6. Elbow 7. Ankle <p><u>Advanced:</u></p> <ol style="list-style-type: none"> 1. Pelvis 2. Pubic symphysis 3. Acetabulum 4. MIPPO 5. Hemiarthroplasty 6. Spine posterior 7. Spine anterior 	<p>Practice at least twice on bone models and record</p>

3. On Patients

i. At the end of the first year of M.S. Orthopaedics programme, the student will be able to perform:

- a. Wound care - different types of wound, and different chemotherapeutic agents for wound care, including VAC application
- b. POP casts/slabs, splints and tractions as per need. Learning of different types of bandaging.
- c. Identify shock and provide resuscitation
- d. Aspiration of joints and infiltration of appropriate drugs
- e. wound debridement
- f. Arthrotomy of knee joint and assist in arthrotomy of Hip, ankle, shoulder.
- g. Incision and drainage of abscess
- h. Split thickness skin grafting
- i. Fasciotomes
- j. External fixators
- k. Skeletal tractions including skull tongs
- l. Triage a disaster situation and multiple trauma patients in an emergency room
- m. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating
- n. Closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.
- o. Perform on a cadaver standard surgical approaches to the musculo skeletal system.

ii. At the end of the second year of M.S. Orthopaedics course, the student should be able to:

- a. Perform closed/open biopsies for lesions of bone, joints and soft tissues
- b. Perform split thickness skin grafting and local flaps

As per the clinical volume available in each institution

<p>c. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing.</p> <p>d. Perform sequestrectomy and saucerisation</p> <p>e. Perform arthrotomy of joints like hip/shoulder, ankle, elbow</p> <p>f. Perform repair of open hand injuries including tendon repair</p> <p>g. Perform arthodesis of small joints</p> <p>h. Perform diagnostic arthroscopy on models and their patients</p> <p>i. Perform carpal tunnel/tarsal tunnel release</p> <p>j. Apply ilizarov external fixator</p> <p>k. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities</p> <p>l. Perform amputations at different levels</p> <p>m. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia</p> <p>n. Perform cadaver based procedures, Arthroscopy, Arthrotomy.</p> <p>iii. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:</p> <p>a. Assist in the surgical management of poly trauma patient</p> <p>b. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle</p> <p>c. Assist in spinal decompressions and spinal stabilizations</p> <p>d. Assist in operative arthroscopy of various joints</p> <p>e. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow</p> <p>f. Assist in corrective osteotomies around the hip, pelvis, knee, elbow, finger and toes</p> <p>g. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.</p> <p>h. Assist in open reduction and internal fixations of complex fractures of acetabulum, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand</p> <p>i. Assist in spinal deformity corrections</p>	<p>As per the clinical volume available in each institution</p> <p>As per the clinical volume available in each institution</p>
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<ul style="list-style-type: none"> j. Independently perform closed/open reduction and internal fixation with DCP, LCP, intra meduallary nailing, LRS k. Assist in limb lengthening procedures l. Assist in Revision surgeries m. Provide pre and post OP care This care should be exercised from first year n. Perform all clinical skills as related to the speciality. 	
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SYLLABUS

I. COGNITIVE DOMAIN

At the end of the M.S. Orthopaedics programme, the post graduate student should be competent and show sufficient understanding of Basic Sciences as applicable to Orthopaedics and Trauma through a problem based approach.

1. Basic Sciences as related to Orthopaedics and Trauma

- a) Embryogenesis of all organ systems
- b) Structure and function of Central Nervous System
- c) Structure and function of the peripheral Nervous System
- d) Structure and function of the arterial and venous system
- e) Structure and functions of the head & neck, abdomen, thorax and extremities.

2. Physiological basis and Pathophysiology in Health and Disease

- a) Physical Growth
- b) Temperature regulation
- c) Acid Base Balance
- d) Fluid Balance
- e) Hematopoiesis
- f) Hemostasis
- g) Electrolyte balance
- h) Bone mineralization: Calcium-Phosphate balance
- i) Renal functions

- j) Hepatic function
 - k) Respiratory functions
 - l) Cardiac functions
 - m) Gastrointestinal functions
 - n) Endocrine functions
 - o) Developmental Milestones
 - p) Nutritional Needs of Orthopaedic/Trauma Patients
 - q) Allergy
3. **Clinical Microbiology as related to Orthopaedic infections**
- a) Virology
 - b) Bacteriology
 - c) Mycology
 - d) Parasitology (Protozoology and Helminthology)
 - e) Waste disposal, Sterilization, Disinfection
4. **Clinical Pharmacology as related to Orthopaedics & Trauma**
- a) Pharmacokinetics – of common medications used in Orthopaedics & Trauma
 - b) Antimicrobials
 - c) Analgesia, Sedation
 - d) Drug Interactions
 - e) Adverse effects
 - f) Antidotes for Poisons
 - g) Drug induced disease
5. **Professionalism and Ethics**
- a) Professionalism
 - b) Ethics
 - c) Medico legal essentials

6. Wound healing principles

- a) Types of wounds
- b) Stages of wound healing
- c) Biochemical & Molecular factors in wound healing
- d) Chemotherapeutic and other Pharmaceuticals in wound care
- e) Host, Environment and agent factors

7. Bone Healing

- a) Principles of bone healing
- b) Biological bone healing
- c) Factors influencing bone healing
- d) Biomechanism of bone healing

TEACHING AND LEARNING METHODS

General principles

Acquisition of competencies being the keystone of doctoral medical education, such training should be skills oriented. Learning in the program, essentially autonomous and self-directed, and emanating from academic and clinical work, shall also include assisted learning. The formal sessions are meant to supplement this core effort.

All students joining the postgraduate (PG) courses shall work as full-time (junior) residents during the period of training, attending not less than 80% of the training activity during the calendar year, and participating in all assignments and facets of the educational process. They shall maintain a log book for recording the training they have undergone, and details of the procedures done during laboratory and clinical postings in real time.

Teaching-Learning methods

This should include a judicious mix of demonstrations, symposia, journal clubs, clinical meetings, seminars, small group discussion, bed-side teaching, case-based learning, simulation-based teaching, self-directed learning, integrated learning, interdepartmental meetings and any other collaborative activity with the allied departments. Methods with exposure to the applied aspects of the subject relevant to basic/clinical sciences should also be used. **The suggested examples of teaching-learning methods are given below but are not limited to these. The frequency of various below mentioned teaching-learning methods**

can vary based on the subject's requirements, competencies, work load and overall working schedule in the concerned subject.

A. Lectures: Didactic lectures should be used sparingly. A minimum of 10 lectures per year in the concerned PG department is suggested. Topics to be selected would be as per subject requirements. All postgraduate trainees will be required to attend these lectures. Lectures can cover topics such as:

1. Subject related important topics as per specialty requirement
2. Recent advances
3. Research methodology and biostatistics
4. **Salient features of Undergraduate/Postgraduate medical curriculum**
5. Teaching and assessment methodology.

Topic numbers 3, 4, 5 can be done during research methodology/biostatistics and medical education workshops in the institute.

B 1. Journal club: Minimum of twice a month is suggested.

Topics will include presentation and critical appraisal of original research papers published in peer reviewed indexed journals. The presenter(s) shall be assessed by faculty and grades recorded in the logbook.

B 2. ORTHO RADIOLOGY MEETS: Twice a month discussions amongst Ortho & Radiology Residents under facilitation of faculty on various imaging modalities used and its interpretation.

B.3. ORTHO SURGICAL PATHOLOGICAL MEET: Special emphasis on the surgical pathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presents the clinical details of the case, radiology PG student describes the Radiological findings and its interpretation and Pathology student describes the morbid anatomy and histopathology of the same case.

B. 4. SKILLS LAB SESSIONS: Once a fortnight for first 2 years.

C. Student Seminar: Minimum of twice a month is suggested.

Important topics should be selected as per subject requirements and allotted for in-depth study by a postgraduate student. A teacher should be allocated for each seminar as faculty moderator to help the student prepare the topic well. It should aim at comprehensive evidence-based review of the topic. The student should be graded by the faculty and peers.

D. Student Symposium: Minimum of once every 3 months.

A broad topic of significance should be selected, and each part shall be dealt by one postgraduate student. A teacher moderator should be allocated for each symposium and moderator should track the growth of students. The symposium should aim at an evidence-based exhaustive review of the topic. All participating postgraduates should be graded by the faculty and peers.

E. Laboratory work / Bedside clinics/case presentation: Case presentation once a week in the ward, outpatient department/special clinics.

Laboratory work/Clinics/bedside teaching should be coordinated and guided by faculty from the department. Various methods like DOAP (Demonstrate, Observe, Assist, Perform), simulations in skill lab, and case-based discussions etc. are to be used. Faculty from the department should participate in moderating the teaching-learning sessions during clinical rounds.

F. Interdepartmental colloquium

Faculty and students must attend monthly meetings between the main Department and other department/s on topics of current/common interest or clinical cases; eg., combined clinical round with Radiology, Pathology etc.

G. a. Rotational clinical / community / institutional postings

Depending on local institutional policy and the subject specialty needs, postgraduate trainees may be posted in relevant departments/ units/ institutions. The aim would be to acquire more in-depth knowledge as applicable to the concerned specialty. Postings would be rotated between various units/departments and details to be included in the specialty-based Guidelines. Few examples are listed below:

1. Clinical postings

A major portion of posting should be in Orthopaedics department. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.

Rotation of posting

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

- Medical Education Unit (MEU) or Department of Medical Education (DOME) (optional)

T/L Education

- Bone Skills Lab sessions – Twice a week
- Surgical Audit sessions – Once every week
- Cadaver based education – Twice a month
- Web based e-learning sessions – Once a fortnight
- Simulated environment learning – Two sessions in a week
- **Mortality & Morbidity meetings with SURGICAL AUDIT:** Once a month

G b. Posting under “District Residency Programme” (DRP):

All postgraduate students pursuing MS/MS in broad specialities in all Medical Colleges/Institutions shall undergo a compulsory rotation of three months in District Hospitals/District Health System as a part of the course curriculum, as per the Postgraduate Medical Education (Amendment) Regulations (2020). Such rotation shall take place in the 3rd or 4th or 5th semester of the Postgraduate programme and the rotation shall be termed as “District Residency Programme” and the PG medical student undergoing training shall be termed as “District Resident”.

Every posting should have its defined learning objectives. It is recommended that the departments draw up objectives and guidelines for every posting offered in conjunction with the collaborating department/s or unit/s. This will ensure that students acquire expected competencies and are not considered as an additional helping hand for the department / unit in which they are posted. The PG student must be tagged along with those of other relevant departments for bedside case discussion/basic science exercises as needed, under the guidance of an assigned faculty.

Opportunities to present and discuss infectious disease cases through bedside discussion and ward/grand rounds with specialists / clinicians in different hospital settings must be scheduled to address antimicrobial resistance issues and strategies to deal with it.

H. Teaching research skills

Writing a thesis should be used for inculcating research knowledge and skills. All postgraduate students shall conduct a research project of sufficient depth to be presented to the University as a postgraduate thesis under the supervision of an eligible faculty member of the department as guide and one or more co-guides who may be from the same or other departments.

In addition to the thesis project, every postgraduate trainee shall participate in at least one additional research project that may be started or already ongoing in the department. It is preferable that this project will be in an area different from the thesis work. For instance, if a clinical research project is taken up as thesis work, the additional project may deal with community/field/laboratory work. Diversity of knowledge and skills can thereby be reinforced.

I. Training in teaching skills

MEU/DOME should train PG students in education methodologies and assessment techniques. The PG students shall conduct UG classes in various courses and a faculty shall observe and provide feedback on the teaching skills of the student.

J. Log book

During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, Casualty and other areas of posting. This should indicate the procedures assisted and performed and the teaching sessions attended. The log book entries must be done in real time. The log book is thus a record of various activities by the student like: (1) Overall participation & performance, (2) attendance, (3) participation in sessions, (4) record of completion of pre-determined activities, and (5) acquisition of selected competencies.

The purpose of the Log Book is to:

- a) help maintain a record of the work done during training,
- b) enable Faculty/Consultants to have direct information about the work done and intervene, if necessary,
- c) provide feedback and assess the progress of learning with experience gained periodically.

The Log Book should be used in the internal assessment of the student, should be checked and assessed periodically by the faculty members imparting the training. The PG students will be required to produce completed log book in original at the time of final practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be submitted by the PG student at the time of the examination.

The PG students shall be trained to reflect and record their reflections in log book particularly of the critical incidents. Components of good teaching practices must be assessed in all academic activity conducted by the PG student and at least two sessions dedicated for assessment of teaching skills must be conducted every year of the PG program. The teaching faculty are referred to the MCI Logbook Guidelines uploaded on the Website.

K. Course in Research Methodology: All postgraduate students shall complete an online course in Research Methodology within six months of the commencement of the batch and generate the online certificate on successful completion of the course.

Other aspects

- The Postgraduate trainees must participate in the teaching and training program of undergraduate students and interns attending the department.
- Trainees shall attend accredited scientific meetings (CME, symposia, and conferences) at least once a year.
- Department shall encourage e-learning activities.
- The Postgraduate trainees should undergo training in Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS).
- The Postgraduate trainees must undergo training in information technology and use of computers.

During the training program, patient safety is of paramount importance; therefore, relevant clinical skills are to be learnt initially on the models, later to be performed under supervision followed by independent performance. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie., assessment to improve learning

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

The Internal Assessment should be conducted in theory and practical/clinical examination, should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the MS training should be based on:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self-directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs
6. Mini Cex encounter – at least 4
7. Clinical encounter cards - at least -4
8. Direct observation of procedural skills – at least 6 including Cadaver dissection
9. OSCE/Theory, Essay, Short notes
10. MCQS
11. Bone Skill Lab performance assessment

Note: These sessions may be organized and recorded as an institutional activity for all postgraduates.

- Attendance at Scientific meetings, CME programmes (at least 02 each)

The student to be assessed periodically as per categories listed in the student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. One research paper should be published / accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

The summative examination would be carried out as per the Rules given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. The theory examination shall be held in advance before the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/Practical and Oral examination.

The postgraduate examination shall be in three parts:

1. **Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student in broad specialty shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. **Theory examination**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training, as given in the latest POSTGRADUATE MEDICAL EDUCATION REGULATIONS. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ M.S shall be held at the end of 3rd academic year.

There shall be four theory papers (as per PG Regulations).

Paper I: Basic sciences as applied to the subject

Paper II: Traumatology and Rehabilitation

Paper III: Orthopaedic diseases

Paper IV: Recent advances in Orthopaedic surgery & General Surgery as applied to Orthopaedics

3. Practical/clinical and Oral/viva voce examination

Practical examination

Practical examination should be spread over **two** days and include various major components of the syllabus focusing mainly on the psychomotor domain.

Oral/Viva voce examination on defined areas should be conducted by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject focusing on psychomotor and affective domain.

It should include:

- Stations for clinical, procedural and communication skills
- Log Book Records and reports of day-to-day observation during the training
- Should test the post graduate student's overall knowledge of the subject in:
 - Ortho Radiology
 - Ortho Pathology
 - Histopathology & Gross anatomy
 - Instruments
 - Orthotics and Prosthetics

Recommended Reading:

1. Campbell's Operative Orthopaedics, Vols 1, 2, 3 & 4 Campbell's Operative Orthopaedics, 4-Volume Set, 14th Edition by Frederick M Azar, MD, S. Terry Canale, MD and James H. Beaty, MD
2. Mercer's Orthopaedic Surgery Vol. 1 & 2, Author(s) : Robert B Duthie Edition: Ninth, Year of Publication: 2003
3. Rockwood And Greens – Fractures in Adults, Vol 1& 2 Rockwood and Green's Fractures in Adults Author(s): Paul Tornetta , William Ricci MD, FAAOS, Charles M. Court-Brown MD, FRCS Ed (Orth), Margaret M. McQueen MD, Michael McKee MD, FRCS (C) Publication Date: March 27, 2019
4. Fractures in Children – Rockwood & Wilkins - Rockwood and Wilkins Fractures in Children Edition: 9. Author(s): Peter M Waters MD, David L. Skaggs MD, John M. Flynn. Publication Date: March 19, 2019

5. Paediatric Orthopaedics – Tachidjian, Vol 4 Tachdjian's Pediatric Orthopaedics: From the Texas Scottish Rite Hospital for Children, 6th edition - November 27, 2020 Author: John Herring
6. Concise System Of Orthopaedics And Fractures – Graham Apley Apley's Concise System of Orthopaedics and Fractures Louis Solomon, David Warwick, Selvadurai Nayagam CRC Press, 31-Mar-2005
7. Textbook of Orthopaedics and Trauma – Kulkarni, Vol 1 Textbook of Orthopedics and Trauma (4 Volumes) GS Kulkarni, Sushrut Babhulkar, Publish Year 2016
8. B.D. Chaurasia's Human Anatomy, Vol1, Vol 2, Vol 3 B D Chaurasia's Handbook of Anatomy English Editions 2022 Eighth Editions Volume 2 (paperpack, CHAURASIAS), Author: CHAURASIAS, Publisher: CBS Publishers, Publishing Date 2022
9. Pharmacology and Pharmacotherapeutics – Satoskar- Pharmacology and Pharmacotherapeutics, 24th Edition - June 30, 2015, Authors: RS Satoskar, Nirmala Rege, SD Bhandarkar
10. Orthopaedics Anatomy and Surgical Approaches Frederick Wreckling Orthopaedic Anatomy and Surgical Approaches Edited by Frederick W. Reckling, Jo Anne B. Reckling and Melvyn P. Mohn, S. P. Frostick, First Published August 1, 1991
11. Green's Operative Hand Surgery-Vol. 1&. 2, Green, David P; Hotchkiss, Robert N Green's Operative Hand Surgery, 2-Volume Set 7th Edition - February 24, 2016, Authors: Scott W. Wolfe, William C. Pederson, Scott H. Kozin, Mark S. Cohen
12. Surgical Exposures in Orthopedics: The Anatomic Approach, Hoppenfeld, Stanley; De Boer, Piet Surgical Exposures in Orthopaedics: The Anatomic Approach, Edition: 6, Author(s): Piet de Boer MD, Richard Buckley MD, FRCSC, Stanley Hoppenfeld MD, Publication Date: October 7, 2021
13. Text Book of Ilizarov Surgical Techniques Bone Correction And Lengthening, Golyakhovsky, Vladimir; Frankel, Victor H Textbook of Ilizarov Surgical Techniques: Bone Correction and Lengthening by Vladimir Golyakhovsky, Victor H Frankel, Publishing Year 2010
14. Applied Orthopaedic Biomechanics, Dutta, Santosh; Datta, Debasis Applied Orthopaedic Biomechanics, by Debasis Datta Santosh K Dutta Publisher : B.I.Publications, Year 2008.

Journals

03-05 international Journals and 02 national (all indexed) journals.

National Medical Commission

Student appraisal form for MS in Orthopedics											
	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Has Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity (e.g., Journal Club, Seminars, CME etc.)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc.)										
1.4	Documentation of acquisition of competence (eg. Log book)										
1.5	Performance in work based assessments										
1.6	Self- directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										

2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										
3	Professional attributes										
3.1	Responsibility and accountability										
3.2	Contribution to growth of learning of the team										
3.3	Conduct that is ethical appropriate and respectful at all times										
4	Space for additional comments										
5	Disposition										
	Has this assessment been discussed with the trainee?	Yes	No								
	If not explain										
	Name and Signature of the assessee										
	Name and Signature of the assessor										
	Date										

National Medical Commission

Subject Expert Group members for preparation of REVISED Guidelines for competency based postgraduate training programme for MS in Orthopaedics

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GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OTORHINOLARYGOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of MS ENT is to standardize Otorhinolaryngology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent ENT Surgeons with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

At the end of postgraduate training the student should be able to:

1. Practice his specialty ethically keeping in mind the requirement of the patient, community and people at large.
2. Demonstrate sufficient understanding of basic sciences related to his specialty and be able to integrate such knowledge in his Clinical practice.
3. Diagnose and manage majority of conditions in his specialty (clinically and with the help of relevant investigations)
4. Plan and advise measures for the promotive, preventive, curative and rehabilitative aspects of health and diseases in the specialty of ENT.
5. Should be able to demonstrate his cognitive skills in the field of ENT and its ancillary branches during the formative and summative evaluation processes.
6. Play the assigned role in the implementation of National Health Programs
7. Demonstrate competence in basic concepts of research methodology and writing thesis and research papers.
8. Develop good learning, communication and teaching skills.

9. Demonstrate sufficient understanding of basic sciences and the clinical applications related to the specialty to be able to integrate this knowledge into Clinical practice. Acquire in-depth knowledge in the subject including recent advances.
10. Demonstrate that he is fully conversant with the latest diagnostics & therapeutics available.

SUBJECT SPECIFIC LEARNING OBJECTIVES

1. Theoretical Knowledge:

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to ENT and be able to integrate such knowledge in his clinical practice. She/He should acquire in-depth knowledge of his subject including recent advances. She/He should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

2. Clinical / Practical skills:

A student should be adept at good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumbar puncture etc. She/he should be able to choose the required investigations to enhance the attitude, communication skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

3. Research:

She/He should know the basic concepts of research methodology, plan a research project, plan and write a thesis and should know how to use library facilities. Basic knowledge of statistics is also required. Knowledge about use of internet resources is required.

4. Teaching:

The student should learn the basic methodology of teaching and assessment and develop competence in teaching medical/paramedical students and their assessment.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

At the end of training, the student should be able to demonstrate ability to practically apply knowledge gained during training period. This would include the following:

Basic Sciences related to Otolaryngology

- Physiology- Mechanism of perception of smell and taste, mechanism of breathing and voice production, lacrimation, deglutition and salivation. Functional tests of the nose and paranasal sinuses, mechanism of cough and sneezing.
- Physics of sound, theories of hearing, mechanism of perception of sound and speech production, physiology of equilibrium and cerebral function. Physiology of brain in connection with hearing, speech, smell and phonation. Audiologic tests like audiometry, impedance, evoked potentials, OAE, Speech audiometry.
- Physiology of larynx, tracheobronchial tree and oesophagus - Histology of mucous membranes, internal ear and other associated organs and structures, nose, PNS NPx, Larynx, Tracheo-Bronchial tree, Lymphoepithelial system. Mechanism of immune system/immunology and genetics.
- Anatomy-Embryogenesis of ear, nose and throat including palate and the larynx, Oesophagus, trachea and lungs, tongue, salivary gland Head and Neck and skull base etc.
- Parapharyngeal spaces in the neck including connective tissue barriers of larynx.
- Applied anatomy of the skull bones, accessory sinuses, external, middle and inner ears, nose, PNS, nasopharynx, meninges, brain, pharynx, larynx, trachea and bronchi, lungs, pleurae, oesophagus and the mediastinum.
- Anatomy of all cranial nerves with their functions.

Principles and Practices of Otolaryngology, Audiology and Speech Pathology

- Clinical Methodology as applied to ORL HN diseases in adult and children and the accessory sinuses, diagnosis and surgical treatment of diseases of nose, throat and ear in adult and children. Prevention and treatment, infectious diseases of Otolaryngology and Head Neck region. Circulatory and nervous disturbances of the nose, throat and ear and their effects on other organs of the body. Deformities, injuries sinus infections, polyps and the tumors of the nose, and paranasal sinuses.
- Examination of the ear, deafness and allied diseases, complications of diseases of the ear. Injuries, tumors, nervous and circulatory neurological disturbances of the ear. Diagnosis and treatment of tinnitus and vertigo. Diagnosis and rehabilitation of the Hearing handicapped including, dispensing of hearing aid other vibrotatile aids.
 - Surgical pathology of Otolaryngology and Head Neck region.
 - Basic knowledge of anaesthesia as related to ENT.
 - Examination of diseases of children (Paediatric ORL) in connection with throat and larynx. Neurological and vascular disturbances. Congenital and neonatal stridor.
 - Pathology of various diseases of the larynx and throat, tracheo-bronchial tree and their causative organisms.

- Indications and various techniques of direct laryngoscopy, nasal endoscopy. Bronchoscopy and oesophagoscopy, including microlaryngoscopic procedures.
- Reading of radiograms, scans, audiograms, nystagmograms and tympanograms in connection with ENT diseases/disorders.
- Special apparatus for the diagnosis and treatment of the diseases of ear, nose and throat including audiometer, BERA, Speech analyser etc.

