Question Paper

Exam Date & Time: 11-Sep-2024 (10:20 AM - 01:00 PM))

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - SEPTEMBER 2024

SUBJECT : BI101THP1:BIOCHEMISTRY - PAPER - I

(PY-1, CBME SCHEME - REPEATERS)

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

Answer all the questions.

1. A 6-month-old male infant presented with complaints of abdominal distension, fever, jaundice, black stools and disturbed level of consciousness for 3 days prior to hospital admission. On further investigations he was diagnosed with Tyrosinemia type I.

1A) Name the biochemical defect. (1)

1B) Name the products accumulated and excreted in urine in this condition. (2)

1C) What is the dietary management of this patient? (2)

1D) Discuss the synthesis and catabolism of tyrosine. (5)

2) Describe citric acid cycle. Why is it regarded as an amphibolic pathway? Add a note on its energetics.

(5+2+3 = 10 marks)

3A) Define allosteric enzymes. Discuss the allosteric regulation of phosphofructokinase.

(1+3 = 4 marks)

3B) An athlete was advised by his nutritionist to start a diet high in lipids and low in carbohydrates for a few days prior to a marathon as an alternative fueling strategy. However, due to consumption of food low in calories, he was admitted few days later to the hospital with nausea, vomiting and a serum pH of 7.20 and bicarbonate 9 mEq/L. Urine was positive for Rothera's test. He recovered with fluids intravenously and insulin.

i) Name the condition affecting the patient.

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

(1+3 = 4 marks).

3C) A 22-year-old woman presented to the hospital with a sudden onset of sharp pain in her back and lower abdomen that worsened over a short period of time. She described an inability to find a comfortable position, nausea, vomiting, and intense sweating. She gave a history of occurrence of similar symptoms twice in the past 10 years. An abdominal X-ray was suggested and a diagnosis of cystinuria was made.

i) What is the biochemical defect in the above patient?

ii) What was the cause of sharp pain in her back and lower abdomen?

iii) Describe the degradation of Cysteine.

(1+1+2 = 4 marks)

3D) Enumerate THREE clinical uses of prostaglandins. How does Aspirin inhibit prostaglandins?

(3+1 = 4 marks).

3E) Discuss enzyme specificity with suitable examples.

(4 marks)

3F) Compare and contrast.

i) Inhibitors and uncouplers of ETC. (2)

ii) NADH and NADPH. (2)

3G) With the help of a neat diagram explain glucose absorption in the intestine. Why is oral rehydration solution (ORS) used in treatment of diarrhea?

(3+1 = 4 marks)

3H) A 2 year old boy presented with acute onset of severe jaundice, anemia requiring transfusion. An intake of fava beans 48 h prior to onset of symptoms was reported. Write the reactions of oxidative phase of HMP and explain how an enzyme deficiency in the shunt pathway can cause the above mentioned symptoms.

(4 marks)

3I) With the help of a diagram briefly explain the metabolism of High density lipoprotein (HDL). Mention TWO functions of Apo-A1.

(3+1 = 4 marks)

3J) i) Explain the Fluid mosaic model. (2)

ii) Write the reactions of formation of melatonin from tryptophan. (2)

3K) Draw a neat labelled diagram of the carnitine shuttle. Write a note on the dietary management of a patient with carnitine deficiency.

(2½+1½ = 4 marks)

3L) Write the reaction for the synthesis of the following compounds explaining their significance.

i) FIGLU (2)

ii) Homocysteine (2)

3M) Applying your knowledge of AETCOM module, explain the role of the doctor as:

I) Health care provider. (2)

Ii) Preventive care supporter. (2)

3N) Give 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) Coconut oil does not require bile salts for its absorption. (1)

ii) von Gierke's disease may cause hyperuricemia. (1)

iii) Alcohol consumption may lead to hypoglycaemia. (1)

iv) The ETC is located in the inner mitochondrial membrane. (1)

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Question Paper

Exam Date & Time: 13-Sep-2024 (10:20 AM - 01:00 PM))

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - SEPTEMBER 2024

SUBJECT : BI 101THP2: BIOCHEMISTRY - PAPER - II

(PY-1, CBME SCHEME - REPEATERS)

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

Answer all the questions.

