Velammal
Medical College Hospital & Research Institute

Velammal Village, Anuppanadi, Madurai -09

SYSTEM-BASED & TEMPORALLY SYNCHRONIZED CONTENT

DEPARTMENTS OF ANATOMY, PHYSIOLOGY, BIOCHEMISTRY

I MBBS SYSTEM-BASED AND TEMPORARILY SYNCHRONIZED CONTENT

GENERAL MODULE

	General Anatomy	General Physiology	General Biochemistry
Theory	● Introduction to Anatomy – Anatomical terms ● Introduction to Skeletal system – Bones ● Introduction to Skeletal system – Joints ● Introduction to Muscular system ● Introduction to Vascular system and Lymphatic system ● Introduction to Nervous System ● Introduction to Integumentary System	● Importance of Physiology in medicine ● Functional organization of human body, Principles of Homeostasis and physiological control mechanism ● Intercellular connections and Communications ● Transport across cell membrane ● Body fluids: Principles and methods of measurement of body fluid compartments	● Enzyme kinetics, Inhibition and regulation of enzyme activity, Isoenzymes: ● Chemistry of carbohydrates / lipids / proteins: Biological oxidation and ATP synthesis: ● Enzymes in clinical diagnosis:
SDL	Types of ossification	● Functional organization of Cell and its organelles	● Enzymes in clinical diagnosis:
Practical	● Anatomical position, terms, planes & sections ● Skeletal system ● Muscular system ● Nervous system ● Vascular system and lymphatic system ● Integumentary system	● Introduction ● Microscopy and collection of blood samples	● Color reactions of carbohydrates ● Color reactions of proteins

GENERAL EMBRYOLOGY, GENETICS, GENERAL HISTOLOGY, HEMATOLOGICAL SYSTEM & IMMUNOLOGICAL SYSTEM

	Anatomy	Physiology	Biochemistry
	GENERAL EMBRYOLOGY, GENETICS & GENERAL HISTOLOGY	HEMATOLOGY & IMMUNOLOGY	HEMATOLOGY & IMMUNOLOGY
Theory	GENERAL EMBRYOLOGY ● Cell structure & Division ● Gametogenesis ● week of development ● II week of development ● III week of development ● Embryonic period ● Placenta & umbilical cord ● Twinning & teratogens GENETICS ● Structural aberrations of chromosomes ● Numerical aberrations of chromosomes ● Modes of inheritance ● Prenatal diagnosis and Genetic counseling	● Introduction to blood and Functions of plasma proteins ● Abnormal Hemoglobins, Jaundice & Physiological basis of Jaundice ● Classification and physiological basis of Anemia; Hematinic Factors ● Physiological basis of investigations for Anemia and Jaundice ● Blood Grouping, physiological basis of blood transfusion and its reactions (2) ● White blood cells – Structure, Functions and fate of WBCs ● Principles of Haemopoeisis and Bone marrow micro environment ● Erythropoiesis – Principles and Regulation ● Leucopoiesis - Principles and regulation ● Immunity and Development of immunity ● Adaptive immunity and its	Immunoglobulin structure and types, Antigen antibody complex Hemoglobin; Structure and function Heme: Synthesis, Catabolism and disorders Anemia: Vitamins : B12 , folic Acid , B6,Iron Hemoglobinopathies

		mechanisms ● Immune Response and Complement System ● Immune tolerance, Immunotherapy, Immunodeficiency and Immunomodulation ● Thrombopoiesis, structure, functions and fate of Platelets ● Hemostasis and Clotting mechanisms ● Haemostatic Balance – Anti-haemostatic and pro haemostatic mechanisms ● Haemorrhagic Disorders ● Tests for Platelet and Clotting functions	
SDL	● Structure & Classification of chromosomes ● Karyotyping	● Red Blood Cell – Structure, Functions and fate of RBCs ● Red blood cell turnover ● Lymphoid organs and Lymph ● Innate immunity and its mechanisms	Biochemical Investigations in Anemia
Practical	General Histology Practical: ● Epithelial tissue ● Connective tissue-General ● Cartilage ● Bone ● Muscular tissue ● Peripheral Nerve & Autonomic Ganglia	● Hb estimation ● Hemocytometry& PCV ● Revision of Hemoglobin ● RBC Count ● ESR and Osmotic fragility ● Peripheral Smear ● TLC ● DLC	● Demonstration of immunological techniques (ELISA, Chemiluminiscence) Colorimetry, Demonstration of Hb and its derivatives