Recent advances in Otolaryngology and Head Neck surgery

- Recent developments in the diagnosis, pathogenesis and treatment of the ENT diseases
- The knowledge of the frontiers of the oto-laryngology and lateral skull base surgery
- Rhinoplasty, endoscopic sinus surgery, and anterior cranial fossa surgery
- Knowledge of LASERS and fibre optics
- Other methods of managing Hearing loss
- Implantable hearing aids cochlear implants
- Phonosurgery
- Etiology and Managements of sleep apnoea/snoring
- Hypophysectomy and optic nerve decompressions
- Immunotherapy and modalities of the gene therapy
- Newer techniques for Radiotherapy including, use of gamma knife for treatment of Intracranial tumors and other malignancy
- Chemotherapy of cancer

General Surgical Principles and Head-Neck Surgery

- General Surgery, Head and Neck oncology, and Medicine as applicable to the ENT disorders/diseases. Surgery of congenital deformities of nose, ear (Pinna) and trachea/oesophagus etc.
- Radiology, Imaging – computed tomography and magnetic resonance imaging, (MRI) and intervention radiology and angiography as related to ENT
- General Pathologic aspects such as wound healing and also pathology and Pathogenesis of ENT diseases, Pharmacology, molecular biology, genetics, cytology, haematology, and immunology as applicable to otolaryngology
- General Principles of faciomaxillary traumatology and neck injury
- Plastic Surgery as applicable to Otolaryngology

B. Affective Domain

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
4. The student should be able to choose the required investigations to enhance the attitude, communicative skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

C. Psychomotor Domain

By the end of the training, a student should be able to demonstrate his skills in:

- Taking a good history and demonstrating good examination techniques.
- arrive at a logical working diagnosis, differential diagnosis after clinical examination and order appropriate investigations keeping in mind their relevance (need based) and thereby provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.
- Should be able to perform and demonstrate the practical skills in the field of ENT including the following:
 - Examination of the ear, nose and throat oral cavity examination
 - Clinico-physiological examination and evaluation of the audio-vestibulo neurological system
 - Examination of the larynx and the throat including flexible endoscopy, stroboscopy, voice analysis and the clinico-physiological examination of the speech
 - Examination of the otological and audiological system including Tuning fork testing, audiological evaluation, micro and otoendoscopy
 - Clinical and physiological evaluation of the nose and paranasal sinuses including nasal endoscopy and olfactory evaluation
 - Examination of the neck and its structures
- Should demonstrate and perform various therapeutic skills related to the speciality such as :
 - Tracheostomy
 - Anterior/ posterior nasal packing
 - Ear Packing and Syringing
 - Foreign body removal from air nose and throat

- Airway management including basic life support skills, Cardiopulmonary resuscitation, intubation, homeostasis maintenance, IV alimentation and fluid, electrolyte maintenance and principles of blood transfusion alimentation including Nasogastric feeding, gastrostomy
- Wound suturing, dressings and care of the wounds
- Basic principles of rehabilitation
- common procedures like FNAC, biopsy, aspiration from serous cavities, lumbar puncture etc.
- Should understand principles of and interpret X-rays/CT/MRI, audiograms, ENG, BERA, OAE, ultrasonographic abnormalities and other diagnostic procedures in relation to the speciality
- Should have observed/performed under supervision the various surgical procedures in relation to the speciality

Syllabus

Course contents:

1. **Anatomy and Physiology of Ear, Nose and Throat, Trachea and esophagus.**
2. The generation and reception of speech
3. **Radiographic anatomy of the ear, nose, throat and imaging.**
4. **Bacteriology in relation to Otorhinolaryngology**
5. Allergy and rhinitis
6. Haematology in relation to Otolaryngology
7. **Anaesthesia for Otolaryngology**
8. **Pharmacology of drugs used in ENT**
9. Electrolyte, fluid balance/shock conditions
10. Use of teaching aids
11. Routine blood, urine testing
12. Preparation of slides
13. Facial nerve stimulation test
14. Audiometric tests like pure tone Audiometry, Impedance Audiometry, Free field Audiometry, Specialized tests of hearing including SISI, Tone decay, ABLB, Speech discrimination score etc.
15. Vestibular tests like caloric testing (Water and Air) stopping test, Fukuda's test,
16. Evoked response audiometry.

Ear:

1. The physical and functional examination of the ear
2. The functional and physical examination of the vestibular system.
3. Tinnitus
4. Affections of external ear
5. Repair of deformities of the external ear.

6. Congenital conditions of the middle ear cleft
7. Traumatic conductive deafness
8. Acute inflammation of the middle ear cleft
9. Non-suppurative otitis media
10. Chronic suppurative otitis media
11. Management of chronic suppurative otitis media
12. Complications of infections of middle ear.
13. Tumors of the middle ear cleft and temporal bone
14. Diseases of the otic capsule-otosclerosis
15. Diseases of the otic capsule-other diseases
16. The deaf child
17. Acoustic neuroma
18. Ototoxicity
19. Presbycusis
20. Diagnosis and management of sudden and fluctuant sensorineural hearing loss
21. Meniere's disease
22. Neurologic aspects of vertigo
23. Facial paralysis
24. Rehabilitation of adults with acquired Hearing loss-Hearing aids
25. The cochlear Implants
26. Nystagmus
27. Otoacoustic emissions

Nose:

1. Examination of the nose
2. Conditions of the external nose
3. Injuries of the facial skeleton
4. Congenital diseases of the nose
5. The nasal septum
6. Foreign bodies in the nose, rhinolith
7. Epistaxis
8. Acute chronic inflammations of the nasal cavities
9. Vasomotor rhinitis-allergic and non-allergic
10. Nasal polyposis
11. Abnormalities of smell
12. Acute sinusitis
13. Chronic sinusitis
14. Nasal Allergy/Fungal allergic sinusitis
15. Complications of acute and chronic sinusitis
16. Tumors of nose and sinuses
17. Facial pains
18. Trans-ethmoidal hypophysectomy

19. Functional endoscopic sinus surgery (FESS)

Throat:

1. Methods of examination of the mouth and pharynx
2. Diseases of the mouth
3. Diseases of the salivary glands
4. Pharyngeal lesions associated with general diseases
5. Diseases of the tonsils and adenoids (excluding neoplasms)
6. Tumors of the pharynx
7. Hypopharyngeal diverticulum (Pharyngeal Pouch)
8. Methods of examining and larynx and tracheobronchial tree
9. Congenital diseases of the larynx
10. Laryngeal disorders in singers and other voice users
11. Neurological affections of larynx and pharynx
12. Intubation of the larynx, laryngotomy and tracheostomy
13. Cervical node dissection
14. Skin grafts in Otolaryngology and reconstructive methods including regional and distant flaps for repair of defects after excision of tumors or trauma.
15. Micro laryngeal surgery/thyroplasty

Miscellaneous and head and neck:

1. Cranial nerves
2. Raised intracranial tension-causes, diagnosis, management with particular reference to otitis hydrocephalus
3. Head injuries and I.C. Haemorrhage
4. Pituitary gland, anatomy, physiology hypo - and hyper - pituitarism, new growths.
5. Intracranial venous sinuses and their affections
5. Osteology: skull, mandible cervical and thoracic vertebral sternum
6. Cervical fascia, facial spaces in neck, retro-pharyngeal and parapharyngeal Abscesses
7. Anatomy and physiology of thyroid gland, goitre, diseases of the thyroid and carcinoma of thyroid
8. Large blood vessels in neck, thoracic duct development of major cervical and thoracic blood vessels.
9. Head and neck reconstructive surgery

Drugs used in ENT:

1. Antibiotics Antihistaminic
2. Nasal vasoconstrictors
3. Local anaesthetics
4. Corticosteroids

5. Cyto-toxic agents
6. Antibiotics
7. Radioactive isotopes
8. Antifungal agents
9. Vasopressive and other agents used in shock like states.

General:

1. Physiology of circulation, regulation of blood pressure, reactions of body to haemorrhage, patho-physiology of shock, fluid balance, blood transfusion and its hazards, fluid replacement therapy, burns
2. Agents used in shock like states

Desirable

1. The ears and nasal sinuses in the aerospace environment
2. Physiological consideration of pressure effects on the ear and sinuses in deep water diving
3. The principles of cancer immunology with particular reference to head and neck cancer
4. Principles of chemotherapy in head and neck cancer
5. Recording of nystagmus by ENG and its interpretation

Ear:

1. Traumatic lesions of the inner ear
2. Inflammatory lesions of the vestibular and auditory nerve
3. Vascular lesions of the inner ear
4. Electronystagmography
5. Skull base/Neurologic surgery

Nose:

1. Cosmetic surgery of the nose
2. Non-healing granuloma of the nose
3. Surgery of the pterygopalatine fossa
4. LASER Surgery

Throat:

1. Oesophageal conditions in the practice of ear, nose and throat surgery
2. Disorders of speech
3. Lower respiratory conditions in Otolaryngology

Miscellaneous and head and neck

1. Functional Anatomy of cerebellum and brainstem

2. Anatomy of mediastinum
3. Pleura, plural cavity, broncho-pulmonary segments and their clinical importance
4. Facial plastic surgery

TEACHING AND LEARNING METHODS

Teaching methodology

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted. Exposure to newer specialized diagnostic/therapeutic procedures concerning ENT should be given.

1. Rotations:

- A major portion of posting should be in ENT Department. It should include in-patients, out-patients, ICU, trauma, emergency room, specialty clinics including Vertigo Clinic, Rhinology Clinic, Otology Clinic, Cancer Clinic, Cadaveric dissection Lab, Audiology and speech therapy.
- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

2. Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

3. Log book: Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

4. Thesis writing and research:

Thesis writing is compulsory.

5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
6. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at

a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

7. The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.
8. Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT ie.,at the end of the training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination will be in three parts:

1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

Paper I: Basic Sciences related Otolaryngology

Paper II: Principles and Practices of Otolaryngology

Paper III: Recent advances in Otolaryngology and Head Neck surgery.

Paper IV: General Surgical Principles and Head-Neck Surgery.

3. Clinical / Practical and viva voce Examination

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a

specialist/teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective Structured Clinical Examination(OSCE).

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading:

Books (latest edition)

- Scott-Brown's *Otorhinolaryngology and Head and Neck Surgery*
- Cummings *Otolaryngology - Head and Neck Surgery*
- *Otolaryngology, Otology & Neurotology* by Paparella & Micheal
- Glasscock-Shambaugh's *Surgery of the Ear*
- *Essentials of Functional Sinus Surgery* by Heinz Stammberger MD
- *Color Atlas of Head & Neck Surgery* by Jatin P Shah
- *Handbook of Clinical Audiology* by Jack Katz
- Stell & Maran's *Textbook of Head and Neck Surgery and Oncology*

Journals

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

MS Courses

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OBSTETRICS AND GYNAECOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of MS Obstetrics and Gynaecology is to standardize Obstetrics & Gynaecology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent Obstetrician and Gynaecologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

Programme Objectives

The **goal** of the MS course in Obstetrics and Gynaecology is to produce a competent Obstetrician and Gynaecologist who can:

- a. Provide quality care to the community in the diagnosis and management of Antenatal, Intra-natal and Post-natal period of normal and abnormal pregnancy and labor.
- b. provide effective and adequate care to a pregnant woman with complicated pregnancy.
- c. provide effective and adequate care to a normal and high risk neonate.
- d. perform obstetrical ultrasound in normal and abnormal pregnancy including Doppler.
- e. manage effectively all obstetrical and gynecological emergencies and if necessary make appropriate referrals.
- f. provide quality care to the community in the diagnosis and management of gynaecological problems including screening, and management of all gynecological cancers including during pregnancy.

- g. conduct a comprehensive evaluation of infertile couple and have a broad based knowledge of assisted reproductive techniques including – ovulation induction, *in vitro* fertilization and intra-cytoplasmic sperm injection, gamete donation, surrogacy and the legal and ethical implications of these procedures.
- h. provide counseling and delivery of fertility regulation methods including reversible and irreversible contraception, emergency contraception etc.
- i. provide quality care to women having spontaneous abortion or requesting Medical Termination of Pregnancy (MTP) and manage their related complications.

SUBJECT SPECIFIC COMPETENCIES

A. Cognitive Domain

At the end of the MS Course in Obstetrics and Gynaecology, the student should have acquired knowledge in the following:

- recognizes the health needs of women and adolescents and carries out professional obligations in keeping with principles of National Health Policy and professional ethics
- has acquired the competencies pertaining to Obstetrics and Gynaecology that are required to be practiced in the community and at all levels of health system
- on genetics as applicable to Obstetrics.
- on benign and malignant gynecological disorders.
- on Gynecological Endocrinology and infertility.
- on interpretation of various laboratory investigations and other diagnostic modalities in Obstetrics & Gynecology.
- on essentials of Pediatric and adolescent Gynecology.
- on care of postmenopausal women and geriatric Gynecology.
- on elementary knowledge of female breast & its diseases.
- on vital statistics in Obstetrics & Gynecology.
- Anesthesiology related to Obstetrics & Gynecology.
- Reproductive and Child Health, family welfare & reproductive tract infections.
- STD and AIDS & Government of India perspective on women's health related issues.
- Medico-legal aspects in Obstetrics & Gynecology.
- Asepsis, sterilization and disposal of medical waste.
- be able to effectively communicate with the family and the community
- is aware of the contemporary advances and developments in medical sciences as related to Obstetrics and Gynaecology.

- maintain medical records properly and know the medico-legal aspects in respect of Obstetrics & Gynecology
- Understands the difference between audit and research and how to plan a research project and demonstrate the skills to critically appraise scientific data and literature
- has acquired skills in educating medical and paramedical professionals

Ethical and Legal Issues:

The post graduate student should understand the principles and legal issues surrounding informed consent with particular awareness of the implication for the unborn child, postmortem examinations consent to surgical procedures including tubal ligation/vasectomy, parental consent and medical certification, research and teaching and properly maintain medical records.

Risk Management:

The post graduate student should demonstrate a working knowledge of the principles of risk management and their relationship to clinical governance and complaints procedures.

Confidentiality:

The post graduate student should:

- be aware of the relevant strategies to ensure confidentiality and when it might be broken.
- understand the principles of adult teaching and should be able to teach common practical procedures in Obstetrics and Gynaecology and involved in educational programme in Obstetrics and Gynaecology for medical and paramedical staff.
- be abreast with all recent advances in Obstetrics and Gynaecology and practice evidence based medicine.

Use of information technology, audits and standards:

The post graduate student should:

- acquire a full understating of all common usage of computing systems including the principles of data collection, storage, retrieval, analysis and presentation.
- understand quality improvement and management and how to perform, interpret and use of clinical audit cycles and the production and application of clinical standards, guidelines and protocols.

- understand National Health Programmes related to Obstetrics and Gynaecology and should be aware of all the Acts and Laws related to specialty.

Health of Adolescent Girls and Post-Menopausal Women

The student should:

- Recognize the importance of good health of adolescent and postmenopausal women.
- Identification and management of health problems of post-menopausal women.
- Understanding and planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Geriatric problems.

Reproductive Tract and 'HIV' Infection

- Epidemiology of RTI and HIV infection in Indian women of reproductive age group.
- Cause, effect and management of these infections.
- HIV infections in pregnancy, its effects and management.
- Relationship of RTI and HIV with gynaecological disorders.
- Planning and implementation of preventive strategies.

Medico-legal Aspects

- Knowledge and correct application of various Acts and Laws while practicing Obstetrics and Gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Knowledge of importance of proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Knowledge of steps recommended for examination and management of rape cases.
- Knowledge of steps taken in the event of death of a patient.

B. Affective domain

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire following clinical & operative skills and be able to:

Operative Skills in Obstetrics and Gynaecology

- Adequate proficiency in common minor and major operations, post-operative management and management of their complications.
- Operative procedures which must be done by P G students during training period: *(in graded manner - assisting, operating with senior person assisting, operating under supervision)*

(Operations MUST BE DONE/OBSERVED during PG training programme and log book maintained)

1. Obstetrics: Venesection, culdocentesis

Conduct normal deliveries

Episiotomy and its repair

- Application of forceps and ventouse (10).
- Carry out caesarian section delivery (10 must be done)
- Manual removal of placenta
- Management of genital tract obstetrical injuries.
- Post partum sterilization/Minilap tubal ligation (20 must be done)
- Medical termination of pregnancy - various methods (20 must be done)

2. Gynaecology: Endometrial / cervical biopsy.

Dilatation and curettage

Coldocentesis, Colpotomy

- Opening and closing of abdomen (10 must be done)
- Operations for pelvic organ prolapse
- Ovarian cyst operation
- Operation for ectopic pregnancy
- Vaginal and abdominal hysterectomy

Operations must be OBSERVED and/or ASSISTED when possible:

- Internal podalic version
- Caesarea Hysterectomy
- Internal iliac artery ligation
- Destructive obstetrical operations
- Tubal microsurgery
- Radical operations for gynaec malignancies
- Repair of genital fistulae
- Operations for incontinence
- Myomectomy, Laparoscopic and hysteroscopic surgery

Diagnostic Procedures

- Interpretation of x-rays - Twins, common fetal malformations / mal-presentations, abnormal pelvis (pelvimetry), Hysterosalpingography
- Sonographic pictures at various stages of pregnancy - normal and abnormal pregnancies, Fetal biophysical profile, common gynaecological pathologies.
- Amniocentesis
- Fetal surveillance methods - Electronic fetal monitoring and its interpretation
- Post-coital test
- Vaginal Pap Smear
- Colposcopy
- Endoscopy - Laparo and Hystero-scopy.

Health of Adolescent Girls and Post-Menopausal Women

- Provide advice on importance of good health of adolescent and postmenopausal women.
- Identification and management of health problems of post-menopausal women.
- Planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Provide education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Provide advice on geriatric problems.

Reproductive Tract and 'HIV' Infection

- Provide advice on management of RTI and HIV infections in Indian women of reproductive age group.

- Provide advice on management of HIV infections in pregnancy, relationship of RTI and HIV with gynaecological disorders.
- Planning and implementation of preventive strategies.

Medico-legal Aspects

- Correct application of various Acts and Laws while practicing obstetrics and gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Implement proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Implement the steps recommended for examination and management of rape cases.
- Follow proper procedures in the event of death of a patient.

Environment and Health

- Follow proper procedures in safe disposal of human body fluids and other materials.
- Follow proper procedures and universal precautions in examination and surgical procedures for the prevention of HIV and other diseases.

Syllabus

Course Contents:

Paper I

1. Basic Sciences

- Normal and abnormal development, structure and function (female and male) urogenital system and female breast.
- Applied Anatomy of genito-urinary system, abdomen, pelvis, pelvic floor, anterior abdominal wall, upper thigh (inguinal ligament, inguinal canal, vulva, rectum and anal canal).
- Physiology of spermatogenesis.
- Endocrinology related to male and female reproduction (Neurotransmitters).
- Anatomy and physiology of urinary and lower GI (Rectum / anal canal) tract.
- Development, structure and function of placenta, umbilical cord and amniotic fluid.
- Anatomical and physiological changes in female genital tract during pregnancy.
- Anatomy of fetus, fetal growth and development, fetal physiology and fetal circulation.
- Physiological and neuro-endocrinal changes during puberty, adolescence, menstruation, ovulation, fertilization, climacteric and menopause.

- Biochemical and endocrine changes during pregnancy, including systemic changes in cardiovascular, hematological, renal hepatic, renal, hepatic and other systems.
- Biophysical and biochemical changes in uterus and cervix during pregnancy and labor.
- Pharmacology of identified drugs used during pregnancy, labour, post-partum period in reference to their absorption, distribution, excretion, (hepatic) metabolism, transfer of the drugs across the placenta, effect of the drugs (used) on labor, on fetus, their excretion through breast milk.
- Mechanism of action, excretion, metabolism of identified drugs used in the management of Gynaecological disorder.
- Role of hormones in Obstetrics and Gynaecology.
- *Markers in Obstetrics & Gynaecology* - Non-neoplastic and neoplastic diseases
- Pathophysiology of ovaries, fallopian tubes, uterus, cervix, vagina and external genitalia in healthy and diseased conditions.
- Normal and abnormal pathology of placenta, umbilical cord, amniotic fluid and fetus.
- Normal and abnormal microbiology of genital tract. Bacterial, viral and parasitological infections responsible for maternal, fetal and gynaecological disorders.
- Humoral and cellular immunology in Obstetrics & Gynaecology.
- Gametogenesis, fertilization, implantation and early development of embryo.
- Normal Pregnancy, physiological changes during pregnancy, labor and puerperium.
- Immunology of pregnancy.
- Lactation.

2. Medical Genetics

- Basic medical genetics including cytogenetics.
- Pattern of inheritance
- Chromosomal abnormalities - types, incidence, diagnosis, management and recurrence risk.
- General principles of Teratology.
- Screening, counseling and prevention of developmental abnormalities.
- Birth defects - genetics, teratology and counseling.

Paper II

Clinical obstetrics

1. Antenatal Care:

- Prenatal care of normal pregnancy including examination, nutrition, immunization and follow up.
- Identification and management of complications and complicated of pregnancy – abortion, ectopic pregnancy, vesicular mole, Gestational trophoblastic Diseases, hyperemesis gravidarum, multiple pregnancy, antipartum hemorrhage, pregnancy induced hypertension, preeclampsia, eclampsia, Other associated hypertensive disorders, Anemia, Rh incompatibility, diabetes, heart disease, renal and hepatic diseases, preterm - post term pregnancies, intrauterine fetal growth retardation,
- Neurological, hematological, dermatological diseases, immunological disorders and other medical and surgical disorders/problems associated with pregnancy, Multiple pregnancies, Hydramnios, Oligoamnios.
- Diagnosis of contracted pelvis (CPD) and its management.
- High-risk pregnancy
 - Pregnancy associated with complications, medical and surgical problems.
 - Prolonged gestation.
 - Preterm labor, premature rupture of membranes.
 - Blood group incompatibilities.
 - Recurrent pregnancy wastage.
- Evaluation of fetal and maternal health in complicated pregnancy by making use of diagnostic modalities including modern ones (USG, Doppler, Electronic monitors) and plan for safe delivery for mother and fetus. Identifying fetus at risk and its management. Prenatal diagnostic modalities including modern ones.
- Infections in pregnancy (bacterial, viral, fungal, protozoan)
 - Malaria, Toxoplasmosis.
 - Viral – Rubella, CMV, Herpes, HIV, Hepatic viral infections (B, C etc)
 - Sexually Transmitted Infections (STDs)
 - Mother to fetal transmission of infections.
- Identification and management of fetal malpositions and malpresentations.
- Management of pregnancies complicated by medical, surgical (with other specialties as required) and gynecological diseases.
 - Anemia, hematological disorders
 - Respiratory, Heart, Renal, Liver, skin diseases.
 - Gastrointestinal, Hypertensive, Autoimmune, Endocrine disorders.
 - Associated Surgical Problems.
 - Acute Abdomen (surgical emergencies - appendicitis and GI emergencies).
 - Other associated surgical problems.
 - Gynaecological disorders associate with pregnancy - congenital genital tract developmental anomalies, Gynaec pathologies - fibroid uterus, Ca Cx, genital prolapse etc.
 - Prenatal diagnosis (of fetal problems and abnormalities), treatment – Fetal therapy
 - M.T.P, PC & P.N.D.T Act etc

- National health MCH programs, social obstetrics and vital statistics
- Recent advances in Obstetrics.

2. Intra-partum care:

- Normal labor - mechanism and management.
- Partographic monitoring of labor progress, recognition of abnormal labor and its appropriate management.
- Identification and conduct of abnormal labor and complicated delivery - breech, forceps delivery, caesarian section, destructive operations.
- Induction and augmentation of labor.
- Management of abnormal labor - Abnormal pelvis, soft tissue abnormalities of birth canal, mal-presentation, mal-positions of fetus, abnormal uterine action, obstructed labor and other distocias.
- Analgesia and anaesthesia in labor.
- Maternal and fetal monitoring in normal and abnormal labor (including electronic fetal monitoring).
- Identification and management of intrapartum complications, Cord presentation, complication of 3rd stage of labor - retained placenta, inversion of uterus, rupture of uterus, post partum hemorrhage.

3. Post Partum

- Complication of 3rd stage of labor retained placenta, inversion of uterus, post partum hemorrhage, rupture of uterus, Management of primary and secondary post-partum hemorrhage, retained placenta, uterine inversion. Post-partum collapse, amniotic fluid embolism
 - Identification and management of genital tract trauma - perineal tear, cervical/vaginal tear, episiotomy complications, rupture uterus.
 - Management of critically ill woman.
 - Post partum shock, sepsis and psychosis.
 - Postpartum contraception.
- Breast feeding practice; counseling and importance of breast-feeding. Problems in breast-feeding and their management, Baby friendly practices.
- Problems of newborn - at birth (resuscitation), management of early neonatal problems.
 - Normal and abnormal purpura - sepsis, thrombophlebitis, mastitis, psychosis.
- Hematological problems in Obstetrics including coagulation disorders. Use of blood and blood components/products.

