

M.B.B.S. FIRST PROFESSIONAL EXAMINATION, SEPTEMBER-2025**PHYSIOLOGY****PAPER - FIRST****[Time allotted: Three hours]****SET - A****[Max Marks: 100]****Q. 1. Multiple choice questions (Darken the single best response in OMR sheet. Time allotted 20 minutes) (20 x 01 = 20)**

1. Digitalis a cardiac glycoside, is the drug of choice for congestive cardiac failure. Which of the following is **not true** about digitalis?
 - a. Increases the contractile strength in healthy human heart
 - b. Increases the calcium ions in cardiac muscle fibers
 - c. Inhibits sodium-potassium pump in cardiac muscle membrane
 - d. Reduces sodium-calcium exchange across cell membrane
2. Changes in fetal circulation at birth include **all except**:
 - a. Closure of foramen ovale
 - b. Decreased systemic vascular resistance
 - c. Decreased pulmonary vascular resistance
 - d. Functional closure of ductus arteriosus
3. A 65 year old male who presented with chief complaints of urinary incontinence was advised cystometry. Which part of cystometrogram is a manifestation of Laplace law?
 - a. I a
 - b. I b
 - c. II
 - d. III
4. Static lung function tests include various lung volume and capacities. What is the term given to the amount of air remaining in lungs at the end of normal expiration?
 - a. Expiratory reserve volume
 - b. Expiratory capacity
 - c. Functional residual capacity
 - d. Residual volume
5. In healthy individuals, auto regulation mechanism of kidney maintains constant GFR despite changes in arterial blood pressure from 70 to 180 mm of Hg. The sensor for the rate of flow of tubular fluid in tubuloglomerular feedback is located in:
 - a. JG cells
 - b. Interstitial cells
 - c. Macula densa cells
 - d. Lacis cells
6. To prevent dehydration one should take plenty of water daily. Water is transported from ECF to ICF by:
 - a. Cotransport
 - b. Diffusion
 - c. Filtration
 - d. Secondary active transport
7. A person having high grade fever with pain in joints and living in area with plenty of mosquitos, got blood investigation with platelet count done. Which of the following is **not** a function of platelet?
 - a. Blood coagulation
 - b. Blood flow
 - c. Clot retraction
 - d. Thrombolysis
8. The most important stimulus controlling the level of resting ventilation in different age groups is:
 - a. PO₂ on peripheral chemoreceptors
 - b. PCO₂ on peripheral chemoreceptors
 - c. pH of CSF on central chemoreceptors
 - d. PO₂ on central chemoreceptors
9. During routine physical examination in a pregnant female in third trimester, third heart sound (S3) was audible on auscultation. Which of the following is **false** about S3?
 - a. Heard at beginning of middle third of diastole
 - b. High frequency sound recorded in phonocardiogram
 - c. Normally present in children, adolescents and young adults
 - d. Presence in older adults indicates systolic heart failure
10. Regulation of blood pressure is also mediated by endogenous vasoactive system in the body. Which of the following vasoactive peptide is a powerful vasoconstrictor?
 - a. Bradykinin
 - b. Endothelin
 - c. Histamine
 - d. Nitric oxide
11. A middle aged teetotaler is disturbed by pain in upper abdomen with belching, heartburn, indigestion, and nausea and vomiting due to gastritis. Which of the following statements is **not true** about parietal cells in the stomach?
 - a. Synthesize and secrete Cl⁻ into the lumen of canaliculi
 - b. Secrete H⁺ into the lumen of canaliculi in exchange for K⁺
 - c. Rich in mitochondria
 - d. High H⁺ - K⁺ ATPase
12. Which of the following factors increases the excitability of a neuron?
 - a. Old age
 - b. Increased extracellular hydrogen ion concentration
 - c. Reduced extracellular calcium ion concentration
 - d. Severe hyponatremia
13. In patients of classical haemophilia the clotting time is increased while bleeding time remains normal. In clotting mechanism via intrinsic and extrinsic pathway, the key reaction is:
 - a. Formation of thrombin
 - b. Formation of prothrombin activator
 - c. Formation of fibrin
 - d. Conversion of factor X to Xa
14. In cancer, there is dysregulation of various transcription factors. Transcription refers to the process:
 - a. Of replication of DNA prior to cell division
 - b. Where DNA wraps around histones to form a nucleosome
 - c. Where a DNA sequence is copied into RNA for the purpose of gene expression
 - d. Where a mRNA is used as a template for protein production
15. In which of the following conditions is CO₂ retention most likely to occur?
 - a. Climbing a high mountain
 - b. Ventilatory failure
 - c. Carbon monoxide poisoning
 - d. Hysterical hyperventilation
16. Drugs that paralyze vascular smooth muscles prevent renal autoregulation. Which of the following is **true** relating to control of renal circulation?
 - a. Prostaglandins & bradykinin increase renal vascular resistance
 - b. Endothelial derived Nitric oxide decreases GFR
 - c. Norepinephrine & epinephrine constricts renal blood vessels
 - d. Angiotensin-II constricts afferent arteriole
17. Surfactant deficiency in premature born babies leads to hyaline membrane disease. Which of the following statement best describes pulmonary surfactant?
 - a. Increases the work required to expand the lungs
 - b. Is secreted by type I alveolar epithelial cells
 - c. Prevents transudation of fluid from the capillaries into the alveolar spaces
 - d. Increases the surface tension of alveolar lining fluid
18. Normally the blood flowing in vessels is prevented from clotting because:
 - a. Vitamin K antagonists are present in plasma
 - b. Thrombin has positive feedback on plasminogen
 - c. Sodium citrate in plasma chelates calcium ions
 - d. Vascular endothelium is smooth and coated with glycocalyx
19. Normally proteins like albumin are not filtered across glomerular membrane and thus not seen in urine due to:
 - a. Negatively charged molecules are larger
 - b. Presence of positively charged sialoproteins on filtering membrane
 - c. Presence of negatively charged sialoproteins on filtering membrane
 - d. Urine is acidic
20. Which of the following type is **not** included in morphological classification of anemia?
 - a. Microcytic hypochromic anemia
 - b. Normocytic normochromic anemia
 - c. Macrocytic hyperchromic anemia
 - d. Macrocytic normochromic anemia

