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1st MBBS Explorer



Anatomy, Physiology, and Biochemistry

MBBS Syllabus (Theory) and Format of Paper, Oral/Viva and Practical Examination
Practical Notes, MBBS and Supplementary Examinations (1994–2015)
"1st MBBS Papers (1994–2015) and Supplementary Papers (2009–2014)", and
"Colored Histology Slides with Descriptions, and Solved Problem Cards"

Indranil Banerjee

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Physiology: MBBS Syllabus (Theory) and Format of Paper

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1ST MBBS EXAMINATION PHYSIOLOGY: SYLLABUS AND FORMAT

Written Paper

Paper I:

1. General Physiology
2. Nerve muscle Physiology
3. Blood
4. GI System
5. Respiratory System
6. Cardiovascular System

Paper II:

1. Endocrine System
2. Reproductive System
3. Excretory System
4. Nervous System
5. Special Sense.

The four questions in each theory paper will preferably have the following distribution of marks.

1. **One long essay type question (out of two) consisting of 2-4 small segments. Marks for each segment will be indicated separately. 12 marks**
2. **Two short essay type question (out of three), each consisting of 2-3 small segments and marks for each segment will be indicated separately. 14 (7 × 2) marks**
3. **Four short notes (out of five). 12 (3 × 4) marks**
4. **Four short clinically oriented explanatory notes (out of four) 12 (3 × 4) marks**

Answer to each question is to be given by the candidates in a separate answer book

SYLLABUS OF PHYSIOLOGY FIRST PROFESSIONAL MBBS COURSE

1. General physiology and Biophysics:

- Molecular structure of cell membrane and its functions. Types of transport across cell membrane.

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- Intercellular connections.
- Resting membrane potential and action potential.
- Homeostasis.
- Physical principles governing flow of blood in heart and blood vessels (to be taught with CVS).
- Physical principles governing air flow in respiratory passage (to be taught with respiratory system).

2. Nerve muscle physiology:

- Neuron: Structure, degeneration, regeneration, denervation hypersensitivity, electrogenesis of action potential.
- Neuromascular transmission and its clinical application.
- Functional anatomy of skeletal muscle. Mechanism of muscle contraction and relaxation, contracture, rigor mortice, isotonic and isometric contraction, energy sources and metabolism, motor unit, size principle, recruitment.
- Type of smooth muscle and mechanism of contraction.

3. Blood:

- Composition and functions of blood.
- Plasma protein: types, origin, functions, applied importance
- RBC: Morphology, erythropoiesis, functions, fate
- ESR and its clinical importance
- Hemoglobin Structure, types, compounds of hemoglobin, abnormal hemoglobin, RBC indices PCV, MCV, MCH, MCHC, Color index.
- Anemia Types with examples
- Polycythemia
- Iron metabolism
- WBC Types, morphology, leucopoiesis, functions
- Immunity: Humoral and cellular, mechanism of immune response, immunoglobins,
- Monocyte: Macrophage system
- Platelets: Structure and functions
- Hemostasis: Role of platelets, Blood coagulation, anticlotting mechanisms, anticoagulants.
- Bleeding disorders: Purpura, Hemophilia, Vitamin K deficiency, tests for bleeding disorders.
- Thrombosis disorders: Thrombosis, embolism
- Blood group: Different systems, blood grouping and cross matching and clinical importance.
- Blood transfusion: Hazards of blood transfusion, storage of blood.

4. Gastrointestinal System:

- Characteristics of GI wall
- Neural control of GI function
- GI hormones
- Saliva: Composition, functions, control of secretion.
- Gastric juice: Composition, mechanism of secretion, functions, regulation of secretion, mucosal barrier, peptic ulcer, gastrectomy, dumping syndrome,

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- Pancreatic juice: Composition, function, and regulation-applied importance.
- Liver and gallbladder: Compositions and functions of bile control of secretion, functions of gallbladder, gallstones, enterohepatic circulation, jaundice, functions of liver and LFT.
- Small intestine: Composition, regulation of secretion, and functions of intestinal juice.
- Large intestine: Functions.
- Movements of GI tract: Mastication, deglutition, gastric motility and emptying, intestinal motility with reference to BER, small bowel wave, peristalsis, paralytic illus defecation.

5. Respiratory system:

- Functional anatomy and functions of respiratory system.
- Mechanics of respiration.
- Lung volumes and capacities: Definitions, normal values, their measurement and clinical importance.
- Pulmonary ventilation, alveolar ventilation, dead space.
- Diffusion of gases across alveocapillary membrane, diffusing capacity.
- Pulmonary circulation.
- Oxygen and carbon dioxide transport in blood.
- Pressure changes during ventilation, pressure volume relationship including surfactant and compliance, airway resistance, work of breathing.
- Control of respiration: Neutral control, chemical control, response to exercise, periodic breathing.
- Hypoxia including high altitude physiology and acclimatization, asphyxia, cyanosis, oxygen therapy and toxicity.
- Effects of increased barometric pressure-nitrogen narcosis, high pressure nervous syndrome, decompression sickness (Caissons disease).
- Artificial respiration.
- Lung function tests.