4. Operative Obstetrics:

- Decision-making, technique and management of complications.
- Vaginal instrumental delivery, Caesarian section, Obst. Hysterectomy, destructive operations, manipulations (External/internal podalic version, manual removal of placenta etc)
- Medical Termination of Pregnancy - safe abortion - selection of cases, technique and management of complication. MTP law.

5. New Born

1. Care of new born: Normal and high risk new born (including NICU care).
2. Asphyxia and neonatal resuscitation.
3. Neonatal sepsis - prevention, detection and management.
4. Neonatal hyper - bilirubinemia - investigation and management.
5. Birth trauma - Detection and management.
6. Detection and management of fetal/neonatal malformation.
7. Management of common neonatal problems.

Paper III

Clinical Gynaecology and Fertility Regulation

- Epidemiology and etiopathogenesis of gynaecological disorders.
- Diagnostic modalities and management of common benign and malignant gynaecological diseases (diseases of genital tract):
 - Fibroid uterus
 - Endometriosis and adenomyosis
 - Endometrial hyperplasia
 - Genital prolapse (uterine and vaginal)
 - Cervical erosion, cervicitis, cervical polyps, cervical neoplasia.
 - Vaginal cysts, vaginal infections, vaginal neoplasia (VIN)
 - Benign Ovarian pathologies
 - Malignant genital neoplasia - of ovary, Fallopian tubes, uterus, cervix, vagina, vulva and Gestational Trophoblastic diseases, Cancer Breast.
- Diagnosis and surgical management of clinical conditions related to congenital malformations of genital tract. Reconstructive surgery in gynaecology.
- Intersex, ambiguous sex and chromosomal abnormalities.
- Reproductive endocrinology: Evaluation of Primary/secondary Amenorrhea, management of Hyperprolactinemia, Hirsutism, Chronic an-ovulation, PCOD, thyroid and other endocrine dysfunctions.
- Infertility - Evaluation and management
 - Methods of Ovulation Induction

- Tubal (Micro) surgery
 - Management of immunological factors of Infertility
 - Male infertility
 - Obesity and other Infertility problems.
 - **(Introductory knowledge of)** Advanced Assisted Reproductive Techniques (ART)
- Reproductive tract Infections: prevention, diagnosis and treatment.
 - STD
 - HIV
 - Other Infections
 - Genital Tuberculosis.
 - Principles of radiotherapy and chemotherapy in gynaecological malignancies. Choice, schedule of administration and complications of such therapies.
 - Rational approach in diagnosis and management of endocrinal abnormalities such as: menstrual abnormalities, amenorrhea (primary/secondary), dysfunctional uterine bleeding, polycystic ovarian disease, hyperprolactinemia (galactorrhea), hyperandrogenism, thyroid - pituitary - adrenal disorders, menopause and its treatment (HRT).
 - Urological problems in Gynaecology - Diagnosis and management.
 - Urinary tract infection
 - Urogenital Fistulae
 - Incontinence
 - Other urological problems
 - Orthopedic problems in Gynaecology.
 - Menopause: management (HRT) and prevention of its complications.
 - Endoscopy (Laparoscopy - Hysteroscopy)
 - Diagnostic and simple therapeutic procedures (PG students must be trained to do these procedures)
 - Recent advances in gynaecology - Diagnostic and therapeutic
 - Pediatric, Adolescent and Geriatric Gynaecology
 - **Introduction to Advance Operative procedures.**

Operative Gynaecology

- Abdominal and Vaginal Hysterectomy
- Surgical Procedures for genital prolapse, fibromyoma, endometriosis, ovarian, adenexal, uterine, cervical, vaginal and vulval pathologies.
- Surgical treatment for urinary and other fistulae, Urinary incontinence
- Operative Endoscopy

Family Welfare and Demography

- Definition of demography and its importance in Obstetrics and Gynaecology.

- Statistics regarding maternal mortality, perinatal mortality/morbidity, birth rate, fertility rate.
- Organizational and operational aspects of National health policies and programs, in relation to population and family welfare including RCH.
- Various temporary and permanent methods of male and female contraceptive methods.
- Knowledge of in contraceptive techniques (including recent developments).
 1. Temporary methods
 2. Permanent Methods.
 3. Recent advances in contraceptive technology
- Provide adequate services to service seekers of contraception including follow up.
- Medical Termination of Pregnancy: Act, its implementation, providing safe and adequate services.
- Demography and population dynamics.
- Contraception (fertility control)

Male and Female Infertility

- History taking, examination and investigation.
- Causes and management of male infertility.
- Indications, procedures of Assisted Reproductive Techniques in relation to male infertility problems.

TEACHING AND LEARNING METHODS

Postgraduate Training

Teaching methodology should be imparted to the students through:

- Lectures, seminars, symposia, Inter- and intra- departmental meetings (clinic-pathological, Radio-diagnosis, Radiotherapy, Anaesthesia, Pediatrics/ Neonatology), maternal morbidity/mortality meetings and journal club. ***Records of these are to be maintained by the department.***
- By encouraging and allowing the students to attend and actively participate in CMEs, Conferences by presenting papers.
- Maintenance of log book: Log books shall be checked and assessed periodically by the faculty members imparting the training.
- Writing thesis following appropriate research methodology, ethical clearance and good clinical practice guidelines.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Department should encourage e-learning activities.

Practical and Clinical Training

- Emphasis should be self learning, group discussions and case presentations.
- Student should be trained about proper History taking, Clinical examination, advising / ordering relevant investigations, their interpretation and instituting medical / surgical management by posting students in OPD, specialty clinics, wards, operation theaters, Labor room, family planning clinics and other departments like anesthesiology, neonatology, radiology/ radiotherapy. **Students should be able to perform and interpret ultra - sonography in Obstetrics and Gynaecology, NST, Partogram**

Rotations:

- Details of 3 years posting in the PG programme (6 terms of 6 months each)

a. Allied posts should be done during the course – for 8 weeks

- | | | |
|------|------------------------|-----------|
| i. | Neonatology | - 2 weeks |
| ii. | Anaesthesia | - 2 weeks |
| iii. | Radiology/Radiotherapy | - 2 weeks |
| iv. | Surgery | - 2 weeks |
| v. | Oncology | - 2 weeks |

b. Details of training in the subject during resident posting

The student should attend to the duties (Routine and emergency):

Out patient Department and special clinics

Inpatients

Operation Theater

Labor Room

Writing clinical notes regularly and maintains records.

1st term - working under supervision of senior residents and teaching faculty.

2nd & 3rd term- Besides patient care in O.P.D., wards, Casualty and labor room, carrying out minor operations under supervision and assisting in major operation.

4th 5th & 6th term - independent duties in management of patient including major operations under supervision of teaching faculty

c. Surgeries to be done during PG training. (Details in the Syllabus)

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training includes

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

Postgraduate Examination shall be in three parts:

1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory Examination:

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There should be four theory papers, as given below:

Paper I: Applied Basic sciences.

Paper II: Obstetrics including social obstetrics and Diseases of New Born

Paper III: Gynaecology including fertility regulation

Paper IV: Recent Advances in Obstetrics & Gynaecology

3. Clinical/Practical & oral/viva voce Examination: shall be as given below:

a) Obstetrics:

Clinical

Long Case: 1 case

2 cases with different problems

Short Case/ Spot Case: 1 case

Viva voce including:

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Dummy Pelvis

b) Gynaecology:

Clinical

Long Case: 1 case

2 cases with different problems

Short Case/ Spot Case: 1 case

Viva including:

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Family planning

Recommended Reading:

Books (latest edition)

Obstetrics

1. William Textbook of Obstetrics
2. High risk Obstetrics - James
3. High risk pregnancy - Ian Donal
4. Text book of Operative Obstetrics - Munro Kerr.
5. Medical disorder in pregnancy - De Sweit
6. High risk pregnancy - Arias
7. A text book of Obstetrics - Thrbull
8. Text book of Obstetrics - Holland & Brews.
9. Manual of Obstetrics - Daftary & Chakravarty

Gynaecology

1. Text book of Gynaecology - Novak
2. Text book of Operative Gynaecology - Te-lindes
3. Text book of operative gynaecology - Shaws
4. Text book of Gynaecology and Reproductive Endocrinology - Speroft
5. Text book of Obstetrics & Gynaecology - Dewhurst
6. Manual of Gynaecological Oncology - Disai
7. Text book of Gynaecology – Jaeffcot

Journals

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OPHTHALMOLOGY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of this programme is to standardize Ophthalmology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in post graduate and undergraduate teaching as well as result in creating competent ophthalmic surgeons with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

Programme Objectives

The clinical post graduate training programmes are intended at developing in a student a blend of qualities that of a clinical specialist, a teacher and a researcher. These programmes are organized such that a post graduate student should possess the following qualities, knowledge and skills:

- a. The student should possess basic knowledge of the structure, function and development of the human body as related to ophthalmology, of the factors which may disturb these mechanisms and the disorders of structure and function which may result thereafter.
- b. The student should be able to practice and handle most day-to-day problems independently in ophthalmology. The student should recognize the limitations of his/her own clinical knowledge and know when to seek further help.
- c. The student should understand the effects of environment on health and be familiar with the epidemiology of at least the more common diseases in the field of ophthalmology.

- d. The student should be able to integrate the preventive methods with the curative and rehabilitative measures in the comprehensive management of the disease.
- e. The student should be familiar with common eye problems occurring in rural areas and be able to deal with them effectively.
- f. The student should also be made aware of Mobile Ophthalmic Unit and its working and components.
- g. The student should be familiar with the current developments in Ophthalmic Sciences.
- h. The student should be able to plan educational programmes in Ophthalmology in association with senior colleagues and be familiar with the modern methods of teaching and evaluation.
- i. The student should be able to identify a problem for research, plan a rational approach to its solution, execute it and critically evaluate his/her data in the light of existing knowledge.
- j. The student should reach the conclusions by logical deduction and should be able to assess evidence both as to its reliability and its relevance.
- k. The student should have basic knowledge of medico-legal aspects of medicine.
- l. The student should be familiar with patient counseling and proper consent taking.

SUBJECT SPECIFIC COMPETENCIES

A post graduate student upon successfully qualifying in the M.S. (Ophthalmology) examination should be able to:

- a) Offer to the community, the current quality of 'standard of care' in ophthalmic diagnosis as well as therapeutics, medical or surgical, in most of the common situations encountered at the level of health services.
- b) Periodically self assess his or her performance and keep abreast with ongoing advances in the field and apply the same in his/her practice.
- c) Be aware of her/his own limitations to the application of the specialty in situations, which warrant referral to more qualified centers or individuals.
- d) Apply research and epidemiological methods during his/her practice. The post graduate student should be able to present or publish work done by him/her.
- e) Contribute as an individual/group towards the fulfillment of national objectives with regard to prevention of blindness.
- f) Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.

At the end of the course, the student should have acquired knowledge in the following:

A. Cognitive domain

Basic Medical Sciences:

- Attain understanding of the structure and function of the eye and its parts in health and disease.
- Attain understanding and application of knowledge of the structure and function of the parts of Central Nervous System and other parts of the body with influence or control on the structure and function of the eye.
- Attain understanding of and develop competence in executing common general laboratory procedures employed in diagnosis and research in Ophthalmology.

1. Clinical Ophthalmology:

Given adequate opportunity to work on the basis of graded responsibilities in outpatients, inpatient and operation theatres on a rational basis in the clinical sections from the day of entry to the completion of the training programme, the students should be able to:

- Acquire scientific and rational approach to the diagnosis of ophthalmic cases presented.
- Acquire understanding of and develop inquisitiveness to investigate to establish cause and effect of the disease.
- To manage and treat all types of ophthalmic cases.
- To competently handle and execute safely all routine surgical procedures on lens, glaucoma, lid, sac, adnexa, retina and muscle anomalies.
- To competently handle all ophthalmic medical and surgical emergencies.
- To be familiar with micro-surgery and special surgical techniques.
- To demonstrate the knowledge of the pharmacological (including toxic) aspects of drugs used in ophthalmic practice and drugs commonly used in general diseases affecting the eyes.

2. Refraction:

- Acquire competence in assessment of refractive errors and prescription of glasses for all types of refraction problems.
- Acquire basic knowledge of manufacture and fitting of glasses and competence of judging the accuracy and defects of the dispensed glasses.

3. Ophthalmic super-specialties:

Given an opportunity to work on a rotational basis in various special clinics of sub-specialties of ophthalmology, if possible, the student should be able to:

- Examine, diagnose and demonstrate understanding of management of the problems of neuro-ophthalmology and refer appropriate cases to neurology and neuro-surgery.
- Examine, diagnose and demonstrate understanding of management of (medical and surgical) complicated problems in the field of (a) lens, (b) glaucoma, c) cornea, (d) retina, (e) pediatric ophthalmology, (f) oculoplasty, (g) uvea, and (I) genetic problems in ophthalmology.
- To demonstrate understanding of the manufacture, and competence in prescription and dispensing of contact lenses and ocular prosthesis.

5. Ophthalmic pathological/microbiological/biochemical sciences

- Be able to interpret the diagnosis in correlation with the clinical data and routine materials received in such cases.

6. Community Ophthalmology

Eye camps may be conducted where the PG students are posted for imparting training to according to a set methodology. The community and school surveys may also be conducted by the post graduate students.

The post graduate students are given an opportunity to participate in surveys, eye camps. They should be able to guide rehabilitation workers in the organisation and training of the blinds in art of daily living and in the vocational training of the blind leading to gainful employment.

7. Research :

- Recognise a research problem.
- State the objectives in terms of what is expected to be achieved in the end.
- Plan a rational approach with appropriate controls with full awareness of the statistical validity of the size of the material.
- Spell out the methodology and carry out most of the technical procedures required for the study.
- Accurately and objectively record on systematic lines results and observation made.
- Analyze the data with the aid of an appropriate statistical analysis.

- Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.
- Write a thesis in accordance with the prescribed instructions.
- Write at least one scientific paper as expected of International Standards from the material of this thesis.

B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. Psychomotor domain

At the end of the course, the student should acquire following clinical skills:

Essential diagnostic skills:

I. Examination techniques along with interpretation

1. Slit lamp Examination

- i. Diffuse examination
- ii. Focal examination
- iii. Retroillumination – direct and indirect
- iv. Sclerotic scatter
- v. Specular reflection
- vi. Staining modalities and interpretation

2. Fundus evaluation

- Direct/Indirect ophthalmoscopy
- Fundus drawing
- 3-mirror examination of the fundus
- 78-D/90-D/60-D examination
- Amsler's charting

II. Basic investigations along with their interpretation

1. Tonometry

Tonometry - Applanation/Indentation/Non-contact

2. Gonioscopy

Gonioscopy grading of the anterior chamber angle

3. Tear/ Lacrimal function tests

- i. Staining- fluorescein and Rose Bengal
- ii. Schirmer test/tear film break up time
- iii. Syringing
- iv. Dacrocystography

4. Corneal

- Corneal scraping and cauterization
- Smear preparation and interpretation (Gram's stain /KOH)
- Media inoculation
- Keratometry - performance and interpretation
- Pachymetry
- Corneal topography - if available

5. Colour Vision evaluation

- Ishihara pseudoisochromatic plates
- Farnsworth Munsell, if available

6. Refraction

- i. Retinoscopy- Streak/ Priestley Smith
- ii. Use of Jackson's cross-cylinder
- iii. Subjective and objective refraction
- iv. Prescription of glasses

7. Diagnosis and assessment of Squint

- i. Ocular position and motility examination
- ii. Synoptophore usage
- iii. Lees screen usage
- iv. Diplopia charting
- v. Assessment of strabismus - cover tests/prisms bars
- vi. Amblyopia diagnosis and treatment
- vii. Assessment of convergence, accommodation, stereopsis, suppression

8. Exophthalmometry

Usage of Hertel's exophthalmometer - proptosis measurement

9. Contact lenses

- Fitting and assessment of RGP and soft lenses
- Subjective verification of over refraction
- Complications arising of contact lens use
- Educating the patient regarding CL usage and imparting relevant knowledge of the complications arising thereon

10. Low Vision Aids

- Knowledge of basic optical devices available and relative advantages and disadvantages of each.
- The basics of fitting with knowledge of availability & cost

III. The post graduate must be well versed with the following investigative modalities although the student may or may not perform it individually. But, she/he should be able to interpret results of the following tests:

1. Fundus photography
2. Fluorescein angiography
3. Ophthalmic ultrasound A-scan/B scan
4. Automated perimetry for glaucoma and neurological lesions
5. Radiological tests - X rays - Antero posterior/ Lateral view
PNS (Water's view) / Optic canal views
Localisation of intra-ocular and intra-orbital FBs
Interpretations of -USG/ CT/ MRI Scans
6. OCT and UBM
7. ERG, EOG, and VEP

IV. Minor surgical procedures – Must know and perform independently

- Conjunctival and corneal foreign body removal on the slit lamp
- Chalazion incision and curettage
- Pterygium excision
- Biopsy of small lid tumours
- Suture removal- skin/conjunctival/corneal/ corneoscleral
- Tarsorrhaphy
- Subconjunctival injection
- Retrobulbar, parabolbar anaesthesia
- Posterior Sub-Tenon's injections

- Artificial eye fitting

V. Surgical procedures

1. Must know and can perform independently

a. Ocular anaesthesia:

- Retrobulbar anaesthesia
- Peribulbar anaesthesia
- Facial blocks- O'Brein / Atkinson/Van lint and modifications
- Frontal blocks
- Infra orbital blocks
- Blocks for sac surgery

2. Must be able to independently perform and deal with complications arising from the following surgeries :

- Lid Surgery - Tarsorrhaphy
 Ectropion and entropion
 Lid repair following trauma
 Epilation
- Destructive procedures
 Evisceration with or without implant
 Enucleation with or without implant
- Sac surgery
 - i. Dacryocystectomy
 - ii. Dacryocystorhinostomy
 - iii. Probing for congenital obstruction of nasolacrimal duct
- Strabismus surgery
 Recession and resection procedures on the horizontal recti.
- Orbit surgery
 Incision and drainage via anterior orbitotomy for abscess
- Cyclocryotherapy/Cyclophotocoagulation

3. PG Students should be well conversant with use of operating microscope and must be able to perform the surgeries listed below competently under the same:

- Cataract surgery
 - i. Standard ECCE (extracapsular cataract extraction; first year) with or without IOL implantation

- ii. Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation
- iii. Intracapsular cataract extraction (second year)
- iv. Cataract with Phacoemulsification (third year)
- v. Secondary AC or PC IOL implantation
- Vitrectomy/Scleral buckling
 - Intra-vitreous and intra-cameral (anterior chamber) injection techniques and doses of drugs for the same
 - Needs to know the basis of open sky vitrectomy (anterior segment) as well as management of cataract surgery complications.
 - Assisting vitrectomy and scleral buckling procedures
- Ocular surface procedures
 - Pterygium excision with modifications
 - Conjunctival cyst excision/foreign body removal
 - Corneal foreign body removal
 - Conjunctival flap/ peritomy
- Glaucoma
 - Trabeculectomy
- Corneal
 - Repair of corneo - scleral perforations
 - Corneal suture removal
 - Application of glue and bandage contact lens
- 4. Should have performed/assisted the following microscopic surgeries
 - i. Keratoplasty
 - Therapeutic and optical
 - ii Glaucoma surgery
 - Pharmacological modulation of trabeculectomy
 - Trabeculectomy
 - Goniotomy
 - Glaucoma valve implant surgery
- 5. Desirable to be able to perform following laser procedures
 - Yag Capsulotomy
 - Laser iridotomy
 - Focal and panretinal photocoagulation
- 6. Should have assisted/knowledge of Keratorefractive procedures

Operations:

The PG is provided with an opportunity to perform operations both extra-ocular and intra-ocular with the assistance of the senior post graduate students and/or under the direct supervision of a faculty member. The student is provided with an opportunity

to learn special and complex operations by assisting the senior post graduate student or the faculty in operations of cases of the specialty and be responsible for the post-operative care of these cases.

In **first phase**, the post graduate student is given training in preparations of cases for operation, pre-medication and regional anaesthetic blocks. In the **next phase**, the post graduate student assists the operating surgeon during the operations. In the **third phase**, the post graduate student operates independently assisted by senior post graduate student or a faculty member. She/he is required to be proficient in some operations and show familiarity with others.

Syllabus

Course contents:

These are only broad guidelines and are illustrative, there may be overlap between sections.

I. Basic Sciences:

1. **Orbital and ocular anatomy**

- i. Gross anatomy
- ii. Histology
- iii. Embryology

2. **Ocular Physiology**

3. **Ocular Pathology**

4. **Ocular Biochemistry**

General biochemistry, biochemistry applicable to ocular function

5. **Ocular Microbiology**

General Microbiology, specific microbiology applicable to the eye

6. **Immunology with particular reference to ocular immunology**

7. Genetics in ophthalmology

8. Community Eye Health

II. Optics

- a. Basic physics of optics
- b. Applied ophthalmic optics
- c. Applied optics including optical devices
- d. Disorders of Refraction

III. Clinical Ophthalmology

- i. Disorders of the lids
- ii. Disorders of the lacrimal system
- iii. Disorders of the Conjunctiva
- iv. Disorders of the Sclera

- v. Disorders of the Cornea
- vi. Disorders of the Uveal Tract
- vii. Disorders of the Lens
- viii. Disorders of the Retina
- ix. Disorders of the Optic Nerve and Visual Pathway
- x. Disorders of the Orbit
- xi. Glaucoma
- xii. Neuro-ophthalmology
- xiii. Paediatric ophthalmology
- xiv. Ocular involvement in systemic disease
- xv. Immune ocular disorders
- xvi. Strabismus and Amblyopia
- xvii. Ocular oncology

TEACHING AND LEARNING METHODS

Teaching Methodology:

The theoretical knowledge is imparted to the post graduate student through distinct courses of lecture demonstrations, seminars, symposia and inter- and intra-departmental meetings. The students are exposed to recent advances through discussions in journal clubs and participation in CMEs, and symposia.

The post graduate students are imparted clinical training in several ways:

1. ***Group Discussion***

The junior post graduate students may present the symposium to their senior postgraduates where it is fully discussed before finally being discussed in front of the faculty or senior eye specialists. A free and fair discussion is encouraged. These discussions enable the post graduate students to prepare for a general discussion in the class.

2. ***Clinical Case discussion***

- a. Bedside discussion on the rounds and outpatient teaching take their toll with patient management. Therefore in addition to these, clinical case discussions should form part of a department's schedule at a fixed time every week. This could range from 1-2 hours and could be held at least once a week. The choice and manner of presentation and discussion varies widely and is left to the discretion of the department. Every effort should be made to include as wide a variety of cases as possible over three years with multiple repetitions. Problem oriented approach is better as it aids in decision making skills.

- b. In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary.
- c. Consultant case presentation is another approach which should be encouraged as it aids in solving complex problems and also is forum for discussion of interesting cases.
- d. Case discussions on the patient's records written by the student is to be encouraged as it helps exercise the student's diagnostic and decision making skills. It also helps the consultant in critical evaluation of the student's progress academically.
- e. Case presentation at other in-hospital multidisciplinary forums.
- f. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- g. Department should encourage e-learning activities.

3. **Seminars**

Seminars should be conducted at least once weekly. The duration should be at least one hour. The topics selected should be repeated once in 3 years so as to cover as wide a range of topics as possible. Seminars could be individual presentations or a continuum (large topic) with many post graduate students participating.

4. **Journal clubs**

Journals are reviewed in particular covering all articles in that subject over a 6 months period and are discussed by the post graduate student under the following headings.

- 1) Aim
- 2) Methods
- 3) Observations
- 4) Discussions and
- 5) Conclusions

The post graduate student to whom the journal is allotted presents the journal summaries to the senior postgraduates. They are expected to show their understanding of the aspects covered in the article and clarify any of the points raised in the article, offer criticisms and evaluate the article in the light of known literature.

- 5. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

- 6. **Out-Patients:** For the first six months of the training programme, post graduate students may be attached to a faculty member to be able to pick up methods of history taking and ocular examination in ophthalmic practice. During this period

the post graduate student may also be oriented to the common ophthalmic problems. After 6 months, the clinical post graduate student may work independently, where he receives new and old cases including refractions and prescribes for them. The post graduate students are attached to a senior post graduate student and faculty member whom they can consult in case of difficulty.

- 7. Wards:** Each post graduate student may be allotted beds in the in-patient section depending upon the total bed capacity and the number of the post graduates. The whole concept is to provide the post graduate student increasing opportunity to work with increasing responsibility according to seniority. A detailed history and case record is to be maintained by the post graduate student.