	● Blood vessels ● Lymphoid organs-I ● Lymphoid organs-II ● Skin ● Demonstration of Embryology models ● Demonstration of genetics models	● Blood Group, BT, CT ● Arneth Count ● Revision Blood Group, BT, CT ● AEC ● Platelet & Retic demo ● Revision of TLC, RBC ● Revision of Hb, BT & CT ● Revision of hematology	

LOCOMOTOR SYSTEM & AUTONOMIC NERVOUS SYSTEM

	Anatomy	Physiology	Biochemistry
Theory	LOCOMOTOR SYSTEM – Upper Limb ● AT-COM ● Introduction & development of locomotor system, pectoral region ● Axilla ● Shoulder joint complex ● Elbow & wrist joints ● Hand – muscles, vessels & nerves ● Hand – spaces ● Nerve injuries of upper limb ● Venous & lymphatic drainage of upper limb LOCOMOTOR SYSTEM – Lower Limb ● Introduction, femoral triangle, adductor canal ● Hip joint ● Popliteal fossa ● Knee joint ● Ankle joint, joints of foot ● Arches of foot ● Venous drainage of lower limb	● Resting Membrane Potential ● Nerve ● Neuromuscular junction ● Skeletal Muscle ● Smooth muscle ● Autonomic nervous system : functional organization ● Sympathetic and para sympathetic systems ● Autonomic function tests	Minerals: Calcium, Phosphorus, Magnesium ● Vitamins: Vitamin D and pantothenic acid ● Rickets, Fanconi syndrome
SDL	● Cubital fossa ● Intermuscular spaces around shoulder ● Radioulnar joints ● Hand grips ● Femoral canal	● Dysfunctions of autonomic nervous system	Theory SDL ● Disorders of muscles: Muscular dystrophy, malignant hyperthermia

	● Saphenous opening ● Tibiofemoral joints ● Gait		
Practical	LOCOMOTOR SYSTEM – Upper Limb Gross ● Pectoral region ● Axilla ● Scapular region ● Arm ● Forearm ● Hand ● Surface anatomy & radiology Osteology ● Clavicle, scapula ● Humerus ● Radius, ulna ● Articulated hand LOCOMOTOR SYSTEM – Lower Limb Gross ● Front of thigh ● Adductor compartment ● Gluteal region ● Posterior compartment of thigh ● Popliteal fossa ● Anterior & lateral compartment of leg and dorsum of foot ● Posterior compartment of leg & retinacula around ankle ● Sole ● Surface anatomy & radiology Osteology	● Mosso‟sErgography ● Nerve conduction test and Surface EMG ● Lying to standing ● Deep breathing difference ● Isometric handgrip test ● Cold pressor test	● Estimation of calcium and Phosphorus

	● Hip bone ● Femur ● Tibia & fibula Articulated foot		

ENDOCRINE SYSTEM, POSTNATAL GROWTH & DEVELOPMENT

	Anatomy	Physiology	Biochemistry
Theory	● Pituitary gland- Gross, microscopic and developmental anatomy ● Thyroid and parathyroid - Gross anatomy ● Thyroid and parathyroid - Microscopic and developmental anatomy ● Adrenal gland - Gross, microscopic and developmental anatomy Postnatal growth and development- I, II, III, IV	● Mechanisms of hormonal action ● Pituitary Gland and Hypothalamus, Hypothalamo-Pituitary Endocrine axis ● Anterior Pituitary hormones ● Hormones from Posterior and Intermediate lobe of Pituitary, Hypothalamic Hormones ● Endocrine disorders of Hypothalamus and pituitary gland ● Thyroid Hormone – Biosynthesis, Secretion and Regulation of thyroid secretion ● Physiological effects of Thyroid Hormone ● Endocrine disorders of thyroid gland ● Adrenocortical hormones – Biosynthesis, Functions and Regulation of secretion ● Endocrine disorders of Adrenal gland ● Endocrine Pancreas – insulin &	● Regulation of blood glucose, Metabolism in starvation, ● Thyroid function tests, Adrenocortical function tests, ● Diabetes mellitus, OGTT

