Question Paper

Exam Date & Time: 18-Jan-2022 10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - JANUARY 2023
SUBJECT: BIOCHEMISTRY - PAPER I
(CBME BATCH – REGULAR/REPEATERS)

Marks: 80 Duration: 160 mins.

Answer all the questions.

1) A 10-year-old girl presented with skin eruptions, ataxia, mental changes and diarrhoea. This was associated with a failure of transport of neutral amino acids in the kidneys and intestine resulting in neutral aminoaciduria.

1A) Name the medical condition, the amino acid deficiency and the reason for the development of the above mentioned features. (3)

1B) Describe the formation of two neurotransmitters from the amino acid in question. (4)

1C) Justify that the involved amino acid is both ketogenic and glucogenic. (1)

1D) Write a note on carcinoid syndrome..... (2)

2) A 7-year-old boy with enlarged abdomen was irritable, lethargic and frequently hungry. History revealed his developmental milestones were delayed. Physical examination revealed enlarged liver. Blood parameters were

	Normal value
Fasting blood glucose: 40mg/dl	(70-100mg/dl)
Cholesterol: 300mg/dl	(< 200mg/dl)
Uric acid: 8.8mg/dl	(2-5.5mg/dl)

2A) Name the glycogen storage disorder and write the steps of glycogenolysis pathway (6)

2B) Explain the basis for the clinical presentation and alteration in blood parameters (4)

3A) Discuss enzyme specificity with examples (4)

3B) A 15-year-old girl was brought to emergency department in comatose state. An alert ambulance attendant noted a fruity odour in breath.

i) Name the condition affecting the patient (1)

ii) Write briefly on synthesis and utilization of the substances accumulated. (3)

3C) A 6-year-old boy was referred to a hospital with mental retardation, developmental delay and mousy odour. Phenyl acetate and phenyl pyruvate were present in appreciable amounts in urine

i) Name the disorder and biochemical defect (1)

ii) Write the normal reaction in the involved metabolism (2)

iii) What is the basis for mousy odour in this patient (1)

3D) Discuss the causes for fatty liver disease and name the factors that help to prevent it. (4)

3E) Discuss the mechanisms for regulating enzyme activity with examples. (4)

3F) Name the substrates for oxidative phosphorylation. Explain the release of energy from these. (1+3 = 4)

3G) Write the significance of amylase in digestion of carbohydrates. Draw a labelled diagram depicting glucose absorption in intestine (1+3 = 4 marks)

3H) Discuss the significance of HMP shunt pathway (4)

3I) Describe the metabolism of lipoprotein which is associated with decreased risk of myocardial infarction. (4)

3J) Outline the synthesis of

i) Creatine (2)

ii) Epinephrine (2)

3K) Write the reactions catalysed and regulation of

i) Hormone sensitive lipase (2)

ii) Acetyl CoA carboxylase (2)

3L) Write the formation and the significance of

i) Histamine (2)

ii) GABA (2)

3M) Write the diagnostic significances of the following:

i) Creatine kinase (2)

ii) Gamma glutamyl transpeptidase (GGT) (2)

3N) Mention the biochemical defect in the following disorders:

i) Niemann Pick's disease (1)

ii) Hereditary fructose intolerance (1)

iii) Type I hyperlipoproteinemia (1)

iv) Respiratory Distress Syndrome (RDS) in neonates (1)

3O) Justify the following statements with appropriate reasoning:

i) Steatorrhea is observed in obstructive liver disorders (1)

ii) Polyuria and polydypsia are seen in diabetes mellitus (1)

iii) TCA cycle is amphibolic (1)

iv) Deficiency of peroxisomes result in very long chain fatty acid accumulation (1)

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Question Paper

Exam Date & Time: 20-Jan-2023 (10:00 AM - 01:00 PM

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL MBBS DEGREE EXAMINATION - JANUARY 2023

SUBJECT: BIOCHEMISTRY - PAPER II

(CBME BATCH)

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

Answer all the questions.

Long answer questions:

1) Explain the process of translation in prokaryotes. Add a note on post-translational modifications and inhibitors

(6+3+1 = 10 marks)

2) A 12-year-old school-going boy complaining of difficulty in reading in dim light. His dietary history revealed that he is not consuming yellow-orange coloured fruits and vegetables.