Relevance of beds and admissions in Ophthalmology has really gone down at present, as most of the surgical and special investigative procedures are being performed on out-patient basis. Most of the teaching has to be imparted in out-patients department and special Clinics.

- 8. Rotations: Specialty clinics**

The student may rotate in the following subspecialty clinics:

- Anterior segment and cataract
- Glaucoma
- Oculoplastics
- Paediatric ophthalmology and strabismus
- Retina and Uvea
- Cornea, Contact lens and low vision
- Neuroophthalmology
- Refractive Clinic

- 9. Practicals in Ocular Histopathology**

The post graduate students may be provided with fully stained slides of the ocular tissues along with relevant clinical data and discuss the diagnosis and differential diagnosis on the basis of the information provided

- 10.** Attend accredited scientific meetings (CME, Symposia, and Conferences).
- 11.** Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to ophthalmology practice are suggested.
- 13.** Maintenance of **log book:** Log books shall be checked and assessed periodically by the faculty members imparting the training.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, ie, during the training

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

FORMATIVE ASSESSMENT, ie., during the training

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post Graduate examination shall be in three parts:

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall

be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners. From regulations)

2. Theory Examination:

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers.

- Paper I:** Basic Sciences related to Ophthalmology, Refraction & Optics
- Paper II:** Clinical Ophthalmology
- Paper III:** Systemic Diseases in Relation to Ophthalmology
- Paper IV:** Recent Advances in Ophthalmology and Community Ophthalmology

3. Clinical/Practical and oral/viva voce examination

Clinical

- 1 long case
- 2 short cases with different problems
- 2 fundus Cases
- 1 refraction case

Oral/Viva voce Examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject and shall include:

- i. Instruments
- ii. Pathology specimens
- iii. Drugs, X-rays, USG/OCT/CT/MRI Scans, etc.
- iv. Visual fields and other ophthalmic diagnostic charts

Recommended Reading:

Books (latest edition)

1. Ophthalmic Surgery: Principles and Techniques. Blackwell Science. Albert DM.
2. Principles and Practice of Ophthalmology. Albert DM, Jakobiec. W B Saunders
3. Principles & Practice of Ophthalmology. Gholam A Paymen
4. The Current American Academy of Ophthalmology Basic and Clinical Science Course (13 volumes)
5. Duke Elder's Practice of Refraction. Abrams D. Churchill Livingstone.
6. Text book of Ophthalmology. Yanoff and Duker
7. Retina. Stephen J Ryan:
8. Ophthalmic Ultrasound: Sandra Byrne and Ronald Green.
9. Cornea: Fundamentals, Diagnosis, and Management. Krachmer JH, Mannis MJ, Holland EJ. Mosby Elsevier.
10. Ophthalmology. Yanoff N, Duker JS. Mosby Elsevier.
11. Review of Ophthalmology. Friedman NJ, Kaiser PK, Trattler WB. Elsevier Saunders, Philadelphia.
12. Corneal Transplantation. Vajpayee RB. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
13. Fundamentals of Clinical Ophthalmology Series. Coster D. Cornea. Blackwell Publishing Limited.
14. The Contact Lens Manual. A practical guide to fitting. Gasson A, Morris A J. Butterworth Heinemann Elsevier.
15. Steinert's cataract surgery.
16. Shields Text book of glaucoma
17. Smith and Nozik : Uvea
18. Rootman's diseases of the orbit
19. Eyelid, conjunctival and orbital tumors. An atlas and textbook. Shields JA, Shields CL. Philadelphia: Lippincott Williams & Wilkins.
20. Intraocular tumors. An atlas and textbook. Shields JA, Shields CL.
21. Pediatric Ophthalmology. Taylor and Hoyt: Saunders Ltd.
22. Management of Strabismus and Amblyopia. Pratt-Johnson and Tilson: Thieme Verlag.
23. Handbook of Pediatric Eye and Systemic disease. Wright, Spiegel and Thompson.
24. Binocular Vision and Ocular Motility. Theory and Management of Strabismus. Von Noorden GK. Mosby.
25. Surgical Management of Strabismus. Helveston:
26. Strabismus: A Decision Making Approach. Von Noorden and Helveston:
27. Thyroid Eye Diseases. Char DR. Williams and Wilkins, Baltimore.

28. A Manual of Systematic Eyelid Surgery. Collin JRO (ed). Churchill Livingstone, Edinburgh.
29. Refractive Surgery. Agarwal A, Agarwal A, Jacob Soosan. Jaypee.
30. LASIK Complications, Prevention and management. Gimbel HV, Penno EEA. Slack Inc.
31. Management of Complications of Refractive Surgery. Alio JL, Azar DT. Springer.
32. Quality of Vision: Essential Optics for the Cataract and Refractive Surgeon. Holladay JT. Slack Inc.
33. Ocular Pharmacology: Havener
34. Anatomy: Wolff 's Anatomy of the Eye and Orbit
35. Physiology: Adler's Physiology of the Eye
36. Textbook of Ophthalmology (2 volumes). Easty DL, Sparrow JM. Oxford Oxford Medical Publications.
37. The Eye. Basic Sciences in Practice. Forrester JV, Dick AD, McMenamin PG, Lee WR. W B Saunders.
38. A Stereoscopic Atlas of Macular Diseases: Diagnosis and Treatment. Gass JDM.
39. Neuroophthalmology. Glaser JS. Lipincott Williams & Wilkins. .
40. Clinical Ophthalmic Pathology. Harry J, Misson G. Butterworth/Heinemann.
41. Inherited Retinal Diseases. A Diagnostic Guide. Jimenez Sierra JM, Ogden TE, Van Boemel GB. Mosby.
42. Clinical Ophthalmology. Kanski JJ. Butterworth/Heinemann.
43. ABC of Resuscitation. Colquhoun, M. C., Evans, T. R., Handley, A. J. BMJ Publishing Group.
44. Walsh and Hoyt's Clinical Neuroophthalmology (5 volumes). Miller NR, Newman NJ, Williams and Wilkins.
45. The human eye. Oyster CW Sinauer Associates. Sunderland. Massachusetts
46. Paediatric Ophthalmology. Taylor D. Blackwell Science.
47. Decision Making in Ophthalmology. Van Heuven WAJ, Zwann J. Mosby.
48. Parsons' Diseases of the eye. Sihota and Tandon.
49. Wills Eye Manual
50. International Council of Ophthalmology Residency Curriculum available at <http://www.icoph.org/>

Journals

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN GENERAL SURGERY

Preamble:

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle effectively medical / surgical problems and should be aware of the recent advances pertaining to his specialty. The PG student should be competent to provide professional services with empathy and humane approach. The PG student should acquire the basic skills in teaching of medical / para-medical students and is also expected to know the principles of research methodology and self-directed learning for continuous professional development.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

SUBJECT SPECIFIC LEARNING OBJECTIVES

Clinical Objectives

At the end of postgraduate training, the PG student should be able to: -

1. diagnose and appropriately manage common surgical ailments in a given situation.
2. provide adequate preoperative, post-operative and follow-up care of surgical patients.
3. identify situations calling for urgent or early surgical intervention and refer at the optimum time to the appropriate centers.
4. counsel and guide patients and relatives regarding need, implications and problems of surgery in the individual patient.
5. provide and coordinate emergency resuscitative measures in acute surgical situations including trauma.
6. organize and conduct relief measures in situations of mass disaster including triage.

7. effectively participate in the National Health Programs especially in the Family Welfare Programs.
8. discharge effectively medico-legal and ethical responsibilities and practice his specialty ethically.
9. must learn to minimize medical errors.
10. must update knowledge in recent advances and newer techniques in the management of the patients.
11. must learn to obtain informed consent prior to performance of operative procedure.
12. perform surgical audit on a regular basis and maintain records (manual and/or electronic) for life.
13. participate regularly in departmental academic activities by presenting Seminar, Case discussion, Journal Club and Topic discussion on weekly basis and maintain logbook.
14. demonstrate sufficient understanding of basic sciences related to his specialty.
14. plan and advise measures for the prevention and rehabilitation of patients belonging to his specialty.

Research:

The student should:

1. know the basic concepts of research methodology, plan a research project and know how to consult library.
2. should have basic knowledge of statistics.

Teaching:

The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.

Professionalism:

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. Cognitive domain

- Demonstrate knowledge of applied aspects of basic sciences like applied anatomy, physiology, biochemistry, pathology, microbiology and pharmacology.
- Demonstrate knowledge of the bedside procedures and latest diagnostics and therapeutics available.
- Describe aetiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adults and children.
- Demonstrate the theoretical knowledge of general principles of surgery.
- Demonstrate the theoretical knowledge of systemic surgery including disaster management and recent advances.
- Demonstrate the theoretical knowledge to choose, and interpret appropriate diagnostic and therapeutic imaging including ultrasound, Mammogram, CT scan, MRI.
- Demonstrate the knowledge of ethics, medico-legal aspects, communication skills and leadership skills. The PG student should be able to provide professional services with empathy and humane approach.

B. Affective domain

- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to word reports, obtain a proper relevant history and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.
- Obtain informed consent for any examination/procedure and explain to the patient and attendants the disease and its prognosis with a humane approach.
- Provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.

C. Psychomotor domain

- Perform a humane and thorough clinical examination including internal examinations and examinations of all organs/systems in adults and children
- Write a complete case record with all necessary details.
- Arrive at a logical working diagnosis / differential diagnosis after clinical examination.
- Order appropriate investigations keeping in mind their relevance (need based).
- Choose, perform and interpret appropriate imaging in trauma - ultrasound FAST (Focused Abdominal Sonography in Trauma).

- Perform minor operative procedures and common general surgical operations independently and the major procedures under guidance.
- Provide basic and advanced life saving support services in emergency situations
- Provide required immediate treatment and comprehensive treatment taking the help of specialist as required.
- Perform minimally invasive surgery in appropriate clinical settings. Must have undergone basic training in operative laparoscopy related to general and GI Surgery.
- Undertake complete patient monitoring including the preoperative and post operative care of the patient.
- Write a proper discharge summary with all relevant information.

Syllabus

Course Contents:

No limit can be fixed and no fixed number of topics can be prescribed as course contents. She/he is expected to know the subject in depth, however, emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in surgical skills commensurate with the specialty (actual hands - on training) must be ensured.

1. General topics:

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to his specialty. Further, the student should acquire in-depth knowledge of his subject including recent advances and should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

1. History of medicine with special reference to ancient Indian texts
2. Health economics - basic terms, health insurance
3. Medical sociology, doctor-patient relationship, family adjustments in disease, organizational behavior, conflict resolution
4. Computers - record keeping, computer aided learning, virtual reality, robotics
5. Hazards in hospital and protection:
AIDS, hepatitis B, tuberculosis, radiation, psychological
6. Environment protection - bio-medical waste management
7. Surgical audit, evidence based surgical practice, quality assurance
8. Concept of essential drugs and rational use of drugs
9. Procurement of stores and material & personal management

10. Research methodology - library consultation, formulating research, selection of topic, writing thesis protocol, preparation of consent form from patients
11. Bio-medical statistics, clinical trials
12. Medical ethics
13. Consumer protection
14. Newer antibiotics
15. Problem of resistance.
16. Sepsis - SIRS
17. Nosocomial infection
18. Advances in imaging technologies
19. Disaster management, mass casualties, Triage
20. O.T. design, technologies, equipment
21. Critical care in surgical practice
22. Response to trauma
23. Wound healing
24. Fluid and electrolyte balance
25. Nutrition
26. Blood transfusion
27. Brain death
28. Cadaveric organ retrieval

1. Systemic Surgery

The student must acquire knowledge in the following important topics are but teaching should not be limited to these topics. A standard text-book may be followed, which will also identify the level of learning expected of the trainees.

- Wound healing including recent advances
- Asepsis, antiseptics, sterilization and universal precaution
- Surgical knots, sutures, drains, bandages and splints
- Surgical infections, causes of infections, prevention
- Common aerobic and anaerobic organisms and newer organisms causing infection including *Helicobacter Pylori*
- Tetanus, gas gangrene treatment & prevention
- Chronic specific infections TB, Filariasis
- Boils, cellulites, abscess, necrotizing fasciitis and synergistic infection
- Antibiotic therapy rationale including antibiotic prophylaxis, misuse, abuse
- Hospital acquired nosocomial infection causes and prevention including MRSA etc.
- HIV, AIDS and Hepatitis B & C, Universal precautions when dealing with patients suffering from these diseases
- Fluid and electrolyte balance including acid – base disturbance, consequences,

interpretation of blood gas analysis data and management

- Rhabdomyolysis and prevention of renal failure
- Shock (septicaemic, hypovolaemic, Neurogenic, anaphylactic), etiology, pathophysiology and management
- Blood and blood components, transfusion indication, contraindication, mismatch and prevention and management of complications of massive blood transfusion
- Common preoperative preparation (detailed preoperative workup, risk assessment according to the disease and general condition of the patient as per ASA grade) and detailed postoperative complications following major and minor surgical procedures
- Surgical aspects of diabetes mellitus particularly management of diabetic foot and gangrene, preoperative control of diabetes, consequences of hypo- and hyperglycaemia in a postoperative setting
- Consequences and management of bites and stings including snake, dog, human bites
- Mechanisms and management of missile, blast and gunshot injuries
- Organ transplantation: Basic principles including cadaver donation, related Human Organ Transplant Acts, ethical and medicolegal aspects.
- Nutritional support to surgical patients
- Common skin and subcutaneous condition
- Sinus and fistulae, pressure sores
- Acute arterial occlusion, diagnosis and initiate management
- Types of gangrene, Burger's disease and atherosclerosis
- Investigations in case of arterial obstruction, amputation, vascular injuries: basic principles and management
- Venous disorders: Varicose veins
- Diagnosis, principles of therapy, prevention of DVT: basic principles and management
- Lymphatic: Diagnosis and principles of management of lymphangitis and lymphedema
- Surgical management of Filariasis
- Burns: causes, prevention and management
- Wounds of scalp and its management
- Recognition, diagnosis and monitoring of patients with head injury, Glasgow coma scale
- Undergo advanced trauma and cardiac support course (certified) before appearing in final examination
- Recognition of acute cerebral compression, indication for referrals.
- Cleft lip and palate
- Leukoplakia, retention cysts, ulcers of tongue

- Oral malignancies
- Salivary gland neoplasms
- Branchial cyst, cystic hygroma
- Cervical lymphadenitis nonspecific and tuberculous, metastatic lymph nodes and lymphomas.
- Diagnosis and principles of management of goitre
- Thyroglossal cyst and fistula
- Thyrotoxicosis
- Thyroid neoplasms
- Management of solitary thyroid nodule
- Thoracic outlet syndrome
- Management of nipple discharge
- Breast abscess
- Clinical breast examination, breast self examination
- Screening and investigation of breast lump
- Concept of Single Stop Breast Clinic
- Cancer breast diagnosis, staging and multimodality management (common neoadjuvant and adjuvant and palliative chemotherapy protocols and indications of radiation and hormonal therapy, pathology and interpretation of Tumour Markers, breast cancer support groups and counseling)
- Recognition and treatment of pneumothorax, haemothorax
- Pulmonary embolism: Index of suspicion, prevention/recognition and treatment
- Flail chest, stove in chest
- Postoperative pulmonary complication
- Empyema thoracis
- Recognition of oesophageal atresia and principles of management
- Neoplasms of the lung including its prevention by tobacco control
- Cancer oesophagus: principles of management including importance of early detection and timely referral to specialist
- Achalasia cardia
- Gastro-oesophageal reflux disease (GERD)
- Congenital hypertrophic pyloric stenosis
- Aetiopathogenesis, diagnosis and management of peptic ulcer including role of H. Pylori and its diagnosis and eradication
- Cancer stomach
- Signs and tests of liver dysfunction
- Amoebic liver abscess and its non-operative management
- Hydatid cyst and its medical and surgical management including laparoscopic management
- Portal hypertension, index of suspicion, symptoms and signs of liver failure and

timely referral to a specialist center

- Obstructive jaundice with emphasis on differentiating medical vs surgical Jaundice, algorithm of investigation, diagnosis and surgical treatment options
- Neoplasms of liver
- Rupture spleen
- Indications for splenectomy
- Clinical features, diagnosis, complications and principles of management of cholelithiasis and cholecystitis including laparoscopic cholecystectomy
- Management of bile duct stones including endoscopic, open and laparoscopic management
- Carcinoma gall bladder, incidental cancer gallbladder, index of suspicion and its staging and principles of management
- Choledochal cyst
- Acute pancreatitis both due to gallstones and alcohol
- Chronic pancreatitis
- Carcinoma pancreas
- Peritonitis: causes, recognition, diagnosis, complications and principles of management with knowledge of typhoid perforation, tuberculous peritonitis, postoperative peritonitis
- Abdominal pain types and causes with emphasis on diagnosing early intra-abdominal acute pathology requiring surgical intervention
- Intestinal amoebiasis and other worms manifestation (Ascariasis) and their surgical complications (Intestinal Obstruction, perforation, gastrointestinal bleeding, involvement of biliary tract)
- Abdominal tuberculosis both peritoneal and intestinal
- Intestinal obstruction
- **Appendix:** Diagnosis and management of acute appendicitis
- Appendicular lump and abscess

Colon

- Congenital disorders, Congenital megacolon
- Colitis infective / non infective
- Inflammatory bowel diseases
- Premalignant conditions of large bowel
- Ulcerative colitis
- Carcinoma colon
- Principles of management of types of colostomy

Rectum and Anal Canal:

- Congenital disorders, Anorectal anomalies
- Prolapse of rectum

- Carcinoma rectum
- Anal Canal: surgical anatomy, features and management of fissures, fistula - in – ano.
- Perianal and ischiorectal abscess
- Haemorrhoids – Non-operative outpatient procedures for the control of bleeding (Banding, cryotherapy, injection) operative options - open and closed haemorrhoidectomy and stapled haemorrhoidectomy
- Anal carcinoma
- Clinical features, diagnosis, complication and principles of management of inguinal hernia including laparoscopic repair
- Umbilical, femoral hernia and epigastric hernia
- Open and Laparoscopic repair of incisional/primary ventral hernia
- Urinary symptoms and investigations of urinary tract
- Diagnosis and principles of management of urolithiasis
- Lower Urinary tract symptoms or prostatism
- Benign prostatic hyperplasia; diagnosis and management
- Genital tuberculosis in male
- Phimosi and paraphimosis
- Carcinoma penis
- Diagnosis and principles of treatment of undescended testis
- Torsion testis
- Hydrocele, haematocele and pyocele Varicocele: Diagnosis (Medical Board for fitness)
- Varicocele: Diagnosis (Medical Board for fitness)
- Acute and chronic epididymo-orchitis
- Testicular tumours
- Principles of management of urethral injuries
- Management of soft tissue sarcoma
- Prosthetic materials used in surgical practice
- Telemedicine, teleproctoring and e-learning
- Communication skills

A student should be expert in good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumbar puncture etc. The student should be able to choose the required investigations.

Clinical cases and Symptoms-based approach to the patient with:

1. Ulcers in oral cavity

2. Solitary nodule of the thyroid
3. Lymph node in the neck
4. Suspected breast lump
5. Benign breast disease
6. Acute abdominal pain
7. Blunt Trauma Abdomen
8. Gall stone disease
9. Dysphagia
10. Chronic abdominal pain
11. Epigastric mass
12. Right hypochondrium mass
13. Right iliac fossa mass
14. Renal mass
15. Inguino-scrotal swelling
16. Scrotal swelling
17. Gastric outlet obstruction
18. Upper gastrointestinal bleeding
19. Lower gastrointestinal bleeding
20. Anorectal symptoms
21. Acute intestinal obstruction
22. Obstructive jaundice
23. Acute retention of Urine
24. Bladder outlet obstruction
25. Haematuria
26. Peripheral vascular disease
27. Varicose veins
28. New born with developmental anomalies
29. Hydronephrosis , Pyonephrosis, perinephric abscess
30. Renal tuberculosis
31. Renal tumors
32. Carcinoma prostate
33. Genital tuberculosis in male

At the end of the course, post graduate students should be able to perform independently (including perioperative management) the following:

- Start IV lines and monitor infusions
- Start and monitor blood transfusion
- Venous cut-down
- Start and manage a C.V.P. line
- Conduct CPR (Cardiopulmonary resuscitation)

- Basic/ advance life support
- Endotracheal intubation
- Insert nasogastric tube
- Proctoscopy
- Urethral catheterisation
- Surgical management of wounds
- Biopsies including image guided
- Manage pneumothorax / pleural space collections
- Infiltration, surface and digital Nerve blocks
- Incise and drain superficial abscesses
- Control external hemorrhage
- Vasectomy (Preferably non-scalpel)
- Circumcision
- Surgery for hydrocele
- Surgery for hernia
- Surgery and Injection/banding of piles
- Management of all types of shock
- Assessment and management of burns
- Hemithyroidectomy
- Excision of thyroglossal cyst
- Excision Biopsy of Cervical Lymphnode
- Excision of benign breast lump
- Modified Radical mastectomy
- Axillary Lymphnode Biopsy
- Excision of gynaecomastia
- Excision of skin and subcutaneous swellings
- Split thickness skin graft
- Management of hernias
- Laparoscopic and open cholecystectomy
- Management of Liver abscess
- appendectomy
- Management of intestinal obstruction, small bowel resection, perforation and anastomosis
- Colostomy

The student must have observed or assisted (the list is illustrative) in the following:

- Hartmann's procedure for cancer rectum
- Splenectomy (emergency)
- Stomach perforation
- Varicose Vein surgery

- Craniotomy (Head Injury)
- Superficial parotidectomy
- Submandibular gland excision
- Soft tissue tumours including sarcoma
- Pancreaticoduodenal resection
- Hydatid cyst liver
- Pancreatic surgery
- Retroperitoneal operations

TEACHING AND LEARNING METHODS

Teaching methodology

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted.

1. Clinical postings

A major portion of posting should be in General Surgery. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.

Rotation of posting

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

2. Clinical meetings:

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

- 3. Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

4. Thesis writing and research:

Thesis writing is compulsory.

5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
6. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
7. The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.
8. Department should encourage e-learning activities.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

FORMATIVE ASSESSMENT, i.e., assessment during the training would include:

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the MS training should be based on following educational activities:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**

4. Departmental and interdepartmental learning activity

5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE ASSESSMENT, ie., assessment at the end of training

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The examination will be in three parts:

1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

Paper I: Basic Sciences

Paper II: Principles and Practice of Surgery

Paper III: Principles and practice of Operative Surgery

Paper IV: Recent Advances in Surgery

3. Clinical / Practical and viva voce Examination

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a specialist/Teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective structured clinical examination.(OSCE)

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

Recommended Reading:

Books (latest edition)

1. *Text Book of Surgery*, by Christopher Davis
2. ASI Text Book of Surgery
3. *Surgery of Colon, Rectum and Anal canal*, by Goligher J C
4. *Schwartz Text Book of Surgery*
5. *Textbook on Laparoscopic Surgery*
6. *Trauma (Mattox)*
7. *Recent Advances in Surgery*
8. *Year Book of Surgery*
9. *Surgical Clinics of North America*
10. *Short practice of Surgery* by Bailey and Love
11. *A manual of clinical Surgery*, by S Das
12. Hamilton Bailey's demonstration of clinical signs
13. *Pye's Surgical Handicraft*

Journals

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks* _____

*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

DM Courses

**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

D 11011/1/22/AC/Guidelines/28

Date: 30-12-2022

**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR DM IN
NEUROLOGY**

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**GUIDELINES FOR COMPETENCY BASED POSTGRADUATE
SUPER-SPECIALTY TRAINING PROGRAMME FOR DM IN
NEUROLOGY**

1. Preamble

The aim of the DM Programme is to impart advanced training in neurology to produce competent super-specialists who can provide clinical care of the highest order to patients with neurological diseases and serve as future teachers, trainers, researchers, and leaders in the field of neurology. After successfully completing the course, they would work as productive members of interdisciplinary teams consisting of physicians, neurosurgeons, geriatric specialists, psychiatrists, psychologists, rehabilitation experts, and other specialists, nurses, and other healthcare functionaries providing care to the patients with various neurological disorders in any setting of the health care system. This document has been prepared by subject-content specialists of the National Medical Commission. The Expert Group of the National Medical Commission had attempted to render uniformity without compromise to the purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies.

SUBJECT SPECIFIC OBJECTIVES

The training program is designed to facilitate the ‘acquisition of learning’ by the postgraduate student in the following three domains of learning:

- Cognitive (knowledge),
- Affective (communication),
- Psychomotor (practice).

