Rajiv Gandhi University of Health Sciences, Karnataka

MBBS Phase – I (CBME) Degree Examination - 19-Aug-2024

Time: Three Hours **Max. Marks: 100**

BIOCHEMISTRY – PAPER I (RS-4)
QP Code: 1024
(QP contains three pages)

Your answers should be specific to the questions asked
Draw neat labeled diagrams wherever necessary

LONG ESSAYS **2 x 10 = 20 Marks**

1. A 24-year-old patient was brought to emergency department in unconscious state. Past history revealed that he was a known case of type 1 diabetes mellitus. His plasma glucose on arrival was 580. Rothera's test with his urine was found to be positive. Provisional diagnosis of diabetic ketoacidosis was made. Physician from emergency department suggested starting him on an insulin drip and administering one amp of bicarbonate. Monitoring of plasma glucose every hour was advised.
   a) What is the acid-base disturbance of the above patient?
   b) Mention the normal pH of blood.
   c) Explain renal mechanism in maintenance of acid-base balance.
   d) List two other clinical conditions causing above acid-base disturbance.

2. Mention the salient features of active site of an enzyme. Explain four factors affecting enzyme activity.

SHORT ESSAYS **8 x 5 = 40 Marks**

3. A 45-year-old HR manager complained of fatigue and tiredness. He also complained of vague aches over his body and pains in the limbs. History revealed that he worked every day in his air-conditioned office for more than 10 hours and had limited exposure to sunlight. After thorough clinical examination, his Physician advised to check for Vitamin D3 levels. Report revealed to be 5ng/mL (Reference range: 20 to 40 ng/mL).
   a) Name the disorder caused by Vitamin D deficiency in adults.
   b) Explain the biochemical functions of Vitamin D.
   c) What is Vitamin D resistant rickets?

4. A 10-year-old girl presented with excessive tiredness, poor appetite, inability to concentrate, difficulty in breathing on exertion and easy fatigability. On examination, there was pallor present. Laboratory tests revealed decrease in hemoglobin, ferritin and MCV. Total Iron Binding Capacity (TIBC) and transferrin levels were elevated. Based on above history and laboratory findings, iron deficiency anemia was made.
   a) Mention two iron rich dietary sources.
   b) Name two substances which decrease absorption of iron.
   c) Explain mucosal block theory.

5. Define gluconeogenesis. Explain the pathway for formation of glucose from glycerol as substrate.

6. Explain the metabolism of HDL. Substantiate why HDL is called as 'good cholesterol'.

7. Define dietary fibers. Give four examples of dietary fibers. Mention the beneficial effects of dietary fibers.

8. Explain the metabolic adoptions during well-fed state.

9. Mention the coenzyme forms of riboflavin. List four biochemical reactions in which coenzyme forms of riboflavin participates.

10. Mention the significance of pentose phosphate pathway and uronic acid pathway.

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SHORT ANSWERS **10 x 3 = 30 Marks**

11. Define symport and antiport with one example to each.
12. Mention the amino acid composition of collagen. Name two disorders associated with defective collagen.
13. How are sugar alcohols formed? Mention the clinical importance of sorbitol and mannitol.
14. How are liposomes formed? Mention the clinical applications of liposomes.
15. What are lipotrophic factors? Give four examples of lipotrophic factors.
16. What are high energy compounds? Give two examples and mention their significance.
17. Mention three biochemical functions of zinc.
18. Define obesity. Mention four health risks associated with obesity.
19. Define hyperkalemia. Mention two clinical conditions associated with hyperkalemia.
20. Name the bile salts and mention their functions.

Multiple Choice Questions **10 x 1 = 10 Marks**

21 i) Km value of an enzyme is
- A. Time required for completion of an enzyme catalysed reaction
- B. Substrate concentration at half the maximum velocity
- C. Half the substrate concentration at maximum velocity
- D. Dissociation constant of enzyme-substrate complex

21 ii) Deficiency of which of the following vitamins results in excretion of xanthurenic acid in urine?
- A. Pyridoxine
- B. Vitamin B12
- C. Folic acid
- D. Niacin

21 iii) Secretion of antidiuretic hormone (ADH) is stimulated by all the following **EXCEPT**
- A. Increased sodium in serum
- B. High osmolality of plasma
- C. Inability to retain sodium
- D. ECF volume contraction

21 iv) Which of the following is a heteropolysaccharide?
- A. Glycogen
- B. Heparin
- C. Chitin
- D. Inulin

21 v) Which of the following represents 'alkali reserve'?
- A. Albumin
- B. Phosphate
- C. Hemoglobin
- D. Bicarbonate

22 i) Marker enzyme for organelle lysosome is
- A. Lactate dehydrogenase
- B. Galactosyl transferase
- C. Acid phosphatase
- D. ATP synthase

22 ii) Major fat in adipose tissue is
- A. Triacylglycerol
- B. Sphingolipids
- C. Phospholipid
- D. Cholesterol

22 iii) All of the following increase the absorption of calcium from intestine **EXCEPT**
- A. Lysine and arginine amino acids
- B. Parathyroid hormone
- C. Calcitonin

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D. Calcitriol

22 iv) Which of the following conditions is associated with secondary hyperlipidemia?
A. Hyperthyroidism
B. Chronic pancreatitis
C. Hepatitis C infection
D. Nephrotic syndrome

22 v) Death due to cyanide poisoning is as a result of
A. Cyanide inhibiting cytochrome oxidase
B. Cyanide hemoglobin complex formation
C. Cyanide blocking oxygen transport in blood
D. Cyanide inhibiting complex I of electron transport chain

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