		glucagon- Biosynthesis, Secretion, Functions and Regulation of secretion ● Disorders of endocrine pancreas ● Hormones of Calcium Homeostasis - Biosynthesis, Functions and Regulation of secretion ● Disorders of Calcium Homeostasis ● Pineal gland ● Hormonal changes in Stress response	
SDL	(Theory and SDL) ● Islets of Langerhans ● Diffuse Endocrine system	(Theory and SDL) ● Introduction and General Principles of regulation of endocrine secretions ● Thyroid function tests ● Adrenomedullary hormones – Biosynthesis, Functions and Regulation of secretion ● Local hormones	● Interpretation of thyroid and adrenal function test
Practical	● Demonstration of gross specimen ● Demonstration of embryology models ● Histology - pituitary and adrenal gland ● Histology - thyroid and parathyroid	CVS and RS practicals will be taken during these 3 weeks‟ time	● Demonstration of Blood Glucose Estimation, ABG , PT

RESPIRATORY SYSTEM

	Anatomy	Physiology	Biochemistry
Theory	● Introduction of respiratory system, paranasal air sinuses ● Nasal cavity &Nasopharynx ● Larynx I ● Larynx II ● Thoracic cage, inlet , outlet, intercostal space ● Intercostal muscles, nerves and vessels ● Diaphragm ● Pleura ● Development of respiratory system	● Functional organization & non respiratory functions of RS ● Mechanics of breathing & compliance ● Pulmonary surfactant&Transport of gases ● Regulation of respiration ● Application of PFT – Obstructive vs Restrictive ● Respiration in altered barometric pressure	● General aspects of acid base balance, Respiratory regulation of blood pH and related disorders ● Interpretation of acid base disorders
SDL	● Trachea, bronchi &Bronchopulmonary segments ● Cross sectional anatomy of thoracic cavity ● Diaphragmatic hernia	● Lung Volumes & capacities ● Classification & Methods of estimating PFT ● Oxygen therapy ● Abnormal respiration ● Assisted Ventilation & CPR	● Interpretation of acid base disorders
Practical	● Thoracic vertebra & sternum ● Thoracic ribs, joints ● Nasal cavities, nasopharynx ● Lungs – right and left ● Histology of trachea, bronchi, lung, epiglottis . ● Embryology models.● adiological anatomy of respiratory system- nasal cavity, paranasal sinuses ● chest x-ray ● Surface anatomy of respiratory system	● Stethography ● Effect of posture on vital capacity ● Clinical Examination of RS ● PFT (demo)	● ATCOM (Communication skills part I)

CARDIOVASCULAR SYSTEM

	Anatomy	Physiology	Biochemistry
Theory	● Introduction to CVS, Mediastinum and contents ● Pericardium and External features of the Heart ● Blood supply to heart ● Chambers of heart-I&Chambers of heart-II ● Superior mediastinum&Posterior mediastinum ● Embryology-development of heart, aortic arches, major veins	● Properties of cardiac muscle ● Conductive system of heart ● Electrophysiology of heart and ECG ● Cardiac cycle ● Cardiac output ● Regulation of heart rate ● Cardiac hemodynamics ● Blood pressure (mechanism &regulation) ● Hypertension ● Hypotension & shock ● Heart failure & its management ● Cerebral circulation ● Coronary circulation ● Cutaneous & Splanchnic circulation ● CVS, RS changes during exercise	● Collagen – structure, disorders ● Lipid metabolism, prostaglandins ● Sulphur containing aa, Homocysteine metabolism and disorders ● Free radicals and antioxidants ● Interpretation of lipid profile
SDL	● Nerve supply to heart, heart valve complex ● Atrial and ventricular septal defects, TOF, PDA, Coarctation of aorta ● Fetal circulation	● Functional anatomy of heart ● JVP and heart sounds ● Physiology of blood vessels ● Fetal circulation	● Hyper lipoproteinemia, metabolic syndrome
Practical	● Location of heart, pericardium and pericardial sinuses ● External features of heart, blood vessels of the heart ● Internal features of chambers of the heart	● Examination of peripheral pulses & recording of BP ● ECG ● Effect of posture on BP ● Effect of exercise on BP ● Systolic time interval (demo)	● Demonstration of estimation of cholesterol and Troponin I

