Question Paper

Exam Date & Time: 18-Nov-2023 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION
FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - NOVEMBER 2023
SUBJECT: BIOCHEMISTRY - PAPER - I
(CBME BATCH - REGULARS)

Marks:100 **Duration: 180 mins.**

Answer all the questions.

1. A one-year-old male child born to consanguineous parents had developmental delay and hypopigmented scalp hair.Screening for plasma amino acid levels showed elevated levels of phenylalanine.
   i) What is the enzyme defect in the child? (1)
   ii) Discuss the catabolism of the amino acid mentioned. (3)
   iii) Discuss the formation of biologically important compounds from this amino acid. (6)

2. A 48 year old male patient with family history of hyperlipidemia was advised to undergo fasting lipid profile tests. LDL-C was found to be 180 mg/dL and HDL-C was 26 mg/dL.
   i) List the tests done under lipid profile and give their normal values. (3)
   ii) Explain the familial defect leading to raised LDL-C. (2)
   iii) Discuss the metabolism of low density lipoprotein. (5)

3A) Describe the composition and functions of **any** T**WO** glycosaminoglycans. (4)

3B) Name the biological applications of these enzymes:
   i) Creatine kinase
   ii) Aspartate transaminase
   iii) Acid phosphatase
   iv) Streptokinase (4)

3C) Describe the secondary structure of Proteins. (4)

3D) A newborn child with seizures was found to have high ammonia levels:
   i) What are the consequences of high ammonia levels in the child. (1)
   ii) Write the reactions of urea cycle. (3)

3E) Discuss the characteristics of competitive inhibition. Give TWO pharmacological examples of its applications. (2+2 = 4 marks)

3F. Explain with reasons:
   i) Galactosemia is associated with cataract. (2)
   ii) Muscle glycogenolysis does not contribute to maintaining the blood glucose levels. (2)

3G) With suitable figures for the machinery and the accepted theory, justify - 'Mitochondria is the power house of the cell". (4)

3H) i) Explain the biochemical significance of Histidine (2)

ii) Explain the biochemical significance of Arginine (2)

3I. A dietician prescribed a high fat, nil carbohydrate diet to an obese young girl for weight reduction. After a while, the girl started showing signs of acidosis.

i) Describe the features of this condition. (1)

ii) Write the reactions of the synthesis and degradation of the metabolites involved. (3)

3J) Discuss the causes, consequences and prevention of fatty liver. (4)

3K) Elucidate the energy generating steps of krebs cycle. Justify the amphibolic role of the cycle with TWO examples. (2+2 = 4 marks)

3L) A 40 year old businessman was found to have the following results on routine health check. Comment on the values and advise the patient with respect to his condition.

i) Fasting plasma glucose - 140 mg/dL

ii) Post prandial glucose - 228 mg/dL

iii) HbA1c - 7.2% (4)

3M. Write the reactions catalysed by the following enzymes and mention the pathway.

i) Pyruvate carboxylase (1)

ii) Fructokinase (1)

iii) Glucose-6-P dehydrogenase (1)

iv) Glycogen phosphorylase (1)

3N. Explain with reasons:

i) Cyanide is lethal. (1)

ii) Pellagra like symptoms are seen in tryptophan deficiency. (1)

iii) Antioxidants are added to PUFA rich oils. (1)

iv) Alkaptonuria is associated with joint pains. (1)

3O. Write briefly on the significance of:

i) Km (2)

ii) Lecithin (2)

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Question Paper

Exam Date & Time: 21-Nov-2023 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - NOVEMBER 2023
SUBJECT: BIOCHEMISTRY - PAPER - II
(CBME BATCH - REGULARS)

Marks: 80 **Duration: 160 mins.**

Answer all the questions.

Long question:

1. A 28-year-old male came to medicine OPD with a history of nausea, vomiting and loss of appetite for the last 5 days. He was on an official tour for last 21 days. On blood investigation: Serum bilirubin was 10mg/dl, conjugated bilirubin 6 mg/dl and unconjugated bilirubin 4mg/dl, ALT:330 IU/L, AST 150 IU/L,

1A) Write the probable diagnosis. (1)

1B) Explain the reason for the altered biochemical parameters in this disorder. (3)

1C) Explain the heme catabolism and excretion of its catabolites. (4)

1D) Enumerate congenital hyperbilirubinemia and its biochemical defects. (2)

2. Write steps of protein biosynthesis in prokaryotes. What are the different post-translational modifications? (7+3 = 10 marks)

