

KING GEORGE'S MEDICAL UNIVERSITY, LUCKNOW U.P.  
DEPARTMENT OF BIOCHEMISTRY

1<sup>st</sup> Terminal Examination MBBS Phase I 2025 Batch

Time Allowed: 20 min

Maximum Marks 20

Note: Attempt all questions and write the correct answer to the MCQs.

SECTION A

Q1. Isoenzyme Hexokinase:

- a) have high  $K_m$
- b) have low affinity
- c) act as glucose sensor in pancreas
- d) show hyperbolic substrate-velocity curve

Ans.

Q2. When an enzyme is subjected to high temperature, it denatures. Which one of the following bond is the first to be disrupted at high temperature?

- a) Disulfide
- b) Hydrogen
- c) Ionic
- d) Peptide

Ans.

Q3. Aspirin an anti-inflammatory drug acts by:

- a) Acetylation of serine residue in active site of COX enzyme
- b) Irreversible inhibition of thymidylate synthase
- c) Stimulating opiate receptors in the central nervous system
- d) Inhibiting the production of thromboxane A<sub>2</sub> only

Ans.

Q4. Which of the following is an essential fatty acid?

- a) Palmitic acid
- b) Stearic acid
- c) Oleic acid
- d) Linoleic acid

Ans.

Q5. The precursor of prostaglandins is:

- a) Linoleic acid
- b) Arachidonic acid
- c) Oleic acid
- d) Stearic acid

Ans.

Q6. Which of the following glycosaminoglycan is intracellular?

- a) Heparin
- b) Hyaluronic Acid
- c) Chondroitin sulfate
- d) Keratin sulfate

Ans.

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**Q7. Which of the following is an epimeric pair?**

- a) Glucose and galactose
- b) Galactose and mannose
- c) Fructose and galactose
- d) Lactose and maltose

Ans.

**Q8. Amino acids exist as zwitterions at:**

- a) Acidic pH
- b) Alkaline pH
- c) Isoelectric pH
- d) Physiological pH only

Ans.

**Q9.  $\alpha$ -Helix structure is commonly present in:**

- a) Collagen
- b) Keratin
- c) Hemoglobin
- d) Immunoglobulin

Ans.

**Q10.  $\text{Na}^+$ - $\text{K}^+$  ATPase is an example of:**

- a) Passive transport
- b) Secondary active transport
- c) Primary active transport
- d) Diffusion

Ans.

**Q11. Mitochondrial DNA is:**

- a) Linear and double-stranded
- b) Circular and double-stranded
- c) Single-stranded
- d) Bound to histones

Ans.

**Q12. Which of the following is affected the earliest in a patient with iron deficiency anemia:**

- a) Serum transferrin saturation
- b) Serum Ferritin
- c) Mean corpuscular volume
- d) Serum iron levels

Ans.

**Q13. Deficiency of which mineral can cause bone pain, tetany, paresthesia and an increased tendency to bleed?**

- a) Calcium
- b) Selenium
- c) Copper
- d) Magnesium

Ans.

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**Q14. Which of the following statement concerning vitamin D is correct?**

- a) A deficiency results in increased secretion of calbindin.
- b) Chronic Kidney Disease results in overproduction of 1,25-Dihydroxycholecalciferol.
- c) 25-Hydroxycholecalciferol is the active form of the vitamin.
- d) It is required in the diet of individuals with limited exposure to sunlight

Ans.

**Q15. Accumulation of which of the following water soluble vitamin can lead to toxicity manifestations?**

- a) Niacin
- b) Thiamin
- c) Riboflavin
- d) Folate

Ans.

**Q16. A 52 year old woman presents with fatigue of several months duration. Blood studies reveal macrocytic anemia, reduced Hb levels, elevated Homocysteine, and normal levels of methylmalonic acid. Which of the following is most likely deficient in this woman?**

- a) Folic acid
- b) Folic acid and vitamin B12
- c) Vitamin B12
- d) Iron

Ans.

**Q17. Which hemoglobin state has low affinity for oxygen?**

- a) R-state
- b) Oxyhemoglobin
- c) T-state
- d) Carbaminohemoglobin

Ans.