	● Superior mediastinum&Posterior mediastinum ● Surface and radiological anatomy ● Embryology models	● Examination of cardiovascular system ● Cardiac AFT	

GASTROINTESTINAL SYSTEM, HEPATOBILIARY & PANCREATIC SYSTEM & NUTRITION

	Anatomy	Physiology	Biochemistry
Theory	● Introduction to GIT & Anterolateral abdominal wall ● Inguinal Canal ● Peritoneum ● Pharynx and esophagus ● Stomach ● Duodenum ● Pancreas ● Liver ● Extrahepatic Biliary Apparatus ● Portal vein &Portosystemic Anastomosis ● Caecum & Vermiform Appendix ● Rectum ● Anal Canal, Ischio-anal fossa ● Development of GIT	● Functional organization of gastrointestinal tract and principles of GI tract ● Enteric nervous System and applied aspects ● Overview of Gastrointestinal Motility and Electro-mechanical Events in GI Tract ● Role of Oral cavity and Salivary glands in GI Function ● Role of Esophagus in GI Function; Deglutition and Esophageal motility ● Functional organization of Stomach and its Electro-mechanical activities ● Gastric Acid Secretion and its Regulation ● Gastric function tests and Peptic Ulcer disease ● Exocrine Pancreas – Secretion and Regulation ● Duodenum – Secretory, Digestive and Absorptive Events ● Liver – Functional organization and role in Digestion ● Gall bladder - Functional organization and role in Digestion	Gastrointestinal system and Nutrition ● Digestion and absorption of carbohydrates, lipids, amino acids ● Metabolism of carbohydrates (Glycogenesis , Glycogenolysis, Gluconeogensis) and amino acids (Aromatic aa , glycine, branched chain, polyamine) ● Micronutrients; Vitamins , Minerals ● BMR, SDA, Balanced diet, dietary fibers Hepatobiliary and Pancreatic function tests ● Bilirubin metabolism, Bile acid synthesis ● Xenobiotics ● Types of jaundice and their biochemical alterations

		● Small intestine – Secretion, absorption, motility and electro mechanical properties ● Large Intestine – Absorption, secretion, motility and electromechanical properties ● Review of Gastrointestinal Motility and applied aspects ● Upper and Lower GI disorder&Problem based learning	
SDL	● Oral cavity ● Inguinal Hernia ● Surgical Incisions ● Pyloric stenosis	● Pancreatic function tests and Liver function tests ● Gastrointestinal Hormones ● Digestion and absorption of carbohydrate / protein / fat in the GI tract ● Gastrointestinal flora, GI lymphoid organs and Immune functions	● Diet therapy in disease conditions, PEM ● Interpretation of LFT, Pancreatic function tests
Practical	Gross Anatomy Demonstration ● Anterolateral Abdominal Wall & Inguinal Canal ● Peritoneal folds and recesses ● Stomach , Duodenum & Coeliac Trunk ● Jejunum , Ileum & Superior Mesenteric Artery ● Caecum & Appendix ● Colon, Rectum, Anal Canal & Inf. Mesenteric Artery ● Liver	● Abdominal examination	●Demonstration of chromatography ● Estimation of Bilirubin

