Question Paper

Exam Date & Time: 27-Dec-2021 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST MBBS DEGREE (CBME) EXAMINATION - DECEMBER 2021
SUBJECT: BIOCHEMISTRY - PAPER I1

Marks: 80 Duration: 160 mins.

Answer all the questions.

Long questions:

1. A 55 year old man was brought to the emergency medicine section of a hospital with complaints of chest pain and breathing difficulty. Biochemical tests reports indicated alteration in the serum levels of certain enzymes. Angiogram demonstrated the narrowing of coronary artery. Serum lipid profile was as follows:
   Total cholesterol (TC): 300 mg/dl
   Triglycerides (TG): 150 mg/dl
   HDL- cholesterol (HDL-C): 25mg/dl

1A) What is the probable cause for the above clinical scenario? (½)

1B) Calculate the serum LDL level in this patient (1½)

1C) With the help of diagrams, describe the metabolism of HDL emphasising its role in heath and Disease (4)

1D) Explain with the help of a graph, the pattern of the diagnostically important enzymes and a protein that would have altered in this condition(4)

2. Explain metabolism of ammonia under the following aspects

2A) Formation (4)

2B) Transport (2)

2C) Detoxification in liver (4)

3. **Short questions:**

3A) Write the components of electron transport chain in a sequential order indicating the sites of ATP synthesis. What is the basis of the arrangement of components? (3+1 = 4 marks)

3B) A 2 months old baby was brought to the paediatrician with history of severe abdominal pain, flatulence and diarrhoea precipitated by breast feeding. Stool examination showed presence of reducing substances.

i) Identify the disorder indicating the biochemical defect.

ii) Give the biochemical basis for all the clinical features and the presence of reducing sugars in stool

iii) What are the treatment options?

(1+2+1 = 4 marks)

3C) Give the biochemical basis for the following:

i) Streptokinase is used as a therapeutic agent

ii) Peroxisomes are protected from the toxic effects of H_2O_2

iii) Trypsin plays a major role in digestion of proteins

iv) Lovastatin is used in the treatment of hypercholesterolemia

(1x4 = 4 marks)

3D) With the help of a reaction, explain why tyrosine is a non-essential amino acid. Write the reactions leading to the synthesis of catecholamines

(1+3 = 4 marks)

3E) An infant born of 28 weeks of gestation showed signs of respiratory distress. X-ray report supported the diagnosis of infant respiratory distress syndrome

i) Name the lipid that is deficient in this case and write its composition

(½+1½ = 2 marks)

ii) Write the function of the above lipid and explain why its deficiency leads to the above condition?

(2 marks)

3F) With the help of a plot, explain the features of competitive enzyme inhibition. Give Two examples of their use in clinical medicine.

(2+2 = 4 marks)

3G) Write the biochemical defect and the substrate accumulating in the following disorders

i) Hyperammonemia type I

ii) Niemann pick diseases

iii) Alkaptonuria

iv) Maple Syrup Urine Disease

(1x4 = 4 marks)

3H) i) One year old child was diagnosed with cataract and presence of reducing sugar in the u rine was detected. Specific test for urine glucose was negative

a) What could be the probable diagnosis? (½ mark)

b) What could be the biochemical defect? (½ mark)

c) What is the biochemical basis of cataract (1 mark)

ii) 3 year old boy was hospitalized with the complaints of facial puffiness.Physical examination revealed mild pitting edema on his feet. Urine analysis showed increased protein in urine and increased serum cholesterol

a) What is the probable diagnosis? (½ mark)

b) Draw the serum electrophoretic pattern seen in this patient (1 mark)

c) What is the biochemical basis of edema? (½ mark)

3I) Explain the role of

i) Insulin in blood glucose regulation

ii) Hormone sensitive lipase in fasting state

(2+2 = 4 marks)

3J) Name Two conditions in which ketone bodies are produced in our body. Explain the synthesis of ketone bodies (1+3 = 4 marks)

3K) Describe the formation and significance of the following compounds:

i) Glutathione

ii) Serotonin

(2+2 = 4 marks)

3L) With the help of diagrams, explain glycogenesis in liver (4)

3M) With the help of suitable reactions explain the role of

i) HMP shunt in the maintenance of RBC membrane integrity

ii) Citrate in the denovo synthesis of fatty acids

(2+2 = 4 marks)

3N) Write the reactions catalysed by the following enzymes. Name the disorders associated with the deficiency of these enzymes

i) Glucose-6-phosphatase

ii) Tyrosinase

(2+2 = 4 marks)

3O) i) Write the reactions involved in the formation of phosphoenol pyruvate from pyruvate

ii) Write the reaction catalysed by pyruvate kinase. Explain why its deficiency results in haemolytic anemia?

(2+2 = 4 marks)

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FIRST MBBS DEGREE (CBME) EXAMINATION - DECEMBER 2021

SUBJECT: BIOCHEMISTRY - PAPER II

Marks: 80 Duration: 160 mins.

1) A 22-year-old student has been on a diet that lacks fresh vegetables and fruits for a few months. He developed painful swollen joints also observed recurrent episodes of bleeding while brushing and petechial rashes on the shin.

1A) Name the deficient nutrient and the disorder. (1)

1B) Discuss the functions of the nutrient giving suitable examples. (5)

1C) Explain the role of micronutrients in the development of microcytic hypochromic anemia. (4)

2) Describe the formation and maturation of mRNA (10)

3A) Explain the regulation of gene expression in prokaryotes with suitable example. (4)

3B) Discuss the significance of: (2+2 = 4 marks)

- i) Parathyroid hormone in blood calcium and phosphorus homeostasis
- ii) Water fluoride content

3C) Explain the process of production of monoclonal antibodies giving two applications (4)

3D) Write the steps in synthesis of prosthetic part of hemoglobin (4)

3E) Describe the biochemical reasons for the manifestations in thiamine deficiency. Justify the increased requirement of thiamine in high carbohydrate diet. (3+1 = 4 marks)

3F) Describe the biotransformation of: (4)

- i) Alcohol
- ii) Picric acid
- iii) Benzoic acid
- iv) Isoniazid

3G) Compare the effects of simple and complex carbohydrates on health (4)

3H) Define renal clearance. Which is most preferred compound for estimating clearance and why? (4)

3I) Describe the role of kidney in acidification of urine (4)

3J) Discuss the significance of: (2+2 = 4 marks)

- i) p53 gene
- ii) Telomerase

3K) A 40-year-old female, presented to the hospital with a two-week history of colicky pain abdomen, increasing malaise and generalized itching. She looked icteric and gave a history of passing clay colored stools. (2+2 = 4 marks)

i) Indicate the diagnostic changes in liver function test in the above case

ii) Write a note on van den Bergh test

3L) A sputum sample suspected for tuberculosis is sent to a molecular diagnostic lab. Describe the principle and procedure of the technique that will help in the detection of the same.(4)

3M) Give reasons for the following: (4)

i) Photosensitivity is not a feature of acute intermittent porphyria

ii) Additional calories are to be included in a protein based diet

iii) Hyperthyroidism can result in low BMI

iv) Sickling of RBCs occurs in deoxygenated condition

3N) Discuss: (2+2 = 4 marks)

i) Anion Gap

ii) Two salient features each of cell mediated and humoral immunity

3O) Indicate the nutrient associated with each of the following giving one function: (4)

i) Acrodermatitis enteropathica

ii) Burning foot syndrome

iii) Keratomalacia

iv) Keshan disease

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