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Note: Attempt all questions in sequence.
Draw suitable diagrams (wherever necessary)

Q. 2. Give reasons: (5 x 2 = 10)

- a. ABO incompatibilities rarely produce hemolytic disease of newborn
- b. Intrapleural pressure is negative (subatmospheric)
- c. Epinephrine is life saving in case of anaphylactic shock
- d. Proteinuria occurs in renal failure
- e. Facilitated diffusion is faster than simple diffusion

Q. 3. Problem based question: (5 x 2 = 10)

A 30 year old female presented in OPD with complaints of:-

- Yellow discoloration of eyes and skin since 2 days &
- Off and on fever with chills and rigor for last 3-4 days.

On examination:-

Icterus- present with mild to moderate splenomegaly

Lab investigations:-

Peripheral blood smear- Reticulocytosis with abnormal RBC's present

Serum bilirubin- 5 mg/dl, S.conjugated bilirubin- 0.1 mg/dl & S.unconjugated bilirubin- 4.9 mg/dl

Liver function tests- Normal

Urine- bilirubin absent & urobilinogen increased (++)

Based on above findings answer the following questions:

- a. What could be most likely diagnosis?
- b. How will you confirm it?
- c. Give the schematic flow diagram of formation of bilirubin.
- d. Give the normal reticulocyte count and explain the structure of reticulocyte.
- e. Why bilirubin is absent in urine?

Q. 4. Write briefly on: (4 x 6 = 24)

- a. Methods of acidification of urine in different parts of renal tubules
- b. Steps involved in the breakdown and absorption of proteins
- c. Liver function tests
- d. What are the privileges and responsibilities of being a doctor?

Q. 5. Structured questions:

(i) Describe the transport of oxygen in blood with a labelled diagram of oxygen- dissociation curve.

Explain Bohr's effect and its significance.

(6 + 4 = 10)

(ii) Define blood pressure giving normal values. Enumerate the reflex mechanisms for maintaining normal arterial pressure. Draw and describe the role of baroreflex mechanism.

(2+3+5 = 10)

Q. 6. Answer as indicated (Explain with labelled /flow diagram): (4 x 4 = 16)

- a. Nonrespiratory functions of the lungs
- b. Structure and functions of Juxta Glomerular Apparatus
- c. Depict diagrammatically ventricular volume- pressure changes during each cardiac cycle.
- d. Basal electrical rhythm