	● Extrahepatic Biliary Apparatus & Portal vein ● Pancreas ● Spleen Osteology : ○ Lumbar Vertebra & Sacrum ○ Osteology of Pelvis ● Surface anatomy of all organs of GIT ● Radiology - Plain and contrast Radiographs ● Demonstration of GIT Embryology models Histology: ○ Salivary Glands- Serous, Mucous, Mixed ● Esophagus, Stomach ● Duodenum, Jejunum, Ileum ● Colon, Appendix ● Liver, Gallbladder, Pancreas		

RENAL SYSTEM

	Anatomy	Physiology	Biochemistry
Theory	● Kidney & ureter ● Urinary Bladder ● Urethra Male & Female ● Development of Kidney, Ureter and Urinary Bladder	• Renal circulation-special features. • Measurement and regulation of renal circulation and clearance • Juxtaglomerular apparatus • Glomerular filtration & GFR-Factors and measurement • Renin-Angiotensin-Aldosterone system • Tubular function (reabsorption, secretion and handling of solutes, • electrolytes and water) • Mechanism of urine concentration and dilution • Role of kidney in Water and Osmolarity balance • Role of kidney in acid base balance • Micturition, Cysto-metrogram, Disorders of Bladder function and Micturition • Physiological basis of Renal failure, Dialysis	● Excretory function: Formation of ammonia, Detoxification of ammonia, Urea cycle ● Regulatory function: Water and electrolyte balance(Na,K,Cl), Renal regulation of pH ● Renal function test: Tests for glomerular and tubular functions
SDL	● Renal Angle ● Morris Parallelogram	• Functional organization of the renal system, Non-excretory functions of Kidney ● Principle of Diuresis and Diuretics	• Interpretation of RFT, Disorders of urea cycle (Hyperammonemia) • Lab diagnosis of renal failure, nephritic/ nephrotic syndrome, RTA • Interpretation of metabolic acidosis and metabolic alkalosis

Practical	● Gross ○ Posterior Abdominal Wall ○ Kidney & its Relations ○ Ureter ○ Urinary Bladder ● Histology ○ Kidney ○ Ureter and Urinary Bladder ● Embryology Models	No Practical	• Urine analysis – normal and abnormal • Demonstration of urea, creatinine, pH meter and pH indicator, potentiometric analysis of electrolytes

REPRODUCTIVE SYSTEM & MAMMARY GLAND

	General Anatomy	General Physiology	General Biochemistry
Theory	● External genitalia – male and female ● Testis and spermatic cord ● Perineum ● Pelvic diaphragm with pelvic peritoneal pouches ● Prostate and accessory male reproductive organs ● Uterus, Adnexa and ovaries& ● Lateral pelvic wall ● Mammary gland ● Development of reproductive system	● Sex differentiation and development ● Male reproduction system ● Female reproduction system ● Physiology of pregnancy and parturition ● Physiology of contraception	• Biosynthesis of Gonadal Hormones • Gonadal function test • Prenatal screening test
SDL	● Prostatic urethra ● Ambiguous genitalia ● Remnants of mesonephric and paramesonephric ducts	• Physiology of breast development and lactation	• Disorders of Gonadal hormonal function
Practical	Gross Anatomy: ● Male reproductive organs (Male external genitalia, & prostate, Testis, seminal vesicles) ● Female reproductive organs (Uterus with adnexa & vagina, Supports of uterus and Ovaries) ● Lateral pelvic wall ● Sections of pelvic cavity – Male and female ● Models for development of reproductive system	• No Practical	• No Practical

	Histology: ● Testis, epididymis, Vas deferens ● Seminal vesicle & prostate, Penis, Uterus, Uterine tube ● Ovary, mammary gland, and placenta Radiology:Hystero-salpingography, Cystoscopy		