6. Cardiovascular system:

- Functional anatomy of heart and blood vessels.
- Properties of cardiac muscle.
- Origin and spread of cardiac impulse, heart block, cardiac arrhythmias.
- ECG: Leads, principles of normal recording, normal waves, and their interpretations, electrical axis of the heart including left and right axis deviation, clinical uses of ECG.
- Cardiac cycle: Mechanical events, pressure changes in atria, ventricles, aorta, pulmonary artery and jugular vein. End diastolic volume, end systolic volume, ejection fraction.
- Heart sounds: Normal character, physiological basis of splitting, murmur.
- Cardiac output: Definition, determination, factors regulating, venous return.
- Arterial pulse: Normal and abnormal.
- Physical principles governing flow of blood in heart and blood vessels, laminar flow, turbulent flow, reynolds number, peripheral resistance, Poiseuille-Hagen formulae.

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- Arterial pressure: Total pressure, lateral pressure, Bernoulli's principle, importance of different pressure measurement, factors controlling BP, effects of gravity, posture and exercise on BP, hypertension and hypotension.
- Regulation of CVS: Local regulation including auto regulation of blood flow, vasoconstrictors 7 vasodilators, substances secreted by endothelium including No. systemic regulation- humeral and neutral, innervations of heart and blood vessels, cardiovascular centers, cardiovascular reflexes, regulation of BP and heart rate.
- Regional circulation: Coronary circulation, cutaneous circulation, pulmonary, cerebral, renal circulation will be taught in respective systems.
- Cardiovascular adjustments in health and disease: Effects of exercise, hemorrhage and shock.

7. Endocrine system:

- General organization of endocrine glands and control system
- Mechanism of hormone action
- Biosynthesis, regulation of secretion, transport, fate and actions of hormones secreted from. Hypothalamus, pituitary, thyroid, adrenal cortex, adrenal medulla, parathyroid (along with calcium metabolism) and endocrine pancreas, importance to be given to clinical conditions associated with hypo and hyper functions of these glands.

8. Reproductive system:

- Sex differentiation and development of reproductive system
- Aberrant sexual differentiation, chromosomal abnormalities, developmental abnormalities
- Puberty, precocious and delayed puberty
- Climacteric
- Male reproductive system: Spermatogenesis, endocrine functions of testis, abnormalities of testicular function, cryptorchidism, male hypogonadism, and sterility.
- Female reproductive system: ovary, oogenesis, ovulation, corpus luteum, ovarian hormones estrogens, progesterone, relaxin, control of ovarian functions by hypothalamic and pituitary hormones.
- Menstrual cycle: Ovarian cycle, uterine cycle, hormonal basis, abnormalities of menstruation, infertility
- Pregnancy: Fertilization, implantation, placental hormones, pregnancy tests, parturition
- Lactation
- Contraception.

9. Excretory System:

- Functional anatomy of kidney, nephron structure, parts, function, types.
- *Juxtaglomerular apparatus:* Autoregulation, peculiarities, measurements.
- *Renal circulation:* Autoregulation, peculiarities, and measurement
- *Glomerular filtration:* Filtration barrier, forces governing filtration, measurement.

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- Tubular functions: Reabsorption, secretion, TM values
- Regulation of ECF: Volume, osmolality and electrolytes
- Micturition
- Renal function tests, renal clearance, abnormal constituents of urine
- Excretory functions of skin.

10. Nervous system:

- Organization of nervous system, functional anatomy of brain and spinal cord, neuron, neuroglia
- Cerebral circulation, CSF, blood brain barrier
- *Synapse:* Types, properties, synaptic transmission, neurotransmitters
- *Sensory receptors:* Classification, generator potential, properties,
- *Reflex action:* Definition, reflex arc, stretch reflex, inverse stretch reflex, withdrawal reflex
- *Sensory system:* Touch, pain, temperature, vibration, proprioception, ascending tracts, sensory cortex
- *Pain:* Types, visceral pain, pain inhibiting mechanism, gating of pain, opioids, analgesia, hyperalgesia, thalamic syndrome
- *Motor system:* Motor cortex, descending tracts pyramidal and extrapyramidal tracts, upper motor neuron lesion, lower motor neuron lesion, hemiplegia, paraplegia, monoplegia.
- *Injuries of spinal cord:* Complete transaction, hemisection, tabes dorsalis, syringomyelia, section of anterior root and posterior root.
- *Cerebellum:* Structure, parts, connections, functions, features of cerebellar lesion.
- *Basal ganglia:* Components, connections, functions, applied.
- Muscle tone, posture, equilibrium, regulation of muscle tone and posture, vestibular apparatus.
- *Autonomic nervous system:* Organizations and functions.
- *Hypothalamus:* Structure and functions, temperature regulation.
- Physiology of thalamus, reticular formation, RAS.
- EEG, sleep and wakefulness.
- Physiology of limbic system.
- *Higher functions of the brain:* Learning and memory, speech.