Long answer questions

1. A 2-year-old boy was referred to the Out-Patient Department, because his parents had noticed knock-knees, and growth disturbance. Blood investigations showed: Alkaline phosphatase 418 U/L (117 - 398 U/L); BUN - Serum 16 mg/dL (5 - 18mg/dL); Creatinine - Serum 0.8 mg/dL (0.3 - 0.7 mg/dL); Calcium 7.2 mg/dL (8.8 - 11.8 mg/dL); Phosphorus 7.5 mmol/L(3.6 - 5.0mmol/L). Based on X-ray and lab evaluation, it was diagnosed as a vitamin deficiency.

1A) Explain the biochemical basis for laboratory and physical findings in this case. (2)

1B) Explain the metabolism and excretion of this vitamin (2)

1C) Explain the metabolic action of this vitamin on target organs. (6)

2) Explain eukaryotic transcription. List **FOUR** differences between prokaryotic and eukaryotic transcription.

(8+2 = 10 marks)

3. **Short answer questions:**

3A) Explain causes and features of Lesch Nyhan syndrome.

(4 marks)

3B) Explain the steps and application of recombinant DNA technology.

(4 marks)

3C) Describe the ethical principles a physician should be aware of while providing health care service to the community.

(4 marks)

3D) Define the terms - respiratory quotient, basal metabolic rate, specific dynamic action and biological value.

(4 marks)

3E) Explain:

i) Glycemic index and its significance. (2)

ii) Bicarbonate buffer and its significance. (2).

(4 marks)

3F) The patient is a 35 year -old female with AIDS brought to the emergency room with a fever of 39°C and a three-month history of copious diarrhea.

Laboratory Data:

Chemistry		Normal Values	Arterial Blood Gas
Sodium	136	136-146 mmol/L	pH 7.35
Potassium	3.4	3.5-5.3 mmol/L	P_{CO2} 27 mmHg
Chloride	112	98-108 mmol/L	P_{O2} 90 mmHg
Total CO_2	14	23-27 mmol/L	bicarbonate 14 mmol/L
BUN	30	7-22 mg/dl	
Creatinine	1.5	0.7-1.5 mg/dl	
Glucose	105	70-110 mg/dl	

i) Based on the above report identify the disorder with justification. (2)

ii) Calculate and comment on anion gap. (2)

3G) Give TWO example each for phase 1 and phase 2 detoxification reactions.

(2+2 = 4 marks)

3H) Explain the laboratory findings in a case of obstructive jaundice.

(4 marks)

3I) A 72-year-old female presented at our emergency department with 1-week febrile sense, progressive dyspnea, and generalized edema. Both lower extremities were warm to touch and showed minimal edema in a symmetrical fashion. X ray showed cardiomegaly. Based on the clinical evaluation, it was identified as vitamin deficiency manifestation.

i) Identify the vitamin and disorder.

ii) Explain the metabolic function of this vitamin with TWO examples.

(1+3 = 4 marks)

3J) Explain the causes and laboratory findings in iron deficiency anemia.

(2+2 = 4 marks)

3K) Justify the clinical presentations and laboratory findings observed in Wilson's disease.

(4 marks)

3L) Explain principle, application and interpretation of Van den Bergh test.

(4 marks)

3M) A child born full term normal delivery showed yellowish discoloration of body and eyes on day 2. Laboratory results were as follows: total serum bilirubin:27.4 mg/dl, direct bilirubin: 0.29 mg/dl. Hemoglobin: 15.1 g/dl, hematocrit: 45.4%, mean corpuscular volume: 103.4 fl, mean corpuscular hemoglobin concentration: 33.5 g/dl. Direct antibody test (Combs') was negative. and reticulocyte count was 1.9%. Blood chemistry was as follows: urea: 24 mg/dl, creatinine: 0.3 mg/dl, AST: 57 U/L, ALT: 24 U/L. Serum glucose-6-phosphate, dehydrogenase, pyruvate kinase and thyroid concentrations were all normal.

Justify why the following test were conducted in this case - Direct antibody test (Combs'); glucose□6-phosphate dehydrogenase; pyruvate kinase and thyroid function test.

(4 marks)

3N) Explain the types of vaccine with examples.

(4 marks)

3O) i) Write a note on innate immunity. (2)

ii) List TWO metabolic functions of zinc (2)

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