NERVOUS SYSTEM, HEAD & NECK, SPECIAL SENSES, MOLECULAR BIOLOGY, CANCER BIOLOGY & INTEGRATIVE PHYSIOLOGY

	Anatomy	Physiology	Biochemistry
Theory	● Scalp ● Posterior Triangle of neck ● Anterior Triangle of neck ● Parotid region ● Submandibular region ● Infratemporal fossa ● Temporomandibular joint ● Pharynx ● Meninges & Dural venous sinuses ● Cavernous sinus ● Development of Pharyngeal arches ● Development of Arterial arches ● Development of face & palate Special senses: ● Tongue ● Eyeball ● Extraocular muscles ● External ear and middle ear ● Internal ear ● Development of eye ● Development of ear Central nervous system: ● Spinal cord ● Cranial nerve nuclei ● Medulla ● Pons ● Midbrain ● Thalamus & Basal nuclei ● Gross features & White matter	● Functional organization of nervous system ● Synaptic transmission in CNS: and neurotransmitters ● Introduction to sensory system : physiology of receptors ● Sensory communication to spinal cord ● Ascending pathways ● Physiology of pain, itch and temperature ● The Thalamus ● The Sensory cortex ● Applied sensory physiology ● Introduction to and organization of motor system ● Segmental organization of motor system ● Muscle spindle and Golgi tendon organ ● The spinal reflexes ● Descending pathways ● Regulation of posture and movement ● Basal ganglia ● cerebellum ● Vestibular apparatus ● Functions of hypothalamus ● Reticular activating system, EEG and sleep ● Limbic system	● Nucleotide chemistry and metabolism, Gout ● Replication, transcription, translation, regulation of gene expression ● Tumor markers, oncogene, tumor suppressor ● Inhibitors of replication, transcription, translation

	of cerebrum ● Cerebellum ● Ventricles of brain ● Blood supply of brain ● Development of Nervous system	● Physiology of learning and memory ● Physiology of language and speech ● Association cortex, cortical plasticity ● Functional anatomy of eye ● The image forming mechanisms ● Visual pathway and visual cortex ● Visual acuity, visual field ● Color vision ● Functional anatomy and functions of the ear ● The auditory pathways ● Mechanism of hearing ● Hearing defects and hearing tests ● Physiology of smell ● Physiology of taste	
SDL	● Cervical sympathetic chain ● Pterygopalatine fossa ● Lymphatic drainage of neck ● Cross –section at C7 ● Eyelid and lacrimal apparatus ● Blood-brain barrier & CSF circulation ● Circumventricular organs ● Lumbar puncture ● Limbic system	● Trigeminal system ● CSF ● The photoreceptor mechanism ● Movements of eye	● Interpretation of CSF analysis
Practical	Gross Anatomy Head & Neck ● Face-Muscles, vessels & Nerves	● Examination of motor system ● Reflexes ● Examination of sensory system	● Demonstration of Electrophoresis, PCR, Western blotting

	● Triangles of neck ● Parotid region ● Submandibular region ● Infratemporal fossa & muscles of mastication ● Pharynx ● Dural venous sinuses Special senses ● Tongue & Eyeball ● Orbit ● Ear Central Nervous System ● Spinal cord ● Brainstem ● Ventricles of brain ● Thalamus & Basal nuclei ● Cerebrum ● White fibres of cerebrum ● Cerebellum ● Radiology & Surface Anatomy Osteology ● Skull ● Mandible & Cervical Vertebrae Histology (2 hrs/batch for Each topic) ● Tongue ● Cornea, optic nerve ● Retina ● Ear ● Spinal cord ● Medulla ● Pons & Midbrain ● Cerebrum & Cerebellum	● Examination of cranial nerves (I - VI) ● Examination of cranial nerves (VII-XII) ● Perimetry	

ADVANCED

	Anatomy	Physiology	Biochemistry
Theory	Continuation of Central Nervous System	Continuation of Central Nervous System ● Physiology of Yoga ● Physiology of Ageing ● Physiology of Temperature regulation ● Stem cell Physiology ● Physiological basis of stress ● Space physiology	Advances In Biochemistry ● Radioactivity, Human genome project, Genetic engineering ● Integrated metabolism ● Lab and molecular diagnostics
SDL	(Theory SDL) Continuation of Central Nervous System	● Stem cell therapy	● Personalized medicine
Practical	Continuation of Central Nervous System	● Evoked potentials demonstration	● Glucometer ● Dipsticks tests