Question Paper

Exam Date & Time: 12-Mar-2021 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST MBBS DEGREE EXAMINATION - MARCH 2021
SUBJECT: BIOCHEMISTRY - PAPER II

Marks: 800   Duration: 160 mins.

1. A 54-year-old overweight woman was brought to the hospital with complaints of cramps and spasm of both hands. She had positive Trousseau and chvostek sign. History revealed having undergone thyroidectomy 2 weeks ago. The blood report was as follows:

    Serum calcium - 6mg/dl

    Serum phosphorus - 5.9 mg/dl

    Serum ALP - 60U/L

1A) Name the deficient nutrient and mention the sources and functions of the same.   (3)

1B) Interpret the laboratory report and explain the cause for the signs   (3)

1C) Discuss the mechanism by which the homeostasis of nutrient is maintained   (4)

2. Explain translation under the following headings:

2A) Activation of amino acid   (2)

2B) Initiation   (3)

2C) Elongation   (3)

2D) Termination   (2)

3A) With the help of a neat diagram explain the recombinant DNA technology and write two applications.   (4)

3B) **Give reasons for the following:**

  i) Hyperuricemia is a manifestation of von Gierke's disease

  ii) Chronic smokers develops peripheral cyanosis

  iii) Histidine load test is performed to assess folate deficiency. I

  v) Fatty liver seen in kwashiorkor.

3C) Write **one** coenzyme form and the reaction catalyzed by each of the following vitamin: (4)

  i) Niacin

  ii)   Vitamin B_{12}

  iii) Thiamin

  IV) Pantothenic acid

3D) A 40-year old man was brought to the hospital with complaints of persistent vomiting for one week. He was diagnosed with an acid base imbalance. Explain the type of imbalance and underlying mechanism for the same. How would this condition be compensated?

                    (2+2 = 4 marks)

3E) Explain detoxification reactions of the following compounds

  i) Ethanol

  ii) Picric acid

  iii) Acetyl salicylic acid

iv)   Bilirubin

(1+1+1+1 = 4 marks)

3F.   Write the applications of

i)   Hybridoma technology

ii)   PCR

iii)   RFLP

iv)   FISH

(1+1+1+1 = 4 marks)

3G)   A 35-year old man, known case of cholelithiasis presents with Five days history of jaundice, right hypochondrial pain generalized pruritus, passing clay coloured stools.

i)   Explain the biochemical reasons for passing the clay coloured stools.

ii)   What happens to the prothrombin time and why?

(2+2 = 4 marks)

3H)   i)   Name one hormone and one enzyme each which are used as a marker to detect cancer indicating the condition

ii)   Explain any one mechanism that leads to the activation of protooncogene

(2+2 = 4 marks)

3I)   A 12-year-old boy presented to the hospital with anemia, jaundice, recurrent bone pain. Peripheral smear showed numerous sickled erythrocytes

i)   Name the molecular defect that affects the erythrocytes

ii)   Explain the basis of clinical manifestation.

(2+2 = 4 marks)

3J)   Explain the influence of dietary fibres on the prevention of constipation, colon cancer, weight gain and hypercholesterolemia

(4)

3K)   Explain the basis of:

i)   Microcytic anemia in pyridoxine deficiency

ii)   Steroids stimulate heme synthesis

(2+2 = 4 marks)

3L)   Describe the significance of the mentioned analyte under the given conditions:

i)   Anion gap in acidosis

ii)   BMI in obesity

(2+2 = 4 marks)

3M)   Explain the role of vitamin A deficiency on eye manifestations.   (4)

3N)   Explain the diagnostic significance of the following: (4)

i)   Microalbuminuria

ii) ^{131}I

iii)   Amylase

iv)   TSH

3O)   Write one function of each of the following: (4)

i)   Interferon

ii)   Interleukin

iii)   IgE

iv)   Complement 3 (C3)

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Question Paper

Exam Date & Time: 11-Mar-2021 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST MBBS DEGREE EXAMINATION - MARCH 2021
SUBJECT: BIOCHEMISTRY - PAPER I

Marks: 80   Duration: 160 mins.

Answer all the questions.