1.1 Predominant in Cognitive domain (Knowledge)

The student should:

- Understand the basic sciences (embryology, anatomy, physiology, biochemistry, pharmaco-therapeutics, etc.) related to the field of neurology.

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- Be conversant with the etiology, pathophysiology, diagnosis, and management of common neurological problems.
- Should understand the importance of providing acute care with the goal of ‘full recovery of function’.
- Know the common problems in Neurology, the acute, life threatening conditions which require redressal in a “time sensitive” manner as well as the transdisciplinary acute medical and surgical conditions which requires team work of different specialities.
- Know the chronic problems encountered in the out patients clinics of Neurology and Medicine including specific neurological disorders and neurological complaints in various systemic diseases spanning a host of medical and surgical conditions. This includes all ages and also certain age specific neurological diseases involving post delivery, neonatal, infantile., genetic and inherited conditions, adolescence, adult and elderly age specific neurological diseases and syndromes.
- Be able to analyze neonatal health problems and develop preventive strategies to decrease neurological morbidity and mortality at hospital and community level including National programs.

- Know neurological end of life care and bereavement follow up.

Group/team approach:

At the end of the course, the postgraduate student should be able to:

- Recognize the role of multi-disciplinary and interdisciplinary approaches in managing various neurological disorders and recognize the importance of family, society, and socio-cultural environment in treating the sick patient.
- Function as a part of a team, co-operate with colleagues, and interact with the neonate's family to provide optimal medical care.

Evidence-based approach:

At the end of the course, the postgraduate student should be able to critically appraise medical literature in order to provide evidence-based care.

Research Methodology:

The postgraduate student should acquire:

- (a) basic knowledge of research methodology and biostatistics,

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- (b) familiarity and participation in clinical and experimental research studies, and

- (c) knowledge in scientific presentation and publication.

Skills:

At the end of the course, the postgraduate student should acquire (a) skills necessary for neurological patient care. He/She should be able to undertake preparation of oral presentation, medical documents, professional opinion in interaction with patients, caretakers, peers, and paramedical staff - both for clinical care and medical teaching. Effective communication with the patient/caretakers regarding the nature and extent of disease, treatment options, realistic outcomes, and optimal management is essential.

1.1 Predominant in Affective domain (Communication)

The PG student should:

- Acquire adequate communication skills to counsel and support the parents and families of the neurological patients. Regular clinical rounds and academic presentations during the teaching program should help the trainees to develop patient-centric and family-centric attitudes, knowledge, and communication skills.
- Establish effective communication with the patient's caregivers, including appropriate counseling for sickness, terminal illness, and bereavement care.
- Interact professionally and obtain relevant specialist/ancillary 'services' consultation where appropriate.
- Ensure effective communication and teamwork while teaching others, including undergraduates in a clinical care unit.
- Be able to communicate and work effectively with a multi-disciplinary team and understand the role of other team members including nurses, physiotherapists,

understand the role of other team members, including nurses, physiotherapists, dieticians, psychologists, and others.

- Inculcate ethical principles in all aspects of neurological, pediatric and adult, medical and surgical care/research (professional honesty and integrity, humility, moderation, informed consent, counseling, awareness of 'patients' rights and privileges) and be a role model for other health care team members and respect patient confidentiality.
- Maintain proper etiquette in dealings with patients, caretakers, and other health

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personnel, including due attention to the 'patient's right to information, consent, and second opinion. Maintain professional integrity while dealing with patients, colleagues, seniors, pharmaceutical companies, and equipment manufacturers.

- Take rational decisions in the face of ethical dilemmas in neurological practice.
- Develop a communication style - both verbal and written, to ensure that the content is accurately understood by the audience.

2.3 Predominant in Psychomotor domain (Practice)

The PG student should:

- Evaluate a patient thoroughly (history, clinical examination), order relevant investigations, and interpret them to reach a diagnosis and plan of management.
- Plan and carry out simple investigations/procedures (bedside, laboratory, imaging) independently.
- Plan and carry out Neurointerventions such as Digital Subtraction Angiography (DSA) procedures through femoral route and assist in diagnostic and therapeutic procedures such as Mechanical Thrombectomy in acute ischemic stroke with large vessel occlusion (AIS with LVO).
- Provide Basic and Advanced Life Support services in emergencies.
- Acquire familiarity with and provide critical care of post neurosurgery and neurointervention patients, including airway support, ventilation, central vascular access.
- Prepare a patient for an elective/emergency surgery and provide specific post-operative care.
- Provide counseling to the patient and primary caretakers for the smooth dispensation of medical care.
- Acquire skills in neurological procedures (including but not limited to invasive and non-invasive respiratory support, peripheral and central venous access, resuscitation, bladder catheterization, DSA, interpretation of acute stroke imaging, (ASPECTS etc), planning and preparation of nutrition (swallowing test, Tube feeds etc), insertion of chest tubes, sepsis workup, suprapubic urine sampling for culture, lumbar puncture,

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use of medical equipment such as ventilators, including high-frequency ventilation, exchange transfusion, therapeutic hypothermia, etc.).

- Monitor and manage patients in the standard ward / high dependency unit / and in the intensive care setting.
- Provide specific and relevant advice to the patient and family at discharge time for proper domiciliary care, hospital reporting in an emergency, and routine follow-up.

SUBJECT-SPECIFIC COMPETENCIES

3.1 Predominant in Cognitive (knowledge) domain:

After completing the DM (Neurology) course, the student be able to :

1. Know and analyze neurological health problems scientifically, considering the biological basis and socio-behavioral epidemiology of the neurological disease, and be able to advise and implement strategies to prevent neurological morbidity and mortality.
2. Acquire knowledge on providing evidence-based primary, secondary, and tertiary care of highest quality, including intensive care of the highest standard to the critically sick patients with neurological diseases using advanced therapeutic and supportive modalities and skills.
3. Acquire knowledge on developmental assessment of sensory and motor function of pediatric patients with neurological diseases and coordinate post discharge comprehensive follow up.
4. Acquire knowledge to be able to take rational decisions in the face of ethical dilemma in neurological practice.
5. Plan and carry out research in neurological/brain health in the clinical, community, and laboratory settings.
6. Teach basics and critical/mandatory information on common neurological diseases and neurological emergencies to the medical and the nursing students and other paramedical/community health functionaries, and develop learning resource materials.

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7. Plan, establish, and manage acute stroke, acute epilepsy, and other acute neurological emergency units independently.

8. Contribute toward the development and adaptation of neurological care technologies.

9. Organize stroke, epilepsy, dementia care in the community and at the secondary health system level and play the assigned role in the national programs aimed at

the non-communicable diseases

the non – communicable diseases.

10. Work as a focal point for a multi-disciplinary endeavor for clinical care, education, research, and community action with other stakeholders and partners.
11. Seek and analyze new literature and information on neurology, update concepts, and practice evidence-based neurology.
12. Lead development of quality improvement projects & develop standard care practices/ protocols for the unit.
13. Develop skills to train nurses in key components of essential neurological care.

3.2 Predominant in Affective domain (communication and values)

During the course of three years, the postgraduate student is expected to attend instructive courses that facilitate proficiency relevant to this domain (eg., communication skills, biomedical ethics, patient counseling).

After completing the DM (Neurology) course, the student should be able to do the following:

- Have empathy for patients and their family and should address them as worthy human beings.
- Discuss options, including the advantages and disadvantages of each investigation and treatment. She/he should be able to discuss medical issues with them in 'layperson's language'.
- Become **confident communicator** and well-accomplished professional.
- Acquire communication skills to be able to debate & deliver a scientific lecture and participate in panel discussions, hold group discussions and be able to deliver the knowledge received by him/her during the course.

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- Be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealing with patients, relatives, and other health personnel and respect the patient's rights, including the right to information and second opinion.
- Acquire communication skills of a high order to write reports, interact with peers, and paramedical staff, and with students for effective teaching.
- Demonstrate humane and compassionate attributes befitting a caring neonatologist.
- Acquire communication skills to give a professional opinion and interact with patients and relatives in a caring manner.

3.3 Predominant in Psychomotor domain (skills)

A. At the end of the course, the student should acquire the following skills (table 1):

Table 1: Must know, desirable to know and observed skills

Must know skills <i>These are mandatory skills. The student should be able to perform the following procedures independently:</i>	Desirable skills <i>These are good to know skills. The student should be able to perform the following procedures independently or as a part of a team and/or interpret the results of:</i>	Observed skills <i>These are mandatory skills but need to be ONLY observed</i>
Common neurological procedures to be performed: 1. Lumbar puncture: 15 2. Muscle and nerve biopsy: 5 3. CSF tap test for NPH: 5 4. Nerve conduction studies and interpretation: 100 5. EMG and interpretation: 100 6. EEG and interpretation: 250 7. Interpretation of VEEG: 75 8. Interpretation of PSG and Sleep titration: 25 9. Endotracheal intubation: 50 10. Perform Digital Subtraction Angiography: 10 11. Oro/nasogastric tube insertion: 75 12. Central venous line insertion: 75 13. Interpretation of VEP/BAER/SSEP: 250 14. Interpretation of acute stroke imaging: 150 15. Interpretation of cerebral angiogram: 100 16. Botulinum Toxin injection for Movement Disorders such as Blepharospasm, Hemi facial Spasm, Meigs Syndrome: 50 17. Application of CPAP: 20 18. Intravenous cannulation: 100 19. Peripheral arterial cannulation: 200 20. Arterial stab sampling: 50 21. TCD for stroke patients : 50 Laboratory investigations	1. Assessment Tools: NIHSS/MRS ADL Scores UPDRS Cognitive Scales EDSS 2. Botulinum Toxin injection for Spasticity, Vocal cord dystonia, other rarer conditions	1. Observe neurological surgery 2. Observe Epilepsy surgery 3. Observe DBS 4. Observe house-keeping protocols and asepsis routines of individual units.

22. Perform the following basic tests in the side lab: microscopy of CSF and peripheral smear, point of care screening tests. and blood gas analysis.		
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Skills Training and Simulation (All medical colleges are mandated to have

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simulation labs by NMC)

- The postgraduate students are encouraged to utilize low and hi-fidelity mannequins; individual task trainers are to be made available in the department for skill practice.
- Sessions in workshop mode are specially organized for new trainees to teach interventional procedures such as cerebral angiography, interpretation of neuroimaging mandatory for treatment of acute stroke; intractable epilepsy work up, electrophysiological procedures, and Botulinum toxin injections etc.
- Simulation sessions on team training and communication also must be organized.

B. Should be able to interpret the results of the following procedures and take necessary action:

- Biophysical profile, interpretation of genetic tests, interpret metabolic screen/diagnosis.
- Interpretation of cranial CT scan (both NCCT and CECT), MRI (T1 weighted, T2-weighted, DWI and flair); basic interpretation of FDG-L-dopa PET-CT scan interpretation of electrophysiological tests (BERA, VEP, aEEG); use of wide-angle cameras to image retina for ROP.
- Participate in morbidity and mortality review (death audits).

C. The student should be able to observe or perform under supervision the following procedures –desirable skills:

- Community-based death surveillance and audit
- Partnership with IT for newer and simpler LMIC specific technology innovation
- Systematic reviews

TRAINING OBJECTIVES OF POST-GRADUATE TRAINING EXPECTED FROM STUDENTS AT THE END OF POST GRADUATE TRAINING AS RECOMMENDED BY THE NMC

1: Acquire comprehensive knowledge of the basics of Neurology including all allied specialities related to Neurology like Neuroanatomy, Neurophysiology,

Neurochemistry, Neuropharmacology, Neuroimaging, Neuropathology, Neuroinfections, Neuroimmunology, Preventive Neurology, Neuroepidemiology, Paediatric Neurology and Neurosurgery.

SKILLS

- 2: Possess complete Clinical Diagnostic Skills for the recognition of common Nervous system diseases.
- 3: Possess a complete knowledge of all the commonly used Neurophysiological diagnostic Tests like Electroencephalography, Electroneurography, Electromyography, Cerebral evoked potentials.
- 4: Acquire skills in the performance and interpretation of special investigations such as Polysomnography, Video EEG monitoring, EEG-Telemetry, autonomic function tests, Transcranial Doppler tests
- 5: Acquire skills in interpretation of common neuroimaging investigations such as CT scanning, MRI scanning, MR and Digital subtraction angiography, Myelography, MR spectroscopy and Single Photon Emission Computerised Tomography.
6. Acquire skills in invasive procedures such as lumbar puncture, intrathecal drug administration, CSF manometry; performing digital subtraction angiography, intra venous and intraarterial thrombolysis; assisting in endovascular thrombectomy in acute ischemic stroke, and Nerve and muscle biopsy and their interpretation of relevant histopathology;
7. Acquire exposure in sophisticated neuromodulation procedures such as planning of deep brain stimulation, vagal nerve stimulation;.
8. Able to apply sound clinical judgement and recommend rational cost effective investigations for the diagnosis and management of Neurology cases in the OPD, Wards, Emergency Room and Intensive Care unit.

SYLLABUS

Course contents

AIM:

To produce specialists with necessary skills, judgement and sense of dedication

to tackle all major and minor cardiac problems. The candidates will be trained in all aspects of Neurology starting from Basic Sciences to recent advances.

PAPER I: BASIC SCIENCES RELATED TO NEUROLOGY

NEUROANATOMY

The Neuroanatomy with special emphasis on development of:

- Neuroaxis (brain, spinal cord and neurons and glia),
- Autonomic nervous system and their maturation process in the post-natal, childhood and adolescent states;
- Location and significance of stem cells,
- CSF pathways,
- Blood supply and sino venous drainage of brain and spinal cord, the meninges,
- Skull and vertebral column, the cranial nerves, spinal roots, plexuses, and their relation to neighboring structures;
- Anatomy of peripheral nerves,
- Neuromuscular junction and muscles;
- Histology of cerebrum, cerebellum, pituitary gland, brain stem and spinal cord, nerves and neuromuscular junction and muscle.
- Functional anatomy of lobes of cerebrum and white matter tracts of brain and spinal cord, craniovertebral junction, conus and epiconus and cauda

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equina, brachial and lumbosacral plexuses, cavernous and other venous sinuses;

- New developments in understanding of:
 - Ultrastructural anatomy of neurons,
 - axonal transport,
 - neural networks and synapses and nerve cell function at molecular level.

NEUROPHYSIOLOGY

- Neurophysiology will cover all the physiological changes in the nervous system during its normal function with special reference to nerve impulse transmission along myelinated fibers,
- neuromuscular junction and synaptic transmission,
- muscle contraction;
- visual, auditory and somatosensory and cognitive evoked potentials;

- Regulation of secretions by glands, neural control of viscera such as heart, respiration, GI tract, bladder and sexual function; sleep-wake cycles;
- Maintenance of consciousness,
- special senses,
- control of functions of (a) pituitary, (b) autonomic system (c) cerebellum, (d) and extrapyramidal functions,
- reflexes,
- upper and lower motor neuron concepts and sensory system.

MOLECULAR BIOLOGY

Brain is the one structure where maximum genes are expressed in the human

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body. The topics include:

- Principles of molecular biology including Gene Structure, Expression and regulation;
- Recombinant DNA Technology;
- PCR Techniques,
- Molecular basis for neuronal and glial function,
- Molecular and cellular biology of the membranes and ion-channels,
- Mitochondrial genome,
- Role of RNA in normal neuronal growth and functional expression,
- Receptors of neurotransmitters,
- Molecular and cellular biology of muscles and neuromuscular junction, etc.
- The Human Genome and its future implications for Neurology including developmental and neurogenetic disorders,
- bioethical implications and genetic counselling,
- Nerve growth and other trophic factors and neuroprotectors,
- Neural Tissue modification by genetic approaches including Gene Transfer, stem cell therapy etc.
- Molecular Development of neural tissue in peripheral nerve repair

NEUROCHEMISTRY

- All aspects of normal and abnormal patterns of neurochemistry including:

- Neurotransmitters associated with different anatomical and functional areas of brain and spinal cord, especially with respect to dopaminergic, serotonergic, adrenergic and cholinergic systems,
- Opioids,
- Excitatory and inhibitory amino acids and their role in pathogenesis of

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Parkinsonism, depression, migraine, dementia, epilepsy,

- Neuromuscular junction and muscle contractions,
- Carbohydrate, amino acid and lipid metabolism,
- Neural expression of disorders of their metabolism,
- Electrolytes and their effect on encephalopathies,
- Muscle membrane function, storage disorders,
- Porphyria.

NEUROPHARMACOLOGY

- Application of neuropharmacology in medical therapy of epilepsy, Parkinsonism, movement disorders, neuropsychiatric syndromes, spasticity, pain syndromes, disorders of sleep and dysautonomia syndromes.
- Antiepileptic drugs, usage during disorders of renal, hepatic function and in dementia.
- Adverse drug reactions of common drugs used in Neurological disorders including antiepileptic drugs, antiplatelets, anticoagulants etc.

NEUROPATHOLOGY

- Pathological changes in various neurological diseases with special reference to vascular, immune-mediated, demyelinating and dysmyelinating, metabolic and nutritional, genetic and developmental, infectious and iatrogenic and neoplastic etiologies and clinical correlation.
- Pathological changes in nerve and muscle in neuropathies and myopathies.
- Ultrastructural pathology such as apoptosis, ubiquitinopathies,

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mitochondrial diseases, channelopathies, peroxisomal disorders, inclusion bodies, prion diseases, disorders mediated by antibodies against various cell and nuclear components, paraneoplastic disorders etc.

NEUROMICROBIOLOGY

Microbiological aspects of infectious neurologic diseases including:

- Encephalitis, meningitis, brain abscess, granulomas, myelitis, cold abscess, cerebral malaria, parasitic cysts of nervous system, rhino cerebral mycoses, leprous neuritis, neuro leptospirosis, primary and secondary Neuro HIV infections, congenital TORCH infections of brain, slow virus infections such as CJD and SSPE.
- Neurological complications of viral infections such as Polio, EBV, Chickenpox, Rabies, Herpes, Japanese encephalitis and other epidemic viral infections.

NEUROTOXICOLOGY

Diagnosis and effective therapy of:

- Organophosphorus poisoning,
- hydrocarbon poisoning,
- lead, arsenic, botulinum toxin and tetanus toxicity,
- snake, scorpion, spider, wasp and beestings.

NEUROGENETICS AND PROTEOMICS:

- Autosomal dominant and recessive and X-linked inheritance patterns,
- disorders of chromosomal anomalies,
- Gene mutations, trinucleotide repeats, dysregulation of gene expressions,
- Enzyme deficiency syndromes,

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- Storage disorders,
- Disorders of polygenic inheritance,
- Proteomics in health and disease.

NEUROEPIDEMIOLOGY:

- Basic methodology in community and hospital based neuro-

epidemiological studies such as systematic data collection, analysis, derivation of logical conclusions,

- Concepts of case-control and cohort studies, correlations,
- Regressions and survival analysis,
- Basic principles of clinical trials.

PAPER II: CLINICAL NEUROLOGY INCLUDING PEDIATRIC NEUROLOGY and NEUROPSYCHIATRY.

GENERAL EVALUATION OF THE PATIENT

- The science and art of history taking,
- Physical examination including elements of accurate history taking, symptoms associated with neurological disease,
- Physical examination of adults, children, infants and neonates, syndromes associated with congenital and acquired neurological disease, cutaneous markers,
- Examination of unconscious patients,
- Examination of higher mental functions, cranial nerves, the ocular fundus,
- Examination of tone, power of muscles,

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- Proper elicitation of superficial and deep reflexes including alternate techniques,
- Neonatal and released reflexes,
- Neurodevelopmental assessment of children, sensory system, peripheral nerves, signs of Meningeal irritation, skull and spine examination including measurement of head circumference, shortness of neck and carotid pulsations .and vertebral bruits.

DISTURBANCES OF SENSORIUM

- Pathophysiology and diagnosis of COMA,
- Diagnosis and management of coma, delirium and acute confusional states, reversible and irreversible causes,
- Persistent vegetative states and brain death,
- Neurophysiological evaluation and confirmation of these states,
- Mechanical ventilation and other supportive measures of comatose

patient,

- Prevention of complications of prolonged coma,
- The significance of timely brain death in organ donation and ICU resource utilization.

SEIZURES and EPILEPSY and SYNCOPÉ

- Diagnosis of seizures, epilepsy and epileptic syndromes,
- Recognition, clinical assessment and management of seizures especially their electrodiagnosis, video monitoring with emphasize on phenomenology and their correlation with EEG,
- Structural and functional brain imaging such as CT and MRI and fMRI and SPECT scan,
- Special situations such as epilepsy in pregnant and nursing mothers,

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driving, risky occupations, its social stigmas differentiation from pseudo seizures,

- Use of conventional and newer antiepileptic drugs, their drug interactions and adverse effects etc.,
- Modern lines of management of intractable epilepsies, such as ketogenic diet, vagal nerve stimulation, epilepsy surgery,
- Pre-surgical evaluation of patients,
- Management of status epilepticus and refractory status epilepticus,
- Differentiation of seizures from syncope, drop attacks, cataplexy, startles etc.

HEADACHES and OTHER CRANIAL NEURALGIAS

- Acquisition of skills in analysis of headaches of various causes such as those from raised intracranial pressures, migraines, cranial neuralgias, vascular malformations,
- Meningeal irritation, Psychogenic etc. and their proper pharmacologic management.

CEREBROVASCULAR DISEASES

- Vascular anatomy of brain and spinal cord,
- Various causes and types of cerebrovascular syndromes, ischemic and hemorrhagic types, arterial and venous types, anterior and posterior

circulation strokes,

- OCSP and TOAST classifications,
- Investigation of strokes including neuroimaging using Dopplers,
- CT and MR imaging and angiography, acute stroke therapy including thrombolytic therapy,

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- Interventional therapy of cerebrovascular diseases,
- Principles of management of subarachnoid hemorrhage etc.
- Special situations like strokes in the young, strategies for primary and secondary prevention of stroke.

DEMENTIAS

- Concept of minimal cognitive impairment,
- Reversible and irreversible dementias, causes such as Alzheimer's and other neurodegenerative diseases and vascular and nutritional and infectious dementias, their impact on individual, family and in society.
- Genetic and familial syndromes.
- Pharmacotherapy of dementias, potential role of cognitive rehabilitation and special care of the disabled.

PARKINSONISM AND MOVEMENT DISORDERS

- Disorders of extrapyramidal system such as Parkinsonism, chorea, dystonia, athetosis, tics, their diagnosis and management,
- Pharmacotherapy of Parkinsonism and its complications,
- management of complications of Parkinsonism therapy, including principles of deep brain stimulation and lesion surgeries.
- Use of EMG guided botulinum toxin therapy,
- Management of spasticity using intrathecal baclofen and TENS.

ATAXIC SYNDROMES:

- Para infectious demyelination, cerebellar tumors, hereditary ataxias, vestibular disorders,
- Diagnosis and management of brainstem disorders,
- Axial and extra-axial differentiation.

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CRANIAL NEUROPATHIES:

- Disorders of smell, vision, visual pathways, pupillary pathways and reflexes,
- Internuclear and supranuclear ophthalmoplegia,
- Other oculomotor disorders,
- Trigeminal nerve testing,
- Bell's palsy,
- Differentiation from UMN facial lesions,
- Brain stem reflexes,
- Investigations of vertigo and dizziness,
- Differentiation between central and peripheral vertigo,
- Differential diagnosis of nystagmus,
- Investigations of deafness, bulbar and pseudobulbar syndromes.

CNS INFECTIONS:

- Diagnosis and management of viral encephalitis, meningitis bacterial, tuberculous, fungal, parasitic infections such as cysticercosis, cerebral malaria, SSPE, Neuro HIV primary and secondary infections with exposure to gram stain and cultures, bac tec, QBC, ELISA and PCR technologies.

NEUROIMMUNOLOGIC DISEASES

- Diagnosis and management of CNS conditions such as Multiple Sclerosis, PNS conditions such as GBS, CIDP, Myasthenia gravis, polymyositis.

NEUROGENETIC DISORDERS

- Various chromosomal diseases,
- Single gene mutations such as enzyme deficiencies,
- Autosomal dominant and recessive conditions and X-linked disorders, trinucleotide repeats,
- Disorders of DNA repair. Genetics of Huntington's disease, familial

dementias, other storage disorders, hereditary ataxias,

- Hereditary spastic paraplegias, HMSN, muscular dystrophies, mitochondrial inheritance disorders.

DEVELOPMENTAL DISORDERS OF NERVOUS SYSTEM

- Neuronal migration disorders,
- Craniovertebral junction diseases,
- Spinal dysraphism,
- Phacomatoses and other neurocutaneous syndromes- their recognition and management.

