2406000101030701
EXAMINATION OCTOBER 2024 (SUPPLEMENTARY EXAM)
FIRST MBBS
BIO-CHEMISTRY (PAPER - I) (NEW)- LEVEL 3

[Time: As Per Schedule] **[Max. Marks: 100]**

Instructions:
1. Fill up strictly the following details on your answer book
   a. Name of the Examination : **FIRST MBBS**
   b. Name of the Subject : **BIO-CHEMISTRY (PAPER - I) (NEW) - LEVEL 3**
   c. Subject Code No : **2406000101030701**
2. Sketch neat and labelled diagram wherever necessary.
3. Figures to the right indicate full marks of the question.
4. All questions are compulsory.

Seat No:

Student's Signature

Section A

Q.1 Multiple choice questions. (20 out of 20) **20x1=20**

1. A 42 year old obese man admitted in emergency due recurrent abdominal pain. Ultrasonographic examination revealed the presence of numerous gall bladder stones. Initially he was treated with chenodeoxy cholic acid. The rational for this initial treatment is that this compound:
   a) Inhibits Cholesterol synthesis
   b) Interferes with the enterohepatic circulation.
   c) Inhibits bile acid synthesis
   d) Increases cholesterol solubility in bile

2. A 9-year young girl had a history of abdominal pain. One day due to severe pain she was taken to tertiary care health center. After clinical examination, blood was drawn, and the plasma appeared milky, with the triacylglycerol level >1500 mg/dl (normal levels up to 150 mg/dl). Which of the following proteins most likely to be deficient in this patient.
   a) Apoprotein C-II
   b) Apoprotein B-100
   c) Apoprotein B-48
   d) Apoprotein C-I

3. Na+- glucose transport is an example of
   a) Facilitated diffusion
   b) Secondary active transport
   c) Primary active transport
   d) Secondary passive transport

4. Which of the following has strongest tendency to gain electrons?
   a) Oxygen
   b) Coenzyme Q
   c) FAD
   d) Cytochrome c

5. A shift in oxygen dissociation curve to the left can occur due to
   a) Metabolic alkalosis
   b) Anemia
   c) Diabetes mellitus
   d) Ascending to high altitudes

6. All of the following increases fatty acid synthesis, EXCEPT
   a) Phosphorylation of Acetyl CoA carboxylase
   b) High level of ATP
   c) High level of Acetyl CoA
   d) Insulin

7. Which of the following diseases results from deficient production of free radicals?
   a) Alzheimer's disease
   b) Chronic glomerulonephritis
   c) Amyotrophic lateral sclerosis
   d) Chronic granulomatous disease

8. Which one of the reactions listed replenishes a TCA cycle intermediate?
   a) Heme Synthesis
   b) Carboxylation of pyruvate
   c) Transamination of oxaloacetate
   d) carboxylation of acetyl CoA

9. A firefighter is brought to the emergency room (ER) from the scene of a fire complaining of headaches, weakness, confusion, and difficulty in breathing. His skin and mucous membranes appear very pink. The causative agent of these symptoms inhibits electron transport and oxidative phosphorylation by which one of the following mechanisms?
   a) Uncoupling of electron transport and phosphorylation
   b) Combining with NADH dehydrogenase
   c) Combining with coenzyme Q
   d) Combining with cytochrome oxidase

10. What is true about Basal Metabolic rate (BMR)?
    a) Increase in old age
    b) Similar for males and female
    c) Increased during exercise
    d) low in hyperthyroidism

11. A 25-year-old male is treated with an antibiotic for a urinary tract infection. A week later he presents to the emergency department with jaundice and complaints of dark urine. His past medical history is unremarkable Which of the following test will confirm the diagnosis?
    a) Sickling test.
    b) G6PD levels in RBCs
    c) Hb electrophoresis
    d) Pyruvate Kinase levels in RBCs

12. If a person had not eaten for a week, other than drinking alcohol, the disruption in the glucose-alanine cycle is occurring at which one of the following steps?
    a) Pyruvate to oxaloacetate in the liver
    b) Pyruvate to alanine in the muscle
    c) PEP to 2-phosphoglycerate in the liver
    d) Alanine to pyruvate in the liver

13. A man presents to the ER with an elevated temperature, sweats, and increased rate of breathing. He had been spraying insecticide and accidentally inhaled some of the poison. Using the insecticide on cultured cells, it was demonstrated that the rate of oxygen consumption by the cells was much greater than in the absence of the compound. This drug is acting most like which one of the following?
    a) Carbon monoxide
    b) Dintrophenol
    c) Rotenone
    d) Cyanide

14. A medical student in exam hall begins nervously hyperventilating and then faints. You make him breath in a paper bag and he recovers. If you have drawn and analyze the blood sample when he was fainted you would have expected to see
    a) Decreased pH, Decreased blood pCO_2
    b) Increased pH, Increased blood pCO_2
    c) Increased pH, Decreased blood pCO_2
    d) Decreased pH, Increased blood pCO_2

15. A 50-years old female obese was recently diagnosed with coronary artery disease was advised to increase green leafy vegetables intake in her diet. All of the following are the beneficial effects of that diet, EXCEPT
    a) Dietary fibers increase glycemic index.
    b) Dietary fibers decrease absorption of bile acids and increase production of bile acids.
    c) Sitosterol present in the diet decreases cholesterol absorption
    d) Dietary fibers retain water in feces and increase stomach fullness.