**Q18. Which hemoglobin species shows the LEAST cooperative binding for oxygen?**

- a) Adult hemoglobin (HbA)
- b) Fetal hemoglobin (HbF)
- c) Deoxyhemoglobin
- d) Myoglobin

Ans.

**Q19. Compared to adult hemoglobin, fetal hemoglobin has:**

- a) Higher P50 value
- b) Lower affinity for oxygen
- c) Reduced binding to 2,3-BPG
- d) More  $\beta$ -chains

Ans.

**Q20. Which amino acid does not show optical activity?**

- a) Alanine
- b) Glycine
- c) Valine
- d) Leucine

Ans.

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SECTION C

Maximum Marks - 40

**Q1.** A 55 year old man presents with complaints of weakness, loss of appetite and weight loss. Recently, he noticed yellow discoloration of his eyes. The patient has history of repeated blood transfusions due to a red cell disorder. Physical examination reveals increased skin pigmentation and enlarged liver. Lab investigation showed increased total bilirubin, ALP, AST, ALT, serum total iron, total iron binding capacity but low transferrin.

- (i) What is the probable diagnosis? (1)
- (ii) What is the biochemical cause of this disease? (2)
- (iii) Explain the basis of yellow discoloration of eyes. (2)
- (iv) What are the different complications of the disease? (3)
- (v) What is the treatment for this disease? (2)

**Q2. Short Answer Questions**

(6x5 = 30)

- a) Why is the oxygen dissociation curve sigmoid in shape? List the factors causing a right shift of the oxygen dissociation curve. ✓
- b) How does binding of the first oxygen molecule affect hemoglobin affinity for subsequent oxygen molecules? ✓
- c) Vitamins have special antioxidant role in our body. Explain. ✓
- d) Explain the mechanism by which Vitamin K functions as the coenzyme for Postsynthetic modification of calcium binding proteins. ✓
- e) Describe the role of vitamin D in calcium metabolism. ✓
- f) Describe in short the role of a Physician in healthcare. ✓

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1<sup>st</sup> Terminal Examination MBBS Phase 1 2025 Batch

Date: 10.01.2026  
Time Allowed: 2 hr 40 min

Maximum Marks – 80

*Note: Attempt all questions in serial order. Answer Section B and Section C in a separate answer books. All parts of a question should be answered together. Illustrate your answer with suitable diagrams where required. Figures in parenthesis indicate marks allotted to a question*

**SECTION B**

Maximum Marks - 40

**Q1.** A 57-year-old male presents to the emergency of KGMU with complaints of profuse sweating and a feeling of tightness in the chest for the past 4 hours. The chest pain radiates to his left shoulder and arm. An ECG reveals ST segment elevation. The physician orders laboratory investigations and findings are as follows:

Parameter	Results	Reference Range
CK-total	400.0	30 – 200 U/L
CK-MB	109.4	1.39 – 6.22 ng/ml
AST	80.0	10 – 40 U/L
hs-Troponin T	0.355	0.0 – 0.014 ng/ml

- (i) Based on clinical presentation and laboratory findings what is your probable diagnosis? (1)
- (ii) Mention the class of the enzymes CK and AST according to the IUBMB classification. (2)
- (iii) Explain the clinical significance of CK-MB versus other CK isoenzymes in the given case. (2)
- (iv) Describe the pattern of CK-MB, AST and Troponin T (time of appearance, peak and return to normal) following a myocardial infarction. (3)
- (v) If patient is later prescribed Lovastatin to manage cholesterol levels, explain the mechanism of action of this drug in term of enzyme inhibition. (2)

**Q2. Short Answer Questions**

(6x5 = 30)

- a) Define phospholipids. Classify phospholipids and describe their structure and functions.
- b) Describe plasma lipoproteins with respect to their classification, composition, and functions.
- c) Write briefly about glycosaminoglycans.
- d) Clinically Important Carbohydrates.
- e) What happens to amino acids at pH below and above pI? Provide two functions of protein.
- f) Write short note on different types of cell transport with examples.