MYELOPATHIES

- Clinical diagnosis of distinction between compressive and non-compressive myelopathies,
- Spinal syndromes such as anterior cord, subacute combined degeneration,
- Central cord syndrome,
- Brown-Sequard syndrome,
- Tabetic syndrome,
- Eellsberg phenomenon.
- Diagnosis of spinal cord and root compression syndromes,
- CV junction lesions,

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- Syringomyelia, conus cauda lesions,
- Spinal AVMs,
- tropical and hereditary spastic paraplegias,
- Fluorosis.

PERIPHERAL NEUROPATHIES

- Immune mediated, hereditary, toxic, nutritional and infectious type peripheral neuropathies; their clinical and electrophysiological diagnosis.

MYOPATHIES AND NEUROMUSCULAR JUNCTION DISORDERS

- Clinical evaluation of patients with known or suspected muscle diseases aided by EMG,
- Muscle pathology, histochemistry, immunopathology and genetic studies,
- Dystrophies polymyositis channelopathies congenital and

- Dyshreflexes, polyomyelitis, Charcot-Marie-Tooth disease, congenital and mitochondrial myopathies,
- Neuromuscular junction disorders such as myasthenia, botulism, Eaton-lambert syndrome,
- Snake and organophosphorus poisoning, their electrophysiological diagnosis and management.
- Myotonia, stiff person syndrome.

PAEDITRIC NEUROLOGY:

- Normal development of motor and mental milestones in a child, Cerebral palsy,
- Attention deficit disorder,
- Autism,
- Developmental dyslexia,

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- Intrauterine TORCH infections,
- Storage disorders,
- Inborn errors of metabolism affecting nervous system,
- Developmental malformations,
- Child hood seizures and epilepsies,
- Neurodegenerative diseases.

COGNITIVE NEUROLOGY AND NEUROPSYCHIATRY:

- Detailed techniques of higher mental functions evaluation,
- Basics of primary and secondary neuropsychiatric conditions such as anxiety, depression, schizophrenia, acute psychosis, acute confusional reactions (delirium), organic brain syndrome,
- Primary and secondary dementias, differentiation from pseudodementia.

TROPICAL NEUROLOGY

Conditions which are specifically found in the tropics like to be taught in detail;

- Neuro-cysticercosis,
- Cerebral malaria,
- Tropical spastic paraplegia,
- Snake/scorpion/ Chandipura
- Encephalitis,
- Madras Motor Neuron disease etc

PAPER III: DIAGNOSTIC and INTERVENTIONAL NEUROLOGY INCLUDING NEUROLOGICAL INSTRUMENTATION, DIAGNOSTIC NEUROLOGY

- Performing and interpreting Digital Electroneurogram, Electromyogram,

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- Evoked potentials, Electroencephalography,
- Interpretation of skull and spine X-rays,
- Computerized tomography of brain and spine,
- Magnetic resonance images of brain including correct identification of various sequences, angiograms, MR spectroscopy,
- Basics of functional MRI,
- Interpretation of digital subtraction imaging, SPECT scans of brain, subdural EEG recording, transphenoidal electrode EEG techniques for temporal lobe seizures,
- video EEG interpretation of phenomenology and EEG-phenomenology correlations,
- EEG telemetry,
- Transcranial Doppler diagnosis and monitoring of acute ischemic stroke,
- Subarachnoid hemorrhage,
- Detection of right-to-left shunts etc;
- Color duplex scanning in Carotid and vertebral extracranial segment screening.

NEUROINSTRUMENTATIONS

Acquire skills in procedures like:

- Intrathecal administration of antispasticity drugs, beta interferons in demyelination, opiates in intractable pain etc.,
- EMG guided Botox therapy for dystonia,
- Subcutaneous administration of antimigraine and antiparkinsonian drugs,
- Intraarterial thrombolysis in extended windows of thrombolysis in ischemic strokes,
- Transcranial Ultrasound clot-bust intervention in a registry in acute stroke

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care unit,

- Planning in deep brain stimulation therapy in uncontrolled dyskinesias and on-off phenomena in long standing Parkinsonism,
- Planning in vagal nerve stimulation in intractable epilepsy.

PAPER IV:

RECENT ADVANCES IN NEUROLOGY:

ADVANCES IN NEUROIMAGING TECHNIQUES, BIONICS IN NEURAL PROSTHESIS and REHABILITATION, NEUROPROTEOMICS and NEUROGENETICS, STEM CELL and GENE THERAPY

ADVANCES IN NEUROIMAGING TECHNIQUES:

- Integration of CT, MR, SPECT, and PET images with each other and with EEG.
- EVOKED potentials based brain maps in structural and functional localization in neurological phenomena and diseases.
- DSA interpretation and diagnosis.

BIONICS IN NEURAL PROSTHESIS AND REHABILITATION:

- Advanced techniques in neuro-rehabilitation such as TENS, principles of man-machine interphase devices in cord, nerve and plexus injuries, cochlear implants, artificial vision.

NEUROPROTEOMICS AND NEUROGENETICS:

Brain functions are regulated by proteomics and genomics linked to various proteins and genes relevant to the brain, body's maximum number of proteins and genes being expressed in brain as neurotransmitters or channel proteins and predisposing brain to a number of disorders of abnormal functioning of these proteins.

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STEM CELL AND GENE THERAPY:

- Principles of ongoing experiments on stem cell therapy for nervous system disorders such as foetal brain tissue transplants in parkinsonism; intrathecal marrow transplants in MND, MS, Spinal trauma; myoblasts infusion therapy in dystrophies.

NEUROEPIDEMIOLOGICAL STUDIES AND CLINICAL TRIALS:

The students of the DM course will be trained in conducting sound Neuro-epidemiology studies on regionally and nationally important neurological conditions as well as on diseases of scientific and research interest to the department. They will also be trained in principles of clinical trials.

Essential Practical Knowledge

1. Online certification in Research Methodology Course
2. Certification of NIHSS, MRS, mBI, EDSS
3. Interpretation of acute stroke imaging
4. Performance of cerebral angiography and interpretation of DSA
5. Performance of TCD
6. Performance and interpretation of electrophysiological tests

TEACHING AND LEARNING METHODS

Postgraduate teaching program

General principles

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Acquisition of practical competencies being the keystone of postgraduate medical education, PG training should be skills-oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

Teaching Methodology

The postgraduate student should be given the responsibility of managing and caring for patients gradually under supervision.

Formal teaching sessions and learning opportunities

A. Intramural activities

Teaching and learning during bedside rounds of various areas, case discussions in NICU, wards by self-reflection, and follow up clinics are mainstays. Several organized learning experiences should be provided to the students to facilitate the refinement of knowledge and skills. Students are expected to actively participate in the teaching program of the department and allied specialties within the department and other departments of the institute. They get regular opportunities to prepare and make presentations in these teaching programs.

Following formal sessions are recommended in order to facilitate learning* :

- Journal club (once 15 days)

- Perinatal round (once 15 days)
- Seminar (once 15 days)*
- Clinical case discussion (once 15 days)
- Perinatal audit/CPC (once a month)
- Research review (once a month)
- Neonatal surgery (once 3 month)

**In addition, depending on the strength of the institutions, sessions on imaging, pathology, microbiology, biostatistics/epidemiology, and interdepartmental seminars may be undertaken. The list of seminar topics is given in Annexure I.*

B. Extramural opportunities

The postgraduate students are encouraged to attend continuing education symposia, workshops, and academic conferences, including meetings of national and international societies, workshops.

Learning by Teaching

The students will participate in teaching junior residents, nurses, nursing students, and

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trainees from other hospitals coming for observership. They will also be given the exposure of teaching and training during workshops and CMEs organized by the faculty within the institution and outreach activities.

- In addition, the student should attend accredited scientific meetings (CME, symposia, and conferences) once or twice a year.
- A postgraduate student of a postgraduate degree course in super specialties would be required to present one poster presentation or read one paper at a national/state conference; should write a research paper from his/her work which should be published/accepted for publication/sent for publication during the period of his postgraduate studies.

C. Log Book: During the training period, the postgraduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs, and Casualty. This should indicate the procedures assisted and performed and the teaching sessions attended. The purpose of the Log Book is to:

- a) Help maintain a record of the work done during training,
- b) Enable Consultants to have direct information about the work; intervene if necessary,
- c) Use it to assess the experience gained periodically.

The Log Book should be used to aid the internal evaluation of the student. The Logbook shall be checked and assessed periodically by the faculty members imparting the training. Candidates will be required to produce the logbook original or copy at the time of practical examination. It should be signed by the Head of the Department. A proficiency certificate from the Head of Department regarding the clinical competence and skillful performance of procedures by the student will be necessary before he/she would be allowed to appear in the examination. The teaching faculty are referred to the NMC Logbook Guidelines uploaded on the Website

E. POSTINGS

Overview

The total period of the DM course is 36 months. Of this, at least 27 months will be spent in the newborn service, 6 months will be meant for essential rotations in related

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specialties, and the rest 3 months will be apportioned for either elective rotations or the newborn service.

Period of postings in various units, divisions / departments

The trainee will be posted in different specialties as follows :-

- Neurology 2 years
- Neuro-physiology 4-6 months
- Neuro-surgery 1 month
- Neuro-pathology 1 month
- Neuro-radiology 1 month
- Elective posting 2 weeks

The elective posting may consist of posting in the other institutes or own institute for training in specific fields

- Psychiatry 1 month
- Neuro-anaesthesia/ICU 1 months

During Clinical Neurology posting the trainee is required to undertake:-

- Ward work
- Consultations
- Neuro-investigations
- EEG reporting
- Out patient clinics
- Neuro-emergency

The above postings should be for a period of 2-4 months at different times over the training period. All the patients seen in the OPD by the trainee or on consultation are to be shown by him/her to the consultants and management planned.

F. Patient safety

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories

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in medical colleges is mandatory.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training program: Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning, and ability to practice in the system.

Periodic Evaluation:

Candidates will be evaluated continuously for their performance in all areas such as clinical and investigative work, case presentations, seminars, journal clubs, procedures undertaken/participated in etc. Additional periodic assessment will include theory and practical assessment mimicking the final examination and should be conducted every 6 months. Such an evaluation will help assessing the progress of the trainees and the quality of the training programme. Evaluation will be communicated to trainees and their feedback would be taken into consideration for modifications in the training programme.

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

Quarterly assessment during the DM training should be based on:

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self-directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs/Workshops/Conferences**
- 6. Participation/conduct of research project - desirable**

Regular internal assessment will be made on day to day work of the trainee which involves patient's care, learning, bed side care presentation and research. Grading is done every six months and final assessment will be made at the end of training period.

In **Medical disciplines**, the student should be assessed in all aspects of case management

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including history taking, physical examination, differential diagnosis, cost effective and appropriate investigations, treatment plan, monitoring and evaluation, patient and family counselling and interaction with all the health workers involved in the care of patients and academic presentations.

Clinical skills and performance, academic performance and personal attributes shall be graded on a scale of 1 to 5 (5 being the highest). The academic presentations shall be graded

at the time of presentation, by the faculty in-charge. Evaluation on clinical skills shall be done by the unit/department in-charge at the end of every semester.

The student to be assessed periodically as per categories listed in post graduate student appraisal form (Annexure II).

SUMMATIVE ASSESSMENT

The summative examination would be carried out as per the Rules given in the relevant POSTGRADUATE MEDICAL EDUCATION REGULATIONS.

Essential pre-requisites for appearing for examination include:

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. At least one research paper should be published/ accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**
3. **Submission of thesis/ research work (desirable: As per PG Regulations)**

1. Theory

There shall be four theory papers:-

Paper I: Basic sciences as related to Neurology (This should include anatomy, physiology, Pathology, biochemistry, pharmacology and genetics as applicable to neurology)

Paper II: Clinical Neurology (This should include all aspects of clinical neurology
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i.e. diagnosis, management, therapeutics, approach to clinical situations)

Paper III: Investigative Neurology (This should include all the investigative procedures i.e. electrophysiology, imaging, neuropathology, magneto-encephalography etc)

Paper IV: Recent advances in Neurology (This should include recent advances in neurosciences including genetics, immunology, therapeutics, pathophysiology etc)

Theory and Practical/Oral Examinations: Theory and Practical/Oral examinations will be conducted as per University guidelines. The theory examination shall be held in advance before the clinical and practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/practical/oral examination.

The practical examination should consist of the following and should be spread over two days, if the number of candidates appearing is more than five. Oral examination shall be comprehensive enough to test the student's overall knowledge of the subject.

This will consist of:

- 1. Up to 10 spotters for Objective Structured Clinical Examination (OSCE) pattern**
- 2. Two clinical cases**

The candidates shall also be given EEG, Pathology specimens, histology slides and neuro-radiology for interpretation, followed by Viva Voce.

The clinical examination and viva-voce will last for not less than two days

1. There should be one long or semi-long case which must be on acute care of a sick neonate. The long case should include: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
2. Three short cases from various sections of the specialty.
3. The log book of procedures and interventions shall also be assessed in the practical examination.

Annexure I

List of seminars

Following is the list of essential seminars which a postgraduate student is required to attend during the three years. Other relevant topics may be included from time to time:-

- Neuron
- Synapse
- Neuroglia
- Cerebral cortex - anatomy and physiology
- Frontal lobe
- Parietal lobe
- Temporal lobe
- Occipital lobe
- Limbic system
- Thalamus
- Basal Ganglia
- Cerebellum
- C.S.F. formation, composition and dynamics
- Cerebral circulation
- Cerebral oedema
- Cerebral perfusion
- CSF & ICP physiological considerations
- Spinal cord circulation
- Spasticity – Pathophysiology
- Rigidity – Pathophysiology
- Tremors
- Myoclonus

- Genesis of E.E.G.
- Ontogenesis of E.E.G.
- EMG routine, F. wave, H. reflex
- EMG recent advances:
 - Evoked potentials – General and Auditory
 - Visual and somatosensory evoked response and event related potentials
 - Basic principles and clinical application of computed tomography
 - Epilepsy – Pathophysiology
 - Epilepsy – Neurochemistry
 - Epilepsy – Management
 - Temporal lobe epilepsy – theory, recent controversy and management
 - Surgery in epilepsy
 - Supra nuclear control of ocular movements
 - Nystagmus
 - Sleep
 - Central speech disorders
 - Mechanism of memory
 - Dementia – Pathophysiology and approach
 - Mechanism and Neurochemistry of pain
 - Immunological and immune related disorders of nervous system
 - Myasthenia gravis – pathophysiology and treatment
 - Slow virus infections of CNS
 - Radiotherapy, immunotherapy and chemotherapy of CNS malignancy
 - MRI – Principles and clinical application

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- Spinal dysraphism
- PET - Principles and clinical application
- Hypertension and brain
- Neurolipidosis – biochemical aspect
- Neurolipidosis – clinical aspect
- Subarachnoid haemorrhage – Presentation and management

- Muscular dystrophies – Current concepts
 - Stroke – Current aspect of aetiopathogenesis
 - Stroke management – Medical / Surgical
 - Wilson’s disease
 - Demyelinating diseases in India
- Functional Imaging in Neurology
 - Neuromuscular Channelopathies
 - Neurology of pain/migraine
 - Neurology of emotions
 - Neurointervention in Stroke
 - Approach to intracranial granulomatous disorders
 - Neurology of HIV infection
 - Neuroprotection in Stroke – An update
 - Update on Aphasias
 - Statins in Neurological disorders
 - Neuromuscular Junction- Physiology and Pathophysiology
 - Stem cells in Neurology

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- Epileptogenesis
- Multiple Sclerosis – Pathophysiology
- Multiple Sclerosis – Therapeutic update
- Ultrasound in Neurology
- Pathophysiology of Mitochondrial disorders (including genetics)
- Excitotoxicity in Neurological Disorders
- Disorders of sleep (Including parasomnias)
- Parkinsonism – Pathophysiology and treatment
- Peripheral nerve – Biochemistry and Physiology
- Skeletal muscle – Ultra, Structure and Biochemistry
- Surgery in Parkinson’s disease and related disorders

2.5	Ability to record and document work accurately and appropriate for level of training													
2.6	Participation and contribution to health care quality improvement													

3	Professional attributes													
3.1	Responsibility and accountability													
3.2	Contribution to growth of learning of the team													
3.3	Conduct that is ethical appropriate and respectful at all times													
4	Scholarship													
4.1	Teaching and mentoring skills appropriate to level of training													
4.2	Ability to formulate research questions, initiate conduct and complete research projects													
4.3	Ability to review and use the published literature appropriately in care of the patient lab or workspace													
4.4	Ability to provide consultations to other specialties as may be required													
5	Space for additional comments													
6	Disposition													
	Has this assessment been discussed with the trainee?	Yes	No											
	If not explain													
	Name and Signature of the assessee													
	Name and Signature of the assessor													
	Date													

Subject Expert Group members for preparation of Guidelines for competency based postgraduate training programme for DM in Neurology

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MCh Courses

**NATIONAL MEDICAL COMMISSION
Postgraduate Medical Education Board**

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**GUIDELINES FOR COMPETENCY
BASED
POSTGRADUATE TRAINING
PROGRAMME FOR M.Ch IN
PLASTIC & RECONSTRUCTIVE
SURGERY**

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR M.Ch. IN PLASTIC AND RECONSTRUCTIVE SURGERY

1. PREAMBLE

Plastic and Reconstructive Surgery is a unique specialty that defies definition, has no organ system of its own, is based on principles rather than specific procedures. It pertains to restoring form and functions and, in many situations, enhancing it. The scope ranges from the top of the Calvarium to the bottom of the sole. It has also been defined as a 'Problem solving specialty' - solving problems related to many other specialties. The range of Plastic and Reconstructive Surgery has expanded by leaps and bounds in the past few decades.

Thus, a structured program for a comprehensive training in the wide range of Plastic and Reconstructive surgery is the need of the hour as it would lay down the gold standard for training across all the platforms in the country. Moreover, it will also help in standardizing the training of future plastic surgeons. This comprehensive document has been prepared keeping this need in mind. The core idea all through has been to prepare a curriculum that is inclusive of theoretical knowledge, practical aspects, and the desired operative capabilities of the trainee. The document will help the teachers micromanage the nitty gritty of the daily training and teaching assignments. At the end of the 3-year training, the candidate would be equipped with vast knowledge, skills, the right aptitude to function as an independent, knowledgeable consultant, teacher and researcher.

SUBJECT SPECIFIC LEARNING OBJECTIVES

(Complete details in annexure II available with Expert Group members)

The aim of course is to produce plastic surgeons capable of setting standards and demonstrate commensurate expertise in the field. The training should aim to facilitate the candidate's acquisition of a judicious mix of the three domains of learning that will be practiced ethically: -

- Cognitive (knowledge) domain,
- Affective (communication) domain, and

- Psychomotor (practice) domain.

i. COGNITIVE DOMAIN (KNOWLEDGE DOMAIN)

- Understand the basic sciences (embryology, anatomy, physiology, biochemistry, pharmaco-therapeutics etc.) and principles of plastic surgical care as applicable to practice in plastic surgery.
 - Be conversant with the embryology, aetiology, pathophysiology, diagnosis and management of common (elective or emergency) conditions requiring plastic surgical intervention.
 - Be conversant with principles guiding care with reference to plastic surgery, aesthetic medicine and surgery and burn management.
 - **Group approach:** Recognize the role of multidisciplinary and interdisciplinary approach in the management of various conditions requiring plastic surgery so as to obtain relevant specialist consultation, where appropriate.
 - **Research Methodology:** Basic knowledge of research methodology and bio-statistics; familiarity and participation in clinical and experimental research studies; involvement in scientific presentation and publication.
- Recognize the importance of family, society and socio-cultural environment in the treatment and rehabilitation of the individual needing plastic surgery care.

ii. AFFECTIVE DOMAIN

The trainee should imbibe the following:

- **Group /Team approach:** function as a part of a team, co-operate with colleagues, and interact with the patient to provide the optimal medical care.
- **Ethical practice:** Abide by ethical principles in medical practice, maintain proper etiquette in dealings with patients, caretakers and other health personnel including due attention to the patient's right to information, consent and second opinion. Maintain professional integrity while dealing with patients, colleagues, seniors, pharmaceutical companies and equipment manufacturers.
- **Teaching and Communication:** Preparation of oral presentation, medical documents, professional opinion in interaction with patients, caretakers, peers and paramedical staff – both for clinical care and medical teaching. Effective communication with the patient/caretakers regarding the nature and extent of

disease, treatment options available and realistic outcome following optimal management is essential.

- Provide counselling to the patient and caretakers for the smooth dispensation of medical care.
- During the course of three years, the post graduate student is expected to attend instructive courses that facilitate proficiency relevant to this domain, for example, communication skills, biomedical ethics, patient counselling, teaching, etc.

iii. PSYCHOMOTOR SKILLS

- Evaluate a patient thoroughly (history, clinical examination), order relevant investigations and interpret them to reach a diagnosis and plan of management.
- Plan and carry out routine investigations/ procedures (bedside, laboratory, radiology) independently.
- Provide Basic and Advanced Life Support services in emergency according to ATLS guidelines.
- Acquire Skills to provide critical care of individuals requiring airway support, ventilation, central vascular access etc. during the course of treatment.
- Prepare a patient for an elective/emergency surgery and provide specific post-operative care.
- Acquire skills in routine ward procedures (wound dressings and peripheral vascular access).
- Acquire proficiency in prescribed minor and major operative procedures, and provide these, initially under supervision and later independently.
- Acquire proficiency in managing emergency and elective referrals and provide adequate support under supervision and later independently.
- Monitor the post-operative patient in the routine post-op ward / high dependency unit / and in the intensive care setting.
- Provide specific and relevant advice to the patient and family at discharge time for proper domiciliary care, reporting to hospital in an emergency and routine follow up.
- Acquire proficiency in teaching undergraduate students, nursing and other health care personnel.

SUBJECT SPECIFIC COMPETENCIES

(Complete details in annexure II available with Expert Group members)

At the end of the course, the student should be able to acquire the following competencies under the three domains, knowledge/skills/ expertise::

1. Cognitive domain (Knowledge domain)

A. THEORETICAL KNOWLEDGE:

Should be able to describe & discuss and synthesize knowledge of different conditions needing plastic surgical care and their diagnosis and management.

B. CLINICAL/PRACTICAL SKILLS:

Should be able to diagnose, investigate, perform surgery, manage and follow-up patients with conditions needing plastic surgical care using modern therapeutic methods.

C. TEACHING SKILLS:

Should be able to teach relevant aspects of conditions needing plastic surgical care to resident doctors, junior colleagues, nursing and para-medical staff.

D. RESEARCH METHODOLOGY:

Should be able to identify and investigate a research problem in conditions needing plastic surgical care using appropriate methodology.

E. GROUP APPROACH:

Should participate in multi-disciplinary meetings with radiologists, paediatricians, pathologists, orthopedic surgeons, rehabilitation specialists, oncologists and experts from allied clinical disciplines.

2. Affective domain (Attitudes including Communication and Professionalism)

The M.Ch. candidate, at the end of training should demonstrate the ability to:

- communicate in a professional manner the treatment plan with patients, their family and care givers,

- function as a part of a team in collaboration with other geriatric mental health care team members including those from related clinical disciplines, psychiatric nursing/occupational therapy staff and nutrition unit.
- Adopt ethical principles and maintain proper etiquette in dealing with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to word reports and professional opinion and to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

Leadership skills

- Organize team activities in the department and community on Plastic Surgery-related conditions including prevention and public awareness.
- Plan and implement group activities with health staff in the hospital and community.

Professionalism

- Accept personal responsibility for care of patients with mental health problems, consistent with good work ethics and empathy.
- Demonstrate appropriate truthfulness and honesty with colleagues.
- Recognize personal beliefs, prejudices, and limitations, which should not come in the way of providing service.
- Respect patient confidentiality at all times in verbal and written communication.

Attitude

- Respect patients' religious, moral, and ethical beliefs and biases, even if they differ from the student's own beliefs.
- Present all available options accurately to the patient and relatives.
- Be aware of the advantages and potential hazards of referring patients and families to community or to national resources.
- Recognize the limitations of their own skills and seeks consultation when necessary.
- Understand and develop sensitivity to end-of-life care and issues regarding provision of care.

Interpersonal and Communication Skills

Human Relationships

- Acquire an effective system for identifying and addressing ethical, cultural, and spiritual issues associated with health care delivery to geriatric mental health patients.
- Acquire knowledge or applies an understanding of psychological, social, and economic factors which are pertinent to the delivery of health care to geriatric mental health patients.
- Effectively engages the patient and/or family in communications which are non-judgmental and non-coercive.