11. Special Sense:

- *Smell:* Receptor, pathway.
- *Taste:* Taste buds, pathway.
- *Vision:* Structure of eyeball, structure of retina, visual pathway and effects of lesion, image forming mechanism, light reflex, accommodation, errors of refraction, electrophysiology of eye, color vision, color blindness, dark adaptation.
- *Hearing:* Functional anatomy of the ear, functions of middle ear, organ of corti, hair cell physiology-endocochlear potential, auditory pathway, sound localization, pitch discrimination, deafness.

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MODEL QUESTIONS

Physiology
First Paper

Time: 2.5 Hours Marks: 50

Answer all questions

Group A

1. Define hypoxia. Classify it and give one example of each type. Discuss acclimatization in high altitude. 2 + 4 + 6

OR

Define immunity. Compare and contrast between innate and acquired immunity. Give a short account of humoral immunity. 2 + 4 + 6

Group B

2. Answer any two of the following:

a. Describe the molecular mechanism of skeletal muscle contraction. What is rigor mortis? **5 + 2**

b. Describe how HCI is secreted by cells in the gastric mucosa. What is mucosal barrier? **4 + 3**

c. Briefly describe oxyhemoglobin dissociation curve. Mention the factors which shift the curve to the left. **5 + 2**

Group C

3. Write short notes on the following (any four): 4 × 3

a. Exocytosis
b. Chemoreceptors
c. Conducting system of the heart
d. Venous return
e. Phagocytosis

Group D

4. Explain the following statements: 4 × 3

a. Fatty meal delays gastric emptying.
b. Left ventricle gets more blood supply in diastole.
c. Oral Vit. B12 cannot cure pernicious anemia.
d. Urobilinogen is absent in complete billiary obstruction.

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MODEL QUESTIONS

Physiology
Second Paper

Time: 2.5 Hours Marks: 50

Answer all questions

Group A

1. What are the functional divisions of the cerebellum? Mention their functions. List the clinical features of cerebellar dysfunction. **2 + 5 + 5**

OR

Discuss the biosynthesis of thyroid hormones. What are the features of hypothyroidism in an adult?

7 + 5

Group B

2. Answer any two of the following:

a. What are the factors controlling spermatogenesis? What is *in vitro* fertilization? **5 + 2**

b. How is sodium reabsorbed in the renal tubule? What is glomerulo tubular balance? **5 + 2**

c. Name the photosensitive pigments in the retina. Describe the sequence of events involved in phototransduction in the retina. **2 + 5**

Group C

3. Write short notes on the following *(any four)* **4 × 3**

a. Pregnancy tests
b. Referred pain
c. REM sleep
d. Cushings syndrome
e. Brown-Sequard syndrome

Group D

4. Explain the following statements: **4 × 3**

a. Near point recedes throughout life.
b. Glycosuria occurs when blood glucose level exceeds 180 mg/dl in venous blood.
c. Bradykinesia occurs in Parkinson's disease.
d. Insulin lowers blood sugar level.

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Salient Features

- The book contains West Bengal University of Health Sciences' syllabus of anatomy, physiology and biochemistry
- Pictures and description of basic slides of histology
- Pictures of transverse sections of the body in anatomy for spotting
- Solved problem cards in biochemistry
- Last 22 years' 1st Professional MBBS—Regular (1994–2015) and Supplementary (2009–2014) Questions
- Detailed biochemistry practical notes on identification of carbohydrates, proteins, glycerol, cholesterol, abnormal constituents of urine, titration of gastric juice and alkali, colorimetry, Beer-Lambert law, estimation of blood sugar, urea, creatinine and total protein, flame photometer, chromatography
- Model test papers of anatomy, physiology and biochemistry with rules for answering questions
- Format of theory paper and practical examination with marks distribution in university examination.

Indranil Banerjee is an ex-student of the first batch of medical graduates from KPC Medical College and Hospital, Kolkata, West Bengal, India. He is also the author of 'Revolutions 2nd MBBS' published by the same publisher.



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