2A) The nutrient deficient in this condition would be? (1 mark)

2B) Discuss the metabolism of this nutrient under the following headings RDA, functions, cause for deficiency manifestations, and deficiency manifestations

(1+3+2+3 = 9 marks)

3) **Short answer questions:**

3A) Give biochemical reasoning:

i) High anion gap is seen in Diabetic ketoacidosis (1 mark)

ii) Fluoride deficiency causes dental caries (1 mark)

iii) Hyperkalaemia is seen in metabolic acidosis (1 mark)

iv) Alkaline phosphatase enzyme activity is increased in Obstructive Jaundice (1 mark)

3B) A-16-year-old female, a strict vegetarian came to the clinic with complaints of generalized weakness after the surgical removal of the ileum. On examination pallor was present. Laboratory investigations revealed decreased hemoglobin, increased MCV, and the presence of large immature RBCs in peripheral smear.

i) The deficient nutrient and type of anaemia observed in this case would be?

(½+½ = 1 mark)

iii) Write the TWO reactions catalysed by coenzyme of this deficient nutrient (3 marks)

3C) Describe

i) Mutagens with examples (2 marks)

ii) Oncogenes with examples (2 marks)

3D) A 44-year-old known alcoholic was brought to the emergency department in an altered sensorium state. His wife revealed that he was not having a proper diet due to increased consumption of alcohol for the last few days and associated with staggering gait and muscle weakness.

i) The nutrient deficient in this case would be? (1 mark)

ii) Write TWO functions of this nutrient (2 marks)

iii) Mention TWO deficiency manifestations of this nutrient (1 mark)

3E) A 25-year-old female underwent thyroidectomy 2 weeks ago. Following this, she developed cramps in her legs and hands. Physical examination was positive for Chvostek's and Trousseau's signs.

i) Name the nutrient deficient in this condition (0.5 mark)

ii) List any TWO biochemical investigations you would suggest to confirm the diagnosis (2 marks)

iii) Enumerate THREE functions of this nutrient (1.5 marks)

3F) A 16-year-old boy was treated with primaquine for malaria. After 2 days, his mother observed yellowish discoloration of his eyes and skin.

Blood reports	
Hemoglobin	6.8g/L
Total Bilirubin	5.6 mg/dL
Unconjugated Bilirubin	4.9 mg/dL
Urine reports	
Urobilinogen	++

i) What is the possible diagnosis of this case? (1 mark)

ii) Explain the biochemical basis for clinical manifestation and altered blood and urine reports (3 marks)

3G) Describe the steps of the polymerase chain reaction. Add a note on its applications.

(3+1 = 4 marks)

3H) i) Describe **TWO** functions of thyroid hormone (2 marks)

ii) Name the biochemical tests performed in CSF with clinical importance (2 marks)

3I) i) Discuss **TWO** nutritional values of proteins (2 marks)

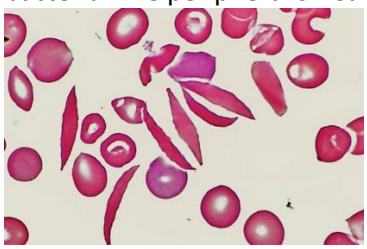
Ii) Define basal metabolic rate. Enlist TWO factors affecting Basal metabolic rate

(1+1 = 2 marks)

3J) Define codon. Describe the features of genetic code.

(1+3 = 4 marks)

3K) A 15-year-old boy presented to the emergency room with complaints of the bilateral thigh and hip pain that is severely increasing over the past two days and has not subsided with pain killers. His laboratory reports showed: Hb level:6.8g/dl, elevated WBC count, and an abnormal number of urinary bacteria. The peripheral smear picture is as follows



i) Explain the molecular defect of this case (1 mark)

ii) Draw the electrophoretic pattern of this disease compared with normal pattern (2 marks)

iii) Explain the effect of hypoxia in this condition (1 mark)

3L) i) Define primary and secondary immune response (2 marks)

ii) Define humoral and cell-mediated immunity (2 marks)

3M) An a-20-year-old female consulted a gynecologist for increased blood flow during the menstrual cycle. She also gave a history of feeling lethargic, dizzy, and weak while performing her tasks. Biochemical

examination showed decreased iron, increased TIBC, and decreased ferritin with microscopic hypochromic RBCs in peripheral smear.

i) Explain the biochemical basis for altered parameters in this case (1.5 marks)

ii) Explain the absorption of deficient nutrient of this case (2.5 marks)

3N) A 20-year-old lady was admitted to the hospital with complaints of severe abdominal pain and neuropsychiatric symptoms. The patient was kept under observation. When the patient became agitated, she was given a mild sedative containing phenobarbitone upon which her condition worsened. On administration of glucose and hematin, her condition improved.

i) Name the defective enzyme (1 mark)

ii) Explain the biochemical basis of worsening condition following phenobarbitone treatment. (1 mark)

iii) Discuss the biochemical basis of administration of glucose and hematin in this case (1+1 = 2 marks)

3O) Explain lac operon concept (4 marks)

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