

SS/MBBS-I/BIO-I/02-21

First Professional MBBS Examination

2021

(February)

BIOCHEMISTRY

Paper-I

Full Marks: 100

Time: 3 hours

The figures in the margin indicate

full marks for the questions

Write the answers to the two Halves in separate books

Answer all questions

FIRST HALF

1. What are the causes of glycosuria? What is renal threshold value for glucose? What is the normal fasting and postprandial plasma glucose level? Write briefly on regulation of plasma glucose level. (4 + 1 + 2 + 8 = 15)

2. What do you mean by oxidative phosphorylation? How does it differ from substrate level phosphorylation? Discuss briefly on chemiosmotic hypothesis of oxidative phosphorylation. Write a note on coupler and uncoupler of oxidative phosphorylation. (1 + 2 + 7 + 5 = 15)

3. For the following MCQ-type questions, write down the answers (a), (b), (c) or (d) against the questions in the answer booklet: (1 x 10 = 10)

(i) Which one of the following is also called invertase?

(a) Sucrase

(b) Lactase

- (c) Maltase
- (d) Isomaltase

(ii) Which one of the following is a heteropolysaccharide?

- (a) Insulin
- (b) Glycogen
- (c) Dextran
- (d) Hyaluronic acid

(iii) Ceramide is a

- (a) simple lipid
- (b) phospholipid
- (c) glycolipid
- (d) derived lipid

(iv) GMI, the receptor for cholera toxin, is a

- (a) phospholipid
- (b) transmembrane protein
- (c) glycolipid
- (d) peripheral membrane protein

(v) Which of the following is an essential fatty acid belonging to W_3 series?

- (a) Arachidonic acid
- (b) Linoleic acid
- (c) α linolenic acid
- (d) μ linolenic acid

(vi) Which of the following amino acids contains an SH group?

- (a) Cystine
- (b) Lysine
- (c) Cysteine
- (d) Methionine

(vii) Which of the following is a high energy compound?

- (a) Glucose and phosphate
- (b) Fructose 1,6-bisphosphate
- (c) Glyceraldehyde 3 phosphate
- (d) 1,3-bisphosphoglycerate

(viii) Methotrexate inhibits which enzyme?

- (a) Xanthine oxidase
- (b) Dihydrofolate reductase
- (c) Adenine phosphoribosyltransferase
- (d) Hypoxanthine guanine phosphoribosyltransferase

(ix) Which of the following is an uncoupler of oxidative phosphorylation?

- (a) Cyanide
- (b) Oligomycin
- (c) Thermogenin
- (d) Carbon monoxide

(x) Main fuel for muscle contraction during short-term maximum exertion is

- (a) muscle glycogen
- (b) muscle reserve of TAG
- (c) plasma glucose
- (d) plasma-free fatty acids

4. A 45-year-old moderately obese diabetic patient was brought to the medical emergency in an unconscious state. He was breathing deeply and rapidly. The breath did not smell of acetone or alcohol. Signs of mild dehydration such as dry tongue. Weak and rapid pulse and low blood pressure were present.

For the last 2 days the patient had hectic sessions of physical activity when he went to a hill station for recreation. He had rich meals during this period often accompanied by drinking till late night. While driving back home early in the morning the family members noticed that he was disoriented and his speech was incoherent.

Blood and urine sample were obtained for analysis :

| Investigation | Patient's report | Reference range |
|-----------------------|------------------|-----------------|
| Random plasma glucose | 85 mg/dl | ≤140 mg/dl |
| pH | 7.32 | 7.35 - 7.43 |
| Plasma Bicarbonate | 20 mmol/l | 21-28 mmol/l |
| PCO ₂ | 32 mm.Hg | 36-46 mm.Hg |
| Lactic acid | 9.8 mmol/l | 0.44-1.4 mmol/l |

Urine Examination—Normal Sugar. Protein and ketone bodies absent.

- (a) What is the biochemical abnormality of this patient? 2
- (b) What is your idea regarding clinical condition of the patient that might have led to the above biochemical abnormality? 2
- (c) What is the role of the following in causing the patient's problems? 3+3=6
 - (i) Severe muscular exercise
 - (ii) Acute alcohol intoxication

SECOND HALF

5. Write short notes on (any seven) :

5×7=35

- (a) Reverse cholesterol transport
- (b) Lipotropic factors
- (c) Primary and secondary bile acids
- (d) Acyl carrier protein
- (e) Biosynthesis and function of nitric oxide
- (f) Polyamines and their functions
- (g) Phenylketonuria
- (h) Hartnup disease

6. Justify the statements :

2×5=10

- (a) Bioavailability of calcium from milk is maximum.
- (b) Urea cycle is a bicycle.
- (c) PLP acts as a Schiff base in transamination reaction.
- (d) Bleeding time is prolonged in obstructive jaundice.
- (e) HDL cholesterol is regarded as a good cholesterol.

7. Discuss briefly the professional qualities a doctor should possess. 5

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