Essay Questions:

1. A 45 year old man who is obese and has a sedentary job got his yearly health checkup done. His serum lipid profile was as follows: -

   Total Cholesterol: 280 mg/dL

   HDL-C : 40mg/dL

   TG: 190 mg/dl

1A) Calculate the LDL-cholesterol level using Friedewald's formula. Write the recommended reference range of the above parameters and comment on the results (3)

1B) Discuss in detail the normal metabolism of the lipoprotein that is increased in this patient (4)

1C) Explain the mechanism of most common clinical complication of hypercholesterolemia (3)

2A) Enumerate the reactions of glycogenesis and glycogenolysis (6)

2B) Describe hormonal regulation of blood glucose homeostasis (4)

Answer all the questions.

3. **Write Short notes:**

3A) List the functions and composition of ECM (4)

3B) A 10-year-old girl from a consanguineous marriage, presents with on and off diarrhea, psychiatric symptoms, confusion, agitation and abnormal tone of speech. On physical examination she had skin rashes on exposed sites. Urine sample reports revealed the presence of neutral amino acids

   i)   Name the neutral amino acids

   ii)   What is the probable diagnosis?

   iii) What is the probable defect?

   iv)   Explain the biochemical basis for clinical presentation

   (1+½+½+2 = 4 marks)

3C) Define K_m. Explain the effect of substrate concentration on enzyme activity.

   (1+3 = 4 marks)

3D) Explain the significance of LDH and ALP estimation in clinical practice (4)

3E) Explain the features of competitive enzyme inhibition. Write the biochemical basis in the use of sulfonamides and methotrexate in treatment

   (2+2 = 4 marks)

3F. Explain the digestion and absorption of dietary lipids. (4)

3G) A mother of 2-year-old baby observed enlargement of abdomen and brought her child to pediatric clinic. Physical examination revealed hepatomegaly. Blood sugar: 50mg/dL, Uric acid: 10mg/dL, lactic acid: 15mg/dL and ketone bodies were present.

  I)   What is the probable diagnosis?

  II)   Name the enzyme deficient in this caseiii) Comment on physical and lab findings with reasoning

  (½+½+3 = 4 marks)

3H) Explain the reactions of beta oxidation of palmitic acid (4)

3I) A mother visits pediatric clinic with her 20-days-old newborn with complaints of failure to thrive, lethargy, feeding intolerance, strong body odor and dehydration. Investigation reveals hyperammonemia.

  I)   Which metabolic pathway is affected in this newborn and why ammonia is elevated?

  II)   Explain how ammonia is detoxified in liver?

  (1+3 = 4 marks)

3J) Write the reactions of oxidative phase of HMP shunt pathway. Add a note on the significance of the pathway

  (2+2 = 4 marks)

3K) Explain the requirement of glycine in the formation of creatine, purine, heme and glutathione. (4)

3L) A 32-year-old car mechanic was brought to emergency room in unconscious state. Physician was informed that he was fixing a car's air conditioner, in a closed garage, by keeping the engine running

  I)   Which derivative of hemoglobin is most likely to be elevated in his body?

  II)   Which process is likely to be affected in his electron transport chain? Indicate the specific site

  iii) What is the basic difference between an uncoupler and an inhibitor in terms of their actions?

  (1+2+1 = 4 marks)

3M) A 4-month-old boy was brought to pediatric clinic with complaints of agitation, tremors, convulsions and mousy body odor. Pediatrician noticed hypopigmented patches over the body. Laboratory investigation revealed positive Guthrie test

  I)   Which metabolic pathway is affected and mention the enzyme deficient in this newborn?

  II)   Explain the biochemical basis for symptoms and signs

  iii) What are the treatment options available

  (1+2+1 = 4 marks)

3N) **Give reasons:**

  i)   Chronic consumption of alcohol may cause fatty liver

  ii)   G6PD deficiency protects against malaria

  iii) Streptokinase is used in treatment of myocardial infarction

  iv)   Proteolytic enzymes are secreted as zymogens in gastrointestinal tract

  (1+1+1+1 = 4 marks)

3O) i) Explain the role of 2,3 BPG in the dissociation behavior of HbF (4)

  II)   Buffering action of hemoglobin in RBCs is most likely attributed to presence of which amino acidresidues in the globin chains?

  III) Compare and contrast the combinations of globin chains in HbA and HbF

  (2+1+1 = 4 marks)

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