3. Psychomotor domain

The list of procedures which a trainee needs to perform independently, perform under supervision, assist, and observe are given below. In addition, trainees are encouraged to improve skills by doing procedures on cadavers, surgical simulators and the surgical skills laboratory.

Sl. No	Competencies in Psychomotor Domain. At the end of the course, the trainee should be able to:
	A. Perform Independently
1.	GENERAL PRINCIPLES <ul style="list-style-type: none">• Create a consent document appropriate to the clinical care sought by a patient• Perform steps of WHO safety protocol: surgical patient safety checklist• Obtain standard views of photographs for different conditions and create a photograph logbook• Select and use appropriate dressing materials for wounds• Demonstrate wound debridement• Demonstrate application of Negative pressure wound therapy• Demonstrate the use of external tissue expansion on simulation models• Demonstrate the harvest of split skin grafts in patients• Harvest and use a full thickness skin graft• Demonstrate use of the skin graft Mesher• Identify cutaneous vascular perforators using a vascular doppler

- Demonstrate with appropriate planning, local skin flaps, pedicled skin flaps, muscle flaps, osseous flaps, free flaps, perforator flaps
- Demonstrate delay procedures
- Demonstrate secondary flap modification (eg; flap debulking)
- Demonstrate harvest of tendon, bone, cartilage for grafts
- Demonstrate the administration of local anaesthetics, Tumescant anaesthesia, nerve blocks in patients
- Demonstrate Endotracheal intubation on a patient or Simulator

MICROVASCULAR SURGERY, BRACHIAL PLEXUS, PERIPHERAL NERVE SURGERY

- Set up the microscope in the operation theatre or Laboratory.
- Clean and store the Micro instruments after use.
- Use magnifying loupes and operating microscope during surgery.
- Make a pattern of the reconstructive plan with its various components for a given defect.
- Examine, decide the management, implement, operate and rehabilitate cases of brachial plexus injuries.
- Diagnose, investigate, exploration and repair of peripheral nerves under magnification.

BURNS

- Perform escharotomy, escharectomy and fasciotomy on the limbs and trunk
- Place central venous lines in the Subclavian, Internal Jugular and Femoral veins in Paediatric and adult patients
- Should manage acute burn patients in intensive care unit including respiratory and critical burn patients.
- Set-up Central Venous pressure measuring systems
- Perform burn wound dressings
- Harvest, apply, manage split skin grafts used to resurface burn wounds
- Procure and apply allograft skin on wounds
- Perform a burn wound biopsy
- Perform dressings for hand burns
- Perform a Z-plasty to lengthen a post burn contracture band
- Release and resurface post burn contractures of various joints

- Make appropriate splints to immobilize hand burns in the functional position.
- Prescribe appropriate splint, pressure garments and exercises for acute burns and post burn deformities.

CRANIOFACIAL, CLEFT AND PEDIATRIC PLASTIC SURGERY

- Place a Nasopharyngeal Airway to maintain the upper airway
- Demonstrate the various incisions and the anatomy to approach the Craniofacial skeleton
- Demonstrate the markings for a Unilateral and Bilateral Cleft lip repair
- Apply arch bars and Intermaxillary fixation for fractures of the maxilla and mandible.

HEAD AND NECK

- Obtain biopsies from benign and malignant lesions of the head and neck
 - Incision biopsy
 - Excision biopsy
 - Core biopsy
- Perform excision biopsy of Benign lesions of the Head and neck
- Make patterns and plans for partial auricular defects
- Demonstrate the carving and shaping of a cartilage framework to reconstruct microtia.

BREAST

- Demonstrate the pre-operative markings of any one technique of reduction mammoplasty
- Perform subcutaneous excision of Gynecomastia.

HAND AND UPPER EXTREMITY

- Administer the following blocks:
 - i. Axillary
 - ii. Wrist,
 - iii. Digital
- Demonstrate the various local and cross finger flaps used in the management of Fingertip injuries
- Perform Flexor tendon repair

- Demonstrate Extensor tendon repair
- Set up the Controlled dynamic mobilization following Flexor tendon repair
- Set up the Controlled dynamic mobilization following Extensor tendon repair
- Perform amputations of the:
 - i. Thumb
 - ii. Digits
 - iii. Below elbow and Above elbow
- Drain apical space infections, Paronychia
- Perform drainage and irrigation in a case of Tenosynovitis.

TRUNK, GENITALIA, LOWER EXTREMITY

- Demonstrate the debridement of a pressure sore.
- Evaluate cases of genital abnormalities.
- Assess and manage congenital and acquired defects in the trunk.

AESTHETIC SURGERY

- Illustrate the design of a small Aesthetic surgery clinic
- Mark the important facial Anthropometric points on a given patient
- Measure the important distances and angles used for facial deformity analysis
- Write a consent format for common aesthetic surgical procedures
- Record photographs of the face, nose, ears, peri-orbital region, malar region, breasts, trunk, arms, thighs, and calves in standard views for documentation
- Administer regional and local anaesthesia to patients undergoing Aesthetic surgery
- Measure the vertical height of the skull, forehead, midface, and lower face
- Measure the Intercanthal distance, Palpebral fissure length, Inter-alar distance, Commissure length
- Measure the width of the skull, forehead, face at the zygoma and mandibular angle
- Measure the nasofrontal & nasolabial angles
- Calculate the Cephalic index
- Draw RSTLs on the Face and other areas

	<ul style="list-style-type: none"> • Demonstrate the pinch test to identify RSTLs • Plan incisions on the face and other parts based on the RSTLs • Perform a Z-plasty and scar revision using the Z-plasty principle • Prepare tumescent fluid to be used to infiltrate the abdomen, thighs and arms • Perform ear lobe repair for partial and complete tears.
<p align="center">B. Perform under supervision</p>	
	<p>GENERAL PRINCIPLES</p> <ul style="list-style-type: none"> • Demonstrate placement of suitable tissue expanders in clinical cases. <p>MICROVASCULAR SURGERY, BRACHIAL PLEXUS, PERIPHERAL NERVE SURGERY</p> <ul style="list-style-type: none"> • Demonstrate dissection of recipient and donor vessel for microvascular anastomosis • Demonstrate the steps of a microvascular anastomosis and choose the appropriate instruments • Demonstrate tests to assess arterial and venous patency after microvascular transfer • Demonstrate perforator-based flap elevation in a cadaver: • Perform Neuroorrhaphy • Harvest a Sural/ Superficial peroneal/ forearm cutaneous nerve graft • Demonstrate the anatomy of common sites for Compression of the Ulnar, Median, Radial, Sciatic, common Peroneal and Posterior Tibial nerves. <p>BURNS</p> <ul style="list-style-type: none"> • Plan and participate in a mock drill to manage mass casualties from a major burn accident • Participate in the early excision and resurfacing of burn wounds • Perform various limb and digit amputations in deep electric burns • Plan and perform flexion, extension, first web contracture release, syndactyly release and resurfacing in chronic hand burns

- Perform release, resurfacing of a post burn neck contracture and make a post-operative splint for immobilization
- Perform contracture release and resurfacing of post burn contractures over various joints
- Resurface Facial burns according to the Aesthetic units of the face.

CRANIOFACIAL, CLEFT AND PEDIATRIC PLASTIC SURGERY

- Dissect the parotid gland and the Facial Nerve branches in the face
- Demonstrate the Bicoronal and subciliary incisions used to expose the skull and orbit
- Take a tongue stitch to prevent Glossoptosis
- Perform nasal bone reduction and make an external nasal splint for a patient
- Demonstrate the anatomy of the TMJ
- Mark incision for cleft palate repair and dissect.

AESTHETIC SURGERY

- Create a digital archiving system for storing patient data
- Perform liposuction and prepare a sample for micro fat grafting in a patient.

C. AS: Assist, OB: Observe, CAD: Cadaver, LAB: Laboratory, SIM: Surgical Simulator

GENERAL PRINCIPLES

- Perform submental intubation in a patient or cadaver
- Perform tracheostomy in a patient or cadaver
- Demonstrate the use of power tools
- Demonstrate perforator-based flap elevation in a cadaver:
 - i. TDAP and latissimus dorsi
 - ii. Scapular and Parascapular
 - iii. DIEP
 - iv. SGAP and IGAP
 - v. Gracilis
 - vi. Fibula and peroneal perforator flap
 - vii. Posterior tibial perforator flap.

MICROVASCULAR SURGERY, BRACHIAL PLEXUS, PERIPHERAL NERVE SURGERY

- Demonstrate the anatomy of the digit
- Demonstrate the macro anatomy of the upper limb at the arm, forearm and hand
- Demonstrate the anatomy of the lower limb at the level of the thigh, leg, and foot
- Demonstrate the neurovascular anatomy of the scalp
- Demonstrate use of anastomotic coupler devices in the Laboratory
- Demonstrate the topographic anatomy of the Ulnar, Median, Radial nerves in the mid arm, upper, mid and lower forearm
- Demonstrate the anatomy of the Brachial Plexus
- Demonstrate the Spinal accessory to Suprascapular, Triceps branch to axillary, Ulnar fascicle to Biceps nerve, Median fascicle to Brachialis nerve, and Intercostal to Musculocutaneous nerve
- Demonstrate the anatomy of the Fallopian tubes
- Demonstrate the anatomy of the Vas Deferens
- Perform superficialization of the Brachial artery prior to performing an AV fistula.

BURNS

- Place naso-gastric and naso-jejunal feeding tubes
- Participate in the respiratory and nursing care of a patient with MODS, on the ventilator
- Participate in the post-operative monitoring and care of a patient with burns after General anaesthesia
- Demonstrate Subclavian and Femoral artery ligation an electrical burn.
- Participate in primary excision and tangential excision of burns.
- Harvest split thickness skin graft.

CRANIOFACIAL, CLEFT AND PEDIATRIC PLASTIC SURGERY

- Dissect the various fat compartments of the face
- Harvest cancellous bone from the Iliac bone for alveolar bone grafting

- Perform frontal craniotomy, orbito-frontal advancement, and occipital advancement
- Draw the Facial midline in the 3 Coronal planes from the Cephalometric tracing, to depict the asymmetry, as described by Grayson
- Assist and perform the key steps of surgery for unilateral cleft lip, anterior palate
- Assist and perform the key steps of surgery for bilateral cleft lip, anterior palate
- Assist and perform the key steps of cleft palate surgery
- Assist in the bone grafting for alveolar clefts
- Demonstrate the Abbe flap for philtral reconstruction
- Demonstrate the open septo-rhinoplasty to correct nasal deformities of the cleft nose
- Demonstrate the LeForte 1 advancement of the maxilla
- Demonstrate the Bilateral Sagittal Split of the Mandible
- Demonstrate arch bar and Ivy loop application in a patient or typhodont
- Perform intermaxillary fixation in patients with fractures of the mandible
- Perform open reduction and Miniplate fixation in fractures of the Frontal bones, Orbit, Zygoma, Maxilla, and Mandible
- Perform intercanthal wiring in a patient
- Demonstrate the vascularized auricular cartilage transfer to the Glenoid fossa
- Excise a bony block and perform Costochondral reconstruction of the mandible for Temporomandibular ankylosis
- Plan alloplastic reconstruction of Temporomandibular joint.
- Set-up an external and internal distractor on a Stereolithographic model of a skull in a child with Brachycephaly
- Perform a Box osteotomy and Facial Bipartition on a model of a patient with Hypertelorism
- Set-up an external and internal distractor on a Stereolithographic model of a mandible in a child.
- Demonstrate a maxillary swing procedure on a model.

HEAD AND NECK

- Demonstrate tongue reconstruction with the following flaps:
 - i. Pectoralis major myocutaneous
 - ii. Anterolateral thigh

iii. Radial forearm microvascular flaps

- Demonstrate the Glabella, Paramedian forehead and Nasolabial flaps for nasal reconstruction
- Demonstrate the Radial forearm microvascular flap for total nasal reconstruction
- Demonstrate the following flaps for lip reconstruction:
 - i. Abbe
 - ii. Estlander
 - iii. Fan
 - iv. McGregor
 - v. Kerapandzic
- Demonstrate the lateral canthotomy and Temporal flap for upper and lower eyelid repair
- Demonstrate the Glabella and Lateral supra-brow flap for reconstruction of the Medial and Lateral canthus
- Demonstrate the harvest of the nasal chondromucosal graft
- Demonstrate the lid switch procedure to reconstruct the upper eyelid
- Demonstrate the elevation of the Temporalis fascia flap
- Demonstrate the use of the Pectoralis major myocutaneous flap for pharyngeal and oesophageal reconstruction
- Demonstrate the Radial forearm free flap for oesophageal reconstruction
- Demonstrate the anterior rhinotomy approach to the anterior cranial fossa
- Demonstrate the LeForte I and the maxillary swing approaches to the skull base
- Demonstrate the mandibular swing and condylotomy to approach the skull base and infra-temporal fossa
- Demonstrate the sublingual, submandibular, retropharyngeal, buccopharyngeal and prevertebral spaces of the neck.

BREAST

- Display the anatomy of the breast and draining lymph nodes
- Demonstrate the steps of a Simple mastectomy and axillary node clearance
- Demonstrate the flaps that can be used for Oncoplastic reconstructions:
 - i. Thoracodorsal Artery Perforator
 - ii. Lateral Intercostal artery Perforator
 - iii. Anterior Intercostal artery Perforator and Superior epigastric artery Perforator based flaps

- Demonstrate, in the Breast glandular flaps that can be used in the redistribution of glandular tissue
- Demonstrate the Pectoral fascial flap and the lower pole dermal apron flap
- Demonstrate the Latissimus dorsi muscle transfer to replace the missing Pectoralis major in Poland's syndrome
- Demonstrate any one technique of mastopexy
- Demonstrate augmentation mammoplasty using implants.

HAND AND UPPER EXTREMITY

- Demonstrate the anatomy of the Flexor and Extensor compartments of the Upper limb
- Demonstrate the Vascular anatomy of the Upper limb
- Demonstrate the anatomy of the hand
- Demonstrate the Nerve supply to the upper limb
- Demonstrate various local and regional flaps that can be used to resurface the thumb
- Demonstrate the anatomy of the Nail bed
- Manage fractures of the Hand with:
 - i. K-wiring
 - ii. Open reduction and internal fixation
 - iii. External fixation
- Demonstrate the Groin and Abdominal flaps for Hand resurfacing
 - i. Thumb
 - ii. Digits
 - iii. Below elbow and
 - iv. Above elbow
- Perform the Great and second toe dissections in preparation for a toe to the thumb transfer in a cadaver
- Perform Pollicization of the Index finger
- Demonstrate the Flexor muscle slide
- Demonstrate the following tendon transfers
 - i. Biceps to Triceps
 - ii. Deltoid to Triceps
 - iii. Brachioradialis to Flexor Pollicis Longus
 - iv. Split FPL to EPL
 - v. FPL tenodesis
 - vi. FDS Lasso procedure
 - vii. House intrinsic balancing procedure
 - viii. EDC and EPL tenodesis
 - ix. ECRL to FDP

x. Pronator teres to FPL.

TRUNK, GENITALIA, LOWER EXTREMITY

- Demonstrate the anatomy of the chest wall, abdominal wall and back
- Demonstrate the anatomy of the:
 - i. Latissimus dorsi
 - ii. Trapezius
 - iii. Omentum and
 - iv. Gluteal flaps
- Demonstrate reconstruction of the Chest wall using:
 - i. Pectoralis Major
 - ii. Latissimus Dorsi
 - iii. Serratus Anterior
 - iv. Rectus Abdominis
 - v. Omentum
- Demonstrate the anatomy of the anterior abdominal wall and the component separation techniques
- Demonstrate the anatomy and vascularity of the Penis, scrotum, and perineum
- Dissect and prepare a Radial forearm flap for phallic reconstruction
- Demonstrate vaginal reconstruction using:
 - i. Pudendal artery-based flaps
 - ii. Gracilis myocutaneous
 - iii. Rectus abdominis and
 - iv. Colon
- Demonstrate the surgical steps involved in excision of the penis and testis along with creation of flaps for the neo vagina and vulva in a male to female gender reassignment surgery
- Demonstrate the surgical steps in obliteration of the vagina, phalloplasty and scrotoplasty in a patient for female to male gender reassignment
- Demonstrate the commonly used flaps in the treatment of pressure sores:
 - I. Superior and inferior Gluteal flap
 - II. Gluteal rotation flap
 - III. Posterior thigh flap
 - IV. Tensor Fascia Lata flap
 - V. Vastus lateralis flap
 - VI. Hamstring flap
- Demonstrate the anatomy of the perineum

- Demonstrate the anatomy of the lower limb at the level of the thigh, leg, and foot.
- Demonstrate the following Flap anatomy
 - i). Anterolateral thigh
 - ii). Anteromedial thigh
 - iii). Superior and Inferior Gluteal Artery
 - iv). Gracilis
 - v). Posterior leg Fasciocutaneous
 - vi). Fibula and fibula perforator
 - vii). Gastrocnemius
 - viii). Soleus
 - ix). Reverse sural artery
 - x). Dorsalis pedis
 - xi). Medial plantar artery
 - xii). Perforator and propellor flaps.

AESTHETIC SURGERY

- Assist in the cleaning, packing and sterilization of commonly used surgical instruments
- Dissect the superficial muscles, the Facial nerve and the blood vessels of the face
- Demonstrate the Superficial Muscular Aponeurotic System (SMAS)
- Identify the retaining ligaments of the face
- Identify the Supra-orbital, Infra-orbital and Mental nerves
- Demonstrate/ observe a Glycolic acid face peel
- Demonstrate the forehead lift and expose the Supra-orbital neurovascular bundle
- Demonstrate the anatomy of the Upper and Lower eyelid
- Dissect to demonstrate the subcutaneous and Sub-SMAS lifts
- Demonstrate the harvest of rib, iliac crest and cranial bone grafts in a cadaver or patient
- Plan a simple W-plasty scar revision on a patient
- Design a small Geometric Broken Line scar revision
- Display the Open approach to the nose and septum
- Demonstrate the Open reduction rhinoplasty
- Demonstrate Costochondral graft for nasal augmentation
- Demonstrate high and low septal preservation rhinoplasty
- Demonstrate the various procedures to modify the nasal tip
- Demonstrate the use of septal and costal cartilage as spreader and septal extension grafts
- Demonstrate the anatomy of the nasal septum

	<ul style="list-style-type: none"> • Demonstrate the muscular and neurovascular anatomy of the Rectus abdominis, External oblique Internal oblique, Transversus abdominis and Peritoneum • Demonstrate the perforator anatomy of the anterior abdominal wall • Demonstrate any one technique of creating a neo-umbilicus • Demonstrate the posterior and anterior component separation procedure for repair of the anterior abdominal wall • Harvest a strip of skin and hair from the Occipital region and prepare Follicular units for Transplant • Perform follicular unit extraction and hair restoration • Perform hair restoration procedures over scalp and face • Demonstrate the anatomy of the Buccal fat pad • Use different types of LASERs for aesthetic procedures • Should use LASER for the management of scars, pigmented lesions, hair removal, vascular lesion etc. • Use threads, Botox and Fillers for aesthetic surgery.

SYLLABUS

COURSE CONTENT:

The M.Ch. Plastic and Reconstructive Surgery course will include Aesthetic, Hand Surgery and Burn Care in its syllabus.

- 1. General Plastic Surgery***
- 2. Microvascular surgery, Brachial plexus and Peripheral nerve surgery***
- 3. Burns and postburn deformity***
- 4. Craniofacial, Cleft and Paediatric Plastic Surgery***
- 5. Head and Neck Surgery***
- 6. Breast***
- 7. Hand and Upper Extremity***
- 8. Trunk and Lower Extremity***
- 9. Aesthetic Surgery and medicine***
- 10. Reconstructive Surgery of External Genitalia and intersex disorders***

11. Sex reassignment

12. Peripheral vascular surgery

13. Maxillofacial surgery, trauma and reconstruction

1. General Plastic Surgery

A. General Principles

1.1 History and development of plastic surgery in India and across the world

1.2 The scope of plastic surgery

1.3 Evidence Based Medicine and research in plastic surgery

1.4 Medico legal issues in plastic surgery practice

1.5 Liability issues in plastic surgery, legal & insurance perspective

1.6 Documentation, Record keeping and consent.

1.7 Patient safety issues in plastic surgery

1.8 Psychological aspects of plastic surgery

1.9 Ethics in plastic surgery

1.10 Photography in plastic surgery.

1.11 Information technology relevant to plastic surgery.

B. Basic principles and techniques

2.1 Wound: Definition, classification and implications

2.2 Wound healing-normal and abnormal.

2.3 Wound management - Mechanical and pharmacological dressing techniques. Negative pressure wound therapy & other techniques.

2.4 Scar biology and management

2.5 Keloid, hypertrophic scars- prevention and management

2.6 Unstable scar and scar contracture.

2.7 Anatomy and functions of skin

2.8 Viscoelastic Properties of Skin

- 2.9 Infective conditions of skin
- 2.10 Benign and malignant skin and soft tissue tumours
- 2.11 Radiation and Radiation Injuries
- 2.12 Principles of tissue reconstruction
- 2.13 Skin grafts
- 2.14 Blood supply to skin, cutaneous circulation and vascular basis of flaps.
- 2.15 Flaps: Classification, variations and applications
- 2.16 Flap pathophysiology and pharmacology
- 2.15 Grafts – fat, fascia, tendon, nerve, cartilage, bone, composite tissue
- 2.16 Principles of Cancer Management
- 2.17 Lymphedema: Pathophysiology and management
- 2.18 Principles of microvascular surgery and technique
- 2.19 Nosocomial infections
- 2.20 Principles of genetics and general approach to the management of congenital malformations.
- 2.21 Vascular anomalies: Pathophysiology and management
- 2.22 Foetal surgery
- 2.23 Local anaesthesia, nerve blocks, regional anaesthesia
- 2.24 Principles of anaesthesia for infants, adults, hypothermia, hypotensive anaesthesia.
- 2.25 Pain management
- 2.26 Plastic Surgical instrumentation: General principles.

C. Technology applications

- 3.1 Technological innovations
- 3.2 Laser and energy device applications
- 3.3 Tissue expansion- principles and application
- 3.4 Distraction Histogenesis
- 3.5 Endoscopy in Plastic Surgery

- 3.6 Robotics
- 3.7 Simulations
- 3.8. 3.D printing technology & applications
- 3.9 Suture materials, Implants and Biomaterials in plastic surgery
- 3.10 Transplantation biology, techniques and applications
- 3.11 Regenerative medicine, cell therapy & stem cells
- 3.12 Tissue Engineering applications in plastic surgery
- 3.13 Telemedicine in plastic surgery
- 3.14 Information and Digital Technology for Plastic surgeon
- 3.15 Teaching tools and methods in plastic surgery
- 3.16. Training modules for plastic surgery trainees.

2. ***Microvascular surgery, Brachial plexus and Peripheral nerve surgery***

A. Microvascular surgery

- 1. Instrumentation in Microsurgery
- 2. Basic Principles of free-flap surgery
- 3. Fundamental principles
 - 3.1 Fundamental Principles of microvascular surgery
 - 3.2. Pre-operative planning for microsurgery
 - 3.3. Factors affecting outcome of microvascular flap surgery
 - 3.4. Anatomy of angiosomes and perforators
- 4. Replantation and revascularization
- 5. Recent advances in microsurgery
- 6. Terminologies in Microsurgery.

B. Peripheral Nerve surgery

- 1. Types of Nerve injury
- 2. Diagnosis and management of peripheral nerve lesions/injuries
- 3. Compression neuropathies- upper and lower limb
- 4. Topographic anatomy of various peripheral nerves.

C. Brachial plexus Surgery

1. Anatomy of the Brachial Plexus
2. Mechanism of Brachial Plexus Injury
3. Examination, Investigations and Diagnosis of Brachial Plexus Injury
4. Management of neonatal brachial plexus injury
5. Management of adult Brachial Plexus injury
6. Management of Chronic Brachial Plexus injury.

D. Microlymphatic surgery

1. Lymphedema pathophysiology
2. Assessment of lymphedema
3. Medical Management of Lymphedema
4. Surgical management of Lymphedema
5. Microlymphatic surgery.

E. Composite Tissue Allotransplantation

1. Principles and regulations of Composite Tissue Allotransplant
2. Recent developments in Hand transplant
3. Face transplant.