16. True about Iron absorption are all EXCEPT
    a) Patients are advised to take iron tablet with lemon water
    b) Hepcidin will inhibit Divalent Metal Ion transporter 1 on luminal surface of intestinal mucosal cells
    c) Patients are advised not to take iron tablet with glass of milk.
    d) In the blood iron is re-oxidize to ferric state by ceruloplasmin.

17. False statement about ion channels is
    a) Voltage gated calcium channels are responsible for release of acetyl choline from nerve endings.
    b) Amelogenin, a calcium channel opens in phosphorylated state is useful in formation of calcium hydroxyapatite crystals.

c) A ligand gated Sodium channel is responsible for generation of action potential in postsynaptic nerves.
d) Voltage gated calcium channels remove cytosolic calcium and maintain low cytosolic calcium levels in muscles.

18. In individuals with iodine deficiency, which one of the following is most likely?
a) TSH levels are elevated and directly stimulate growth of the thyroid gland to a very large size.
b) Synthesis of the Na+, K+-ATPase is increased.
c) Mono- and di-iodinated thyroid hormone molecules are produced and elevated levels of these derivatives compensate for the deficiency.
d) Tissue utilization of oxygen is increased.

19. In Wilson's disease
a) Copper fails to be excreted in the bile
b) Copper level in plasma is decreased
c) Ceruloplasmin level is increased
d) Intestinal absorption of copper is decreased

20. All are true about regulation of sodium and water balance, EXCEPT
a) Hypovolemia stimulates thirst
b) Expansion of ECF inhibits aldosterone secretion
c) Hypo-osmolality stimulates ADH secretion
d) Low blood pressure stimulates Aldosterone secretion

Section B

Q.2 Long Answer Questions (2 out of 3) **2x10=20**

1. Enumerate the causes of fatty liver and explain how these causes lead to fatty liver formation (5). Explain how fatty liver progresses to cirrhosis of the liver (3). Write a note on lipotropic factors (2).
2. Describe hormonal regulation of blood glucose (3). Explain why polyuria, polydipsia, and polyphagia are seen in diabetes mellitus (3). Describe the biochemical basis of the formation of ketoacidosis in diabetes mellitus (3). How diabetic ketoacidosis differs from starvation ketoacidosis (1).
3. Write a complete reaction that links glycolysis to Krebs cycle (2). Describe the significance of the Krebs cycle in detail (8).

Q.3 Short Answer Questions (10 out of 11) **10x2=20**

1. Explain why excess lipoprotein (a) is atherogenic.
2. Why cataracts and hepatomegaly are seen in galactosemia?
3. Write at least four differences between hexokinase and glucokinase.

4. Explain why fasting hypoglycemia and hyperuricemia are seen in type-1 glycogen storage disease.
5. Draw the Cori's cycle and write its significance.
6. Write types of vesicular transport mechanisms with suitable examples.
7. Why are premature babies prone to acute respiratory distress syndrome?
8. Calcium level in blood is increased by parathyroid hormone. Explain.
9. Write the causes and clinical features of iron deficiency anemia.
10. The Rapoport-Leubering cycle is beneficial for RBCs. Justify.
11. Oral iron treatment should be supplemented with ascorbate and tocopherol. Why?

Section C

Q.4 Short Answer Questions (4 out of 5) **4x5=20**

1. Describe free radical formation and its effects on our body.
2. Describe the liver function tests based on synthetic and excretory functions.
3. Describe phase-II detoxification reactions.
4. Describe the roles and responsibilities of a physician in the health-care system.
5. Describe digestion and absorption of fat.

Q.5 Clinical Cases (2 out of 2) **2x10=20**

1. A 9-month-old boy was brought to the pediatric clinic by his mother, who was a daily labourer from a poor family in a rural area. She reported to the attending pediatrician that he was exhausted and fatigued. When further enquired, she revealed that she was previously breastfeeding but had to stop to return to work. She had three more children. To feed all of them she had to dilute her formula with water to make formula to serve all of them. After a physical examination, he was diagnosed with Marasmus (severe malnutrition). As per the hospital's policy, he was provided with a dietary kit with all the nutrients.

1. Write the types of protein-energy malnutrition given by WHO. (2)
2. Enlist at least four conditions that cause protein energy malnutrition. (2)
3. Write at least four biochemical alterations of protein energy malnutrition. (2)
4. Explain mutual supplementation by a suitable example. (2)
5. What is positive and negative nitrogen balance? Mention in which conditions you will observe a positive nitrogen balance and which conditions you will observe a negative nitrogen balance (2)

2. A male patient age 45 years was asked to go for an oral glucose tolerance test (OGTT) to confirm his diabetic status. His OGTT values are given below, go through it and answer the questions

Sample No. (both serum & urine)	Time (minutes)	S. Glucose (mg/dl)	Urine sugar
1	0 (fasting)	182	Positive
2	30	250	Positive
3	60	330	Positive
4	90	275	Positive
5	120	190	Positive

1. Write instructions given to patient before undergoing OGTT? (2)
2. Write interpretation of OGTT results of this patient? (2)
3. Write normal reference range of fasting blood sugar, random blood sugar and post- prandial blood sugar? (2)
4. Why sugar is detected in all the urine samples? (2)
5. Write the name and principle of the test by which sugar is detected in urine. (2)

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