3. Short answer type questions:

3A) A 45-year-old female patient was brought to the emergency department in a confused and disoriented state. Her husband gave the history that she was diagnosed as type I diabetes mellites for last 15 years, and she was on Insulin. On examination, he was **dehydrated**, had tachycardia, **having deep, rapid breathing** with a **sweety odor in his breath**.

i) What is the probable cause of the above manifestations? (1)

ii) Write the biochemical basis for the underlined manifestations. (3)

3B) Mr. Ram, a 75-year-old man came to a dentist with complaints of - bleeding from gums while brushing his teeth for last 6 month. He was staying alone since 2 years after death of his wife, most of the time he was taking bread, packed foods and unable to get fruits and vegetables.

i) Name deficiency disorder and nutrient deficient causing bleeding gums in this case. (1)

ii) Explain the biochemical basis of gum bleeding in this case. (3)

3C. 15-year-old boy came to OPD with a history of being unable to see in dim light, he is fine during the daytime. On examination, he was found to have grayish-white patches on the sclera, on blood investigation his plasma retinol level was low.

i) Which nutritional deficiency may cause these symptoms? (1)

ii) Explain the role of that nutrient on vision. (3)

3D. Describe the principle and clinical application of the following technique:

i) ELISA (2)

ii) PCR (2)

3E) Define tumor markers. Name THREE tumor markers with their clinical significance. (4)

3F) Define biotransformation. How are Sulphonamides, isoniazid and benzoic acid detoxified in our body? (1+3 = 4 marks)

3G) Write the clinical uses of radioisotopes. (4)

3H) A 3-year-old boy reported to the pediatric OPD with the chief complains of generalized swelling of the body for 5 days. The swelling started from the face followed by swelling of abdomen, upper and lower limbs. His blood reports are-

Urea:14mg/dl, Creatinine: 0.8mg/dl

Serum cholesterol (Total): 423 mg/dl

Serum albumin: 2.3 g/dl

Urine RE Result:

Albumin ++++, Sugar= Nil

Protein in 24 hours urine: 3.6gm/day

i) What is probable diagnosis?

ii) Interpret the given biochemical parameters and explain its correlation with the disorder. (4)

3I. A 46-year-old man presents to the emergency department with severe right toe pain. The patient denies any trauma to the toe and no previous history of such pain in other joints. He had taken beer with his friends last night. On examination the right big toe was swollen, warm, red, and exquisitely tender. On blood investigation: uric acid: 12.7mg/dl, synovial fluid analysis revealed rod- or needle-shaped crystals that were negatively birefringent under polarizing microscopy.

i) What is the probable disorder the patient is suffering from? (1)

ii) Mention TWO enzyme deficiencies may cause this type of disorder? (1)

iii) Interpret the laboratory investigations and explain the biochemical basis. (2)

3J. A 30 yr. old man is brought to the emergency in an unconscious state following multiple episodes of vomiting. ABG analysis shows-

Blood pH - 7.55, pCO_2 - 40 mm Hg, HCO_3^- 32 mEq/L

i) Name the type of acid-base disorder is this? (1)

ii) Comment on acid-base disturbance in this case and add a note on the compensatory mechanism. (3)

3K. A 10-year-old baby came to primary health center with complaints of failure to thrive, and irritability. On examination baby was found to be very thin with muscle wasting and thin sparse hair. His Serum albumin level was found to be 2.5 g /dl.

i) Which type of protein energy malnutrition is the baby suffering from? (1)

ii) What is adult dietary requirement for protein? (1)

iii) Describe the digestion of protein in intestine. (2)

3L. A 21-year-old healthy male student went to celebrate a birthday party at the bar. His friends convinced him to have his first beer since he had turned 21. After consuming the beer, he began to experience intense, worsening cramping pain in his abdomen. He had nausea and vomiting, anxiety with hallucinations and he was taken to the emergency room. He was noted to have

hypertension, tachycardia, and peripheral neuropathy. Initial laboratory tests revealed a normal complete blood count. Serum and urine delta amino levulenic acid (ALA) and porphobilinogen (PBG) were both found to be elevated.

i) What is the probable cause of the above manifestation? (1)

ii) Write the biochemical basis of pain and neuropsychiatric symptoms. (2)

iii) Write the cause of precipitation of symptoms by consumption of ethanol. (1)

3M) Write the active form of Vitamin B_1. Describe the biochemical role of vitamin B_1 in various metabolism (1+3 = 4 marks)

3N) Explain the structure of IgM diagrammatically. Write the role of IgM in immunity. (2+2 marks)

3O) Write the dietary sources of calcium. Describe the process of calcium homeostasis. (1+3 = 4 marks)

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