F. Video microsurgery

G. Robotic microsurgery

H. Tubal recanalization and Vaso-vasostomy

I. Arteriovenous Fistula

3. Burns

- 1 History of acute burns injuries & management
- 2 Multidisciplinary burn team
- 3 Prevention of burns
- 4 Burn management in disasters and humanitarian crisis
- 5 Pathophysiology of acute burns

- 6 Systemic Inflammatory Response Syndrome (SIRS)
- 7 Early burn care
- 8 Fluid management in acute burns
- 9 Inhalation burns
- 10 Management of the burn wound
- 11 Skin and skin substitutes
- 12 Nutrition in Burns
- 13 Burn wound infection and treatment
- 14 Sepsis in burns
- 15 Multiorgan Dysfunction Syndrome (MODS)
- 16 Anaesthesia for a burned patient
- 17 Biomarkers in Burn care
- 18 Electrical burns
- 19 Chemical burns
- 20 Facial burns
- 20 Hand burns
- 21 Feet burns
- 22 Paediatric burns
- 24 Geriatric burns
- 25 Burns in pregnancy
- 26 Management of Pain in burns
- 27 Psychiatric and psychological considerations in burns
- 28 Burn rehabilitation
- 29 Post burns scars
- 29 Post burns contractures
- 30 Post burn facial deformities
- 31 Skin bank
- 32 Role of allografts in burns
33. Skin substitutes

34. Organizing a burn unit.

4. Craniofacial Cleft and Paediatric Plastic Surgery

1 General

- 1.1. Embryology and anatomy of craniofacial complex.
- 1.2. Growth and development changes in face, anatomy of facial skeleton.
- 1.3. Structure and development of teeth and Dentofacial anomalies.
- 1.4 Harvesting of bone grafts (including cranial bone).

2 Craniofacial anomalies

- 2.1. Principles of craniofacial surgery.
- 2.2. Craniofacial clefts. Tessier's clefts classification.
- 2.3. Craniosynostosis - syndromic and non-syndromic
- 2.4. Hypertelorism.
- 2.5. Craniofacial microsomia.
- 2.6. Craniofacial distraction.
- 2.7. Hemifacial atrophy.
- 2.8. Treacher-Collins Syndrome.
- 2.9. Pierre Robin sequence.
- 2.10. Other craniofacial syndromes, e.g.- Binders syndrome etc.
- 2.11 Distraction osteogenesis
- 2.12 Distractors and craniofacial fixation devices.

3 Cleft Lip and Palate

- 3.1. Embryology of head and neck.
- 3.2. Embryogenesis of cleft lip and palate.
- 3.3. History and evolution of techniques in Cleft surgery.
- 3.4. Classification of Clefts
- 3.5. Unilateral Cleft lip
- 3.6. Bilateral Cleft lip
- 3.7. Cleft Palate

- 3.8. Alveolar Clefts
- 3.9. Secondary deformity correction in clefts
- 3.10. Management of palatal fistula
- 3.11. Flaps in clefts- Abbe flap, Tongue flap, buccal flaps, free flaps etc.
- 3.12. Secondary cleft nose correction
- 3.13. Orthodontics in Cleft lip and Palate.
- 3.14. Midface skeletal evaluation and corrections and Orthognathic surgery
- 3.15 Distraction in Clefts.
- 3.16. Velopharyngeal incompetence.
- 3.17. Speech therapy in cleft lip and palate.
- 3.18. Middle ear management in Cleft palate
- 3.19. Antenatal diagnosis and management.

4 Maxillofacial Trauma

- 4.1. Dentofacial anatomy, occlusions, various terminologies.
- 4.2. ATLS protocols.
- 4.3. Management of Airway and acute care.
- 4.4. Evaluation of injuries, imaging, principles of treatment.
- 4.5. General principles of facial soft tissue injury repair.
- 4.6. Management of soft tissue injuries of specific regions of the face.
- 4.7. Facial nerve injuries and management.
- 4.8. Restoration of anatomical subunits of face.
- 4.9. Incisions to access the craniofacial skeleton.
- 4.10. Access osteotomies to the skull base.
- 4.11. Skeletal Fractures –Principles and management
- 4.12. Fracture Mandible and condyle fractures.
- 4.13. Midface fractures: maxilla, nasal bone, NOE complex
- 4.14. Naso-Orbito-Ethmoid injuries.
- 4.15. Nasal bone fractures.

- 4.16. Frontal bone fractures.
- 4.17. Zygomatic complex fractures.
- 4.18. Management of Panfacial injuries.
- 4.19. Management of dento-alveolar injuries.
- 4.20. Fracture reduction and different modalities of skeletal stabilization;
AO principles.
- 4.21. Primary and secondary bone grafting of the facial skeleton.
- 4.22. Avulsion injuries of face.
- 4.23. Gunshot injuries of face.
- 4.24. Paediatric Facial fractures.
- 4.25. Management of facial fractures in elderly and edentulous jaw.

5 Maxillofacial Disorders

- 5.1. Temporomandibular joint: Ankylosis, Hypermobility, dislocation.
- 5.2. Temporomandibular joint pain, dysfunctions.
- 5.3. T. M Joint Reconstruction.
- 5.4. Obstructive sleep apnoea – Evaluation, planning and management.
- 5.5. Principles of osteointegration and Implantology.
- 5.6. Craniofacial and Maxillofacial Prosthetics.
- 5.7. Craniofacial Implants and retained prosthesis.
- 5.8. Radiological imaging

5. Head and Neck Surgery

A Head and Neck Tumors

- 1 Benign and Malignant tumors of Head and Neck.
- 2 Tumors of oral cavity, oropharynx and Mandible.
- 3 Jaw tumours, lesions and cyst.
- 4 Principles of Reconstruction
 - 4.1 Principles of reconstruction of Cancer of upper Aerodigestive system
 - 4.2 Reconstruction of the Mandible and Maxilla

- 6 Tumors of skin
 - 6.1 Benign skin tumors of the Head and neck
 - 6.2 Malignant skin tumors of the Head and Neck
- 7 Paediatric head and neck tumours.

B Head and Neck reconstruction by region

- 1 Reconstruction of Scalp and Calvarium
- 2 Reconstruction of the Nose
- 3 Reconstruction of the Eyelids and Orbit
- 4 Reconstruction of external ear
- 5 Reconstruction of the Lip and commissure
- 6 Cheek reconstruction
- 7 Tongue reconstruction
- 8 Reconstruction of pharynx and oesophagus

C Principles Skull Base Surgery

D Vascular malformations of head and neck

E Infections of the Head & Neck

- 1 Infection of the Cervical spaces
- 2 Ludwig's angina
- 3 Post Hansen's deformities of the face
- 4 Cancrum oris/ Mucor mycosis

6. Breast

- 1 Diagnosis of Breast Cancer
- 2 Oncoplastic Surgery
- 3 Management of Carcinoma Breast
- 4 Nipple and Areola Reconstruction

- 5 Congenital Anomalies of The Breast
- 6 Tuberos Breast
- 7 Poland's Syndrome
- 8 Fat Grafting in The Breast
- 9 Reduction Mammoplasty
- 10 Mastopexy
- 11 Augmentation Mammoplasty and Breast Implants
- 12 Anaplastic Large Cell Lymphoma and Breast Implants (ALCL)
- 13 Gynaecomastia.

7. Hand and Upper Extremity

1 Regional anatomy and principles

- 1.1 Functional anatomy of hand
- 1.2 Biomechanics of the Hand
- 1.3 Regional anaesthesia in upper limb surgeries
- 1.4 Examination of hand and upper limb
- 1.5 Diagnostic imaging of hand and upper extremity

2 Traumatic disorders of hand

- 2.1 Fingertip and nail injuries
- 2.2 Anatomy of the skeleton of the hand and fractures of the hand and wrist
- 2.3 Flexor tendon injuries of the Upper Limb
- 2.4 Extensor tendon of the Upper Limb
- 2.5 Mutilating injuries of the Upper extremity
- 2.6 Amputation and Prosthesis
- 2.7 Thumb reconstruction
- 2.8 Acute nerve injuries and repair
- 2.9 Compartment syndrome of the Upper limb
- 2.10 Paediatric upper extremity trauma and reconstruction.

3 Non-traumatic disorders of upper extremities

- 3.1 Infections of hand
- 3.2 Dupuytren's disease
- 3.3 Rheumatoid arthritis of the Hand
- 3.4 Compression neuropathies of upper extremity
- 3.5 Hand ischemia and Volkmann's ischemic contracture
- 3.6 Complex Regional Pain Syndrome
- 3.7 Tumors of the upper limb.

4. Congenital disorders of hand and upper extremities

- 4.1 Embryology, classification and principles.
- 4.2 Common congenital hand anomalies.
- 4.3 Vascular anomalies of upper extremity.

5 Miscellaneous

- 5.1 Comprehensive management of burned hand.
- 5.2 Occupational hand disorders
- 5.3 Management of the stiff hand
- 5.4 Management of the Spastic hand
- 5.5 Management of upper extremity in tetraplegia.
- 5.6 Hand therapy.

8. Trunk and Lower Extremity

1 Lower Extremity

- 1.1 Comprehensive Lower Extremity Anatomy
- 1.2 Management of Lower Extremity Trauma
- 1.3 Lower Extremity Sarcoma Reconstruction
- 1.4 Reconstructive Surgery: Lower Extremity Coverage/Composite reconstruction
- 1.5 Diagnosis and Treatment of Painful Neuroma and of nerve compression in the lower extremity

1.6 Lower Extremity Composite Reconstruction

1.7 Foot Reconstruction.

2 Trunk Reconstruction

2.1 Comprehensive Trunk Anatomy

2.2 Reconstruction of chest

2.3 Reconstruction of the soft Tissues of the back

2.4 Abdominal Wall reconstruction.

3 Reconstruction of Genitalia

3.1 Reconstruction of Male Genitalia

3.2 Reconstruction of acquired vaginal defects

3.3 Gender identity disorders and disorders of sex development.

4 Pressure Sores

5 Perineal Reconstruction

9. Aesthetic Surgery

1. Aesthetic surgery practice

1.1. Setting up an aesthetic surgery practice

1.2. Preoperative analysis and surgical Planning in aesthetic surgery

1.3. Psychological assessment & specialist referrals

1.4. Obtaining informed consent and patient counselling

1.5. Clinical photography, documentation and record keeping

1.6. Dealing with complications and unsatisfied patients

1.7. Communication and team building

1.8. Ethics and medico-legal aspects of aesthetic surgery

1.9. Anaesthesia for aesthetic surgery: general and regional nerve blocks

1.10. Care and maintenance of instruments sterilization and infection control practices.

2. Age related changes & rejuvenation

A. Facial ageing

- 2.1. Anatomy of the face relevant to aesthetic surgery and injectables
(soft tissues and skeletal)
- 2.2. Ageing of the face- skin, soft tissues and skeleton.

B. Facial rejuvenation

- 2.3. Non-surgical skin care and rejuvenation topicals and
cosmeceuticals
- 2.4. Cutaneous resurfacing - chemical peel, surgical dermabrasion
- 2.5. Regenerative medicine: platelet rich plasma, mesenchymal stem
cells and their aesthetic applications
- 2.6. Laser: physics, tissue interactions and various clinical applications
- 2.7. Other energy based devices: radio-frequency and ultrasound: their
application in skin tightening and body contouring.
- 2.8. Forehead lift: endoscopic and surgical
- 2.9. Brow lift
- 2.10. Blepharoplasty: upper and lower
- 2.11. Oriental blepharoplasty
- 2.12. Secondary blepharoplasty
- 2.13. Thread lifts: science, indications, technique complications
- 2.14. Various facelift techniques: minimal access cranial suspension
(macs) subcutaneous lift, Smas-platysma plication, extended
Smas, subperiosteal lift
- 2.15. Secondary deformities from facelift surgery.

3. Aesthetic skeletal surgery

- 3.1. Facial skeleton: male and female. Age related changes in the facial
skeleton

3.2. Facial skeletal augmentation: bone graft and implants

3.3. Facial masculinisation and feminisation surgeries

3.4. Anthropometry, cephalometry, orthognathic surgery.

4. Soft tissue fillers

4.1. Chemical composition and application of soft tissue fillers

4.2. Temporary, semi-permanent, permanent fillers vascular and other complications of fillers.

5. Botulinum toxin

5.1. Botulinum toxin: science, indications, techniques, complications.

6. Incisions and scars

6.1. Resting skin tension lines and their relation to incision placement and scar revision.

6.2. Non-surgical management of incisions and scars

6.3. Surgical management of scars of the face and other regions.

7. Rhinoplasty

7.1. Nasal anatomy, physiology and assessments

7.2. Rhinoplasty: aesthetic and functional, open and closed, reduction and augmentation

7.3. Structural and preservation rhinoplasty

7.4. Tip-plasty

7.5. The deviated/ crooked nose and cleft rhinoplasty

7.6. The septum in rhinoplasty

7.7. Secondary rhinoplasty.

8. Lip

8.1. Augmentation

8.2. Reduction

9. Fat grafting

- 9.1. Structural fat grafting: principles, extraction, preparation & injection techniques. Micro, milli & nano fat grafting. indications and complications.
- 9.2. Autologous fat grafting: biology, volumetric & non-volumetric effects of fat grafts
- 9.3. Platelet rich plasma, platelet rich fibrin, nano- fat grafting.

10. Liposuction

- 10.1 Principles and composition of various wetting solutions & safety issues
- 10.2 preoperative planning, postoperative care
- 10.3. Lipo-structuring- concept, applications, 7 techniques- power assisted liposuction (PAL), ultrasound assisted liposuction (UAL), laser assisted liposuction, cryo-lipolysis
- 10.4. High definition lipostructuring
- 10.5. Face liposuction and lipolysis
- 10.6. Axillary contouring and axillary breast management
- 10.7. Gynaecomastia correction
- 10.8. Recent techniques- Vaser, radio frequency, j plasma skin tightening
- 10.9. Large volume liposuction.

11. Body contouring surgeries

- 11.1 Obesity & massive weight loss (MWL) and post bariatric surgery weight loss
- 11.2 Management of high BMI patients

11.3. Body and limb contouring procedures: brachioplasty, belt lipectomy, lower body lift, upper body lift, thigh plasty, buttock lift: assessment, indications, techniques & complications.

12. Abdominoplasty

- 12.1 anatomy and blood supply
- 12.2. Standard abdominoplasty & variants
- 12.3. High tension lateral abdominoplasty, mini abdominoplasty, extended lipo-abdominoplasty
- 12.4. Neo-umbilicoplasty
- 12.5. Correction of divaricated recti, ventral hernia, mesh repair.

13. Implants and augmentation

- 13.1. Implant biology
- 13.2. Buttock augmentation, calf augmentation.

14. Aesthetic genital surgery: male & female

- 14.1. Anatomy & embryology
- 14.2 Analysis and planning, anatomical and functional corrections
- 14.3 Penile, scrotal, vaginal, vulval, mons pubis surgical procedures.

15. Hair restoration

- 15.1 Scalp anatomy and pathology biology of the hair follicle from the surgical perspective
- 15.2 Patterns of hair loss
- 15.3 Tools for evaluation of hair quality- TrichoScan, densitometry etc.
- 15.4. Management protocols for alopecia. Medical restoration
- 15.5. Various techniques of restoration including strip harvest (FUT), (FUE)
- 15.6 Body hair transplant (non-scalp donor harvest)
- 15.7 Surgical correction of baldness

15.8 Eyebrow, moustache, beard hair transplantation.

16. Other aesthetic procedures

16.1. Aesthetic jewellery piercing

16.2. Cheek dimple creation

16.3. Buccal fat pad removal

16.4. Ear lobe: repair, augmentation, reduction.

TEACHING AND LEARNING METHODS

GENERAL PRINCIPLES:

The syllabus has been designed to ensure competency-based training of the student during the 3 years. This will cover the Cognitive, Psychomotor and Affective domains.

The training will essentially be self-directed and revolve around practical skills acquired from graded patient care responsibilities and formal academic sessions. Trainees are expected to be fully conversant with the use of computers (documentation, editing and presentation software (word, power point, excel etc.)) and be able to use databases like the Medline, PubMed etc.

PATIENT CARE RESPONSIBILITIES:

The student will be posted in the OPD, Wards, Operation theatres and the Emergency medicine where he will participate in patient care responsibilities

1. History taking,
2. Clinical Examination,
3. Documentation : Clinical notes, Clinical photographs,
4. Progress notes,
5. Order and interpret relevant investigations,
6. Treatment planning,
7. Make a pattern of the treatment plan where indicated,
8. Counsel the patient or relatives regarding the procedure to be undertaken,
9. Take informed consent,

10. Assist or perform the surgical treatment,
11. Coordinate care and rehabilitation with other ancillary departments.

FORMAL ACADEMIC SESSIONS:

Below is a suggested Academic schedule that could be followed:

Sr. No.	Description	Frequency
1	Subject seminars	Once a week
2	Journal club	Once in two weeks
3	Didactic lectures by faculty	Once a month
4	Bedside teaching	As and when feasible
5	Clinical rounds	Once a week
6	Structured interactive group discussion (Including buzz sessions, debates, problem based learning etc)	Once a week
7	Case Presentation and Treatment Planning	Once a week
8	File Audit/Statistic Meet/Mortality and Morbidity Audit	Once month
9	Cadaver dissections	As and when possible/ Once a week
10	Skills laboratory i). Microvascular laboratory ii). Craniofacial techniques/ fracture fixation iii). Simulator based	Daily/ Weekly/ Once a month (as per requirement)
11	Grand Round/Interdepartmental Meet	Once a month

The following things have to be considered in the formal teaching program

- i. PG student shall be required to participate in the teaching and training programme of Undergraduate students and interns.
- ii. Department should encourage e-learning activities.

EXTERNAL POSTINGS:

As it is not possible for all departments to expose the student to all aspects of Plastic and reconstructive surgery, it is recommended (if permissible) that the student be permitted external postings to departments of excellence in various subspecialties for a period of 2 weeks to a month at a time, a total of three months being permitted during a period of 3 years. This is provided that the student has shown the required progress and worked to the satisfaction of the

faculty members and head of the department, availability of permissible leave of absence as per the concerned University Rules & Regulations.

The sub-speciality where posting may be done would include:

1. Burns
2. Hand surgery
3. Microvascular surgery
4. Aesthetic surgery
5. Cleft and craniofacial surgery
6. Others as deemed useful by the HOD and student
 - i. Orthopaedics
 - ii. Anaesthesia
 - iii. Oncosurgery
 - iv. Radiodiagnosis

PAPER PRESENTATION AND PUBLICATION (Compulsory)

A postgraduate student would be required to present one poster, read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

RESEARCH METHODOLOGY/ THESIS: (Optional)

It is desirable for the trainee to take up a thesis during their posting and complete it before their training ends.

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.

ASSESSMENT

GENERAL PRINCIPLES

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

FORMATIVE ASSESSMENT

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

INTERNAL ASSESSMENT

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

QUARTERLY ASSESSMENT

1. Patient based:
 - i. Documentation of case records
 - ii. Progress notes
 - iii. Clinical photographs
2. Laboratory or Skill based learning:
 - i. Cadaver dissection
 - ii. Microvascular laboratory
 - iii. Learning on simulation models
3. Self-directed learning and teaching:
 - i. Seminar: departmental
 - ii. Journal based / recent advances learning
 - iii. Case presentation and treatment planning.

The department could also conduct an annual assessment on the lines of the final Summative assessment.

SUMMATIVE ASSESSMENT: Assessment at the end of training.

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post graduate examination shall be in two parts:

The examinations shall be organised based on 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training.

1. **Log book** of work done during the training period including rotation postings, departmental presentations, and internal assessment reports should be submitted.
2. At least **two presentations** at national level conference. At least one research paper should be published/ accepted in an indexed journal. **(It is suggested that the local or University Review committee assess the work sent for publication).**

There will be four theory papers based on broad distribution, as below:

Paper I: General principles and basic sciences relevant to plastic and reconstructive surgery.

Paper II: Clinical part I- Burns, Cleft and Craniofacial, Micro neurovascular and Brachial plexus, Hand and upper extremity surgery

Paper III: Clinical part II- Aesthetic surgery, Head and neck, Breast, Trunk, Genitalia, Lower limb surgery

Paper IV: Recent Advances in Plastic and Reconstructive Surgery

1. Clinical Examination

- i. **Long case:** Should assess the students' ability to diagnose a complex condition, order and interpret relevant investigations and plan the reconstruction of a composite defect.
- ii. **Short cases: 2 or 3:** Each case would assess one or more aspects of one of areas of reconstruction.
- iii. **Ward rounds: 4 cases:** Assess the students' ability to counsel a patient or relatives about a procedure, possible complications, expected results and post-operative management. It could also assess his ability to anticipate complications, prevent them and manage them should they occur.

2. Viva voce

1. Surgical planning
2. Operative procedures
3. Instruments
4. Radiology: X-rays, CT scan,
5. Osteology (Skull, Mandible, Hand, Fibula)

6. Photographs based viva.

LOG BOOK:

The student will maintain a comprehensive log of:

1. Cases operated- observed, assisted, performed independently,
2. Seminars presented/ attended,
3. Faculty lectures attended,
4. Journal presentations made and attended,
5. Conferences/webinars attended, and presentations made.

WORK RECORD: PHOTO ALBUM:

The student will maintain a photographic documentation of the important cases operated or assisted including relevant post-operative follow up.

Recommended reading:

Books (latest edition)

1. Neligan, Peter C. Text book of Plastic surgery. Elsevier.
2. Karoon Agrawal. Text book of Plastic, Reconstructive and Aesthetic surgery (6 volumes): Thieme
3. Kevin C. Chung, Grabb & Smith's: Plastic Surgery. Lippincott, Williams and Wilkins, New York.
4. Mathes, Stephen J. Plastic Surgery (Vol. 1-8). London. W.B. Saunders.
5. Mimis Cohen. Mastery of Plastic & Reconstructive Surgery (Vol.1-3). Little, Brown & Co.
6. Alan D. McGregor, Ian A. McGregor. Fundamental Techniques of Plastic Surgery. Elsevier.
7. Berish Strauch, Luis Vasconez, Charles K. Herman, Bernard T. Lee. Grabb's Encyclopaedia of flaps (2 Vol) .
8. Fu-Chan Wei, Samir Mardini. Flaps and Reconstructive Surgery. Elsevier.
9. Scott W. Wolfe, William C. Pederson, Scott H. Kozin, Mark S. Cohen. Green's Operative Hand Surgery (2 Vol.).

10. David N. Herndon, Total Burn Care. Elsevier.
11. Sujatha Sarabhai. Principles & Practice of Burn care. JP Brothers.
12. Rajiv Sood, Bruce M. Achauer. Burn surgery- Reconstruction and Rehabilitation. Saunders Elsevier.
13. Raymond Fonseca. Oral and Maxillofacial Surgery. Elsevier.
14. Robert Acland, S. Raja Sabapathy. Acland's Practice manual for Microvascular Surgery. The Indian Society for Surgery of The Hand.
15. Prabha Yadav, Vinay Shankhdhar, Dushyant Jaiswal. Mastering Cancer Reconstructive Surgery with Free Flaps. JP Brothers.

Journals

03-05 international Journals and 02 national (all indexed) journals.

National Medical Commission

Student appraisal form for M.Ch. in Plastic and Reconstructive Surgery											
	Element	Less than Satisfactory			Satisfactory			More than satisfactory			Comments
		1	2	3	4	5	6	7	8	9	
1	Scholastic Aptitude and Learning										
1.1	Knowledge appropriate for level of training										
1.2	Participation and contribution to learning activity e.g., Journal Club, Seminars, CME etc)										
1.3	Conduct of research and other scholarly activity assigned (e.g Posters, publications etc)										
1.4	Documentation of acquisition of competence (eg Log book)										
1.5	Performance in work based assessments										
1.6	Self Directed Learning										
2	Care of the patient										
2.1	Ability to provide patient care appropriate to level of training										
2.2	Ability to work with other members of the health care team										
2.3	Ability to communicate appropriately and empathetically with patients families and care givers										
2.4	Ability to do procedures appropriate for the level of training and assigned role										
2.5	Ability to record and document work accurately and appropriate for level of training										
2.6	Participation and contribution to health care quality improvement										

3	Professional attributes																		
3.1	Responsibility and accountability																		
3.2	Contribution to growth of learning of the team																		
3.3	Conduct that is ethical appropriate and respectful at all times																		
4	Scholarship																		
4.1	Teaching and mentoring skills appropriate to level of training																		
4.2	Ability to formulate research questions, initiate conduct and complete research projects																		
4.3	Ability to review and use the published literature appropriately in care of the patient lab or workspace																		
4.4	Ability to provide consultations to other specialties as may be required																		
5	Space for additional comments																		
6	Disposition																		
	Has this assessment been discussed with the trainee?	Yes	No																
	If not explain																		
	Name and Signature of the assessee																		
	Name and Signature of the assessor																		
	Date																		

Subject Expert Group members for preparation of Guidelines for competency based postgraduate training programme for MCh. In Plastic and Reconstructive Surgery

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