

MANIPAL ACADEMY OF HIGHER EDUCATION
FIRST MBBS DEGREE EXAMINATION – AUGUST 2020
SUBJECT: BIOCHEMISTRY– PAPER I (ESSAY)

Monday, August 10, 2020

Time: 10:20 – 13:00 Hrs.

Maximum Marks: 80

✍ **Answer ALL the questions.**

✍ **Long Answer Questions.**

1. A new born infant developed hyperammonemia after 32 hours of birth. The infant was treated with dietary supplement of benzoate and arginine. Following is the blood report of the infant

Citrulline	Arginine	Ammonia	Glutamine
Low	Low	High	High

- 1A. What is the probable diagnosis and possible enzyme defect in this patient?
 1B. Explain the biochemical basis for increased glutamine level and treatment with benzoate
 1C. Describe the transport and disposal of ammonia

(1+1+(2+6) = 10 marks)

2. Write the reactions of following pathways indicating enzymes and coenzymes

- 2A. Citric acid cycle
 2B. Synthesis of epinephrine from Phenylalanine

(5+5 = 10 marks)

3. **Short answer questions:**

3A. A 14 year old girl was brought to the casualty with altered sensorium and a history of significant weight loss in the last 4 months, increased thirst and increased urination. On examination patient was found to be dehydrated and drowsy. Biochemical investigations revealed random blood glucose = 480mg/dl, urine ketones present, urine sugar +++, blood pH 7.2

- i) What is the probable diagnosis?
 ii) Explain the biochemical basis for **three** clinical/ biochemical findings underlined
 iii) Describe the role of insulin in the regulation of blood glucose level
- 3B. Explain the reactions for formation and one fate of the following compounds
 i) UDP-Glucose ii) NADPH
- 3C. Schematically represent the organization of electron transport chain explaining the various complexes
- 3D. Discuss the metabolism of ketone bodies
- 3E. With the help of appropriate diagrams explain the secondary structure of proteins giving examples

- 3F. Describe glycogenolysis in liver mentioning its significance
- 3G. Explain the metabolism and clinical significance of high density lipoproteins (HDL)
- 3H. Classify lipids giving examples for each class
- 3I. Write a note on fatty liver. Name TWO lipotropic factors
- 3J. **Write the clinical significance of the following:**
- | | |
|---------------------|--------------------------|
| i) Acid phosphatase | ii) Amylase |
| iii) Serum albumin | iv) Bence Jones proteins |
- 3K. Define isoenzymes. Explain **two** isoenzymes which are used in the diagnostic evaluation of myocardial infarction
- 3L. Write the biochemical defect in
- | | |
|--------------------------------|----------------------|
| i) Hartnup's disease | ii) Alkaptonuria |
| iii) Maple syrup urine disease | iv) Refsum's disease |
- 3M. Write briefly on:
- | | |
|------------------------|------------------|
| i) Glycated hemoglobin | ii) Galactosemia |
|------------------------|------------------|
- 3N. Write notes on:
- Use of radioisotopes in diagnosis
 - Effect of pH on the velocity of an enzyme catalyzed reaction
- 3O. Give biochemical basis for the following:
- Phospholipids are amphipathic in nature
 - 2,4 dinitro phenol is an uncoupler
 - Trypsin plays a major role in digestion and absorption of proteins
 - 2,3 DPG level increases in higher altitude

(4 marks × 15 = 60 marks)



MANIPAL ACADEMY OF HIGHER EDUCATION**FIRST MBBS DEGREE EXAMINATION – AUGUST 2020****SUBJECT: BIOCHEMISTRY – PAPER II (ESSAY)**

Tuesday, August 11, 2020

Time: 10:20 – 13:00 Hrs.

Maximum Marks: 80

✍ Answer ALL the questions.

1. 48 year old male was brought to casualty with malaria. His blood investigations showed decreased haemoglobin, increased unconjugated bilirubin, normal conjugated bilirubin, normal ALP, AST and ALT.

1A. What is your provisional diagnosis?

1B. Explain the biochemical basis for lab findings.

1C. What additional tests can be done in this patient to confirm the diagnosis.

1D. Explain the pathway of bilirubin metabolism

(1+2+2+5 = 10 marks)

2. Explain translation and add a note on post translational modifications.

(7+3 = 10 marks)

3A. A 50 years old male was admitted to emergency ward having history of chronic obstructive airway disease. On examination he was found to be cyanosed and breathless. Blood analysis showed the following results.

pH = below normal

pCO₂ = markedly elevated

(HCO₃⁻) = marginally elevated

i) Identify the nature of acid-base disorder.

ii) What could be the cause of elevated pCO₂ and HCO₃⁻?

iii) What is the normal plasma bicarbonate value?

(1+2+1 = 4 marks)

3B. What are trace elements? Name two trace elements and add a note on their functions

(1+3 = 4 marks)

3C. Define BMR. Add a note on its significance in diet planning.

(1+3 = 4 marks)

3D. Name the active metabolic form of vitamin D and add a note on its functions.

(1+3 = 4 marks)

3E. i) Name two factors each, that favour and inhibit the absorption of calcium in GI tract

ii) Name the buffer systems in plasma. Which of them is the most important and why?

(2+2 = 4 marks)

- 3F. i) Give two examples for detoxification by conjugation
ii) With reference to liver function, name the test / marker to assess
a) synthetic function b) hepatocellular damage
c) Obstructive liver disease d) hepatocellular cancer
(2+2 = 4 marks)
- 3G. i) Calculate the calorific value of a diet containing 57gm carbohydrate, 32gm protein and 29 gm fat.
ii) Name two sulphur containing vitamins. Add a note on the function/s of any one of them
(2+2 = 4 marks)
- 3H. Give a brief account of steps involved in formation of recombinant DNA
(4 marks)
- 3I. Write briefly on sickle cell anemia
(4 marks)
- 3J. Outline the steps of Southern blot technique. What are its applications?
(3+1 = 4 marks)
- 3K. Give a labelled diagram of transfer RNA. Add a note on its function.
(3+1 = 4 marks)
- 3L. Name two vitamins the deficiency of which cause anemia with the biochemical basis for the same.
(4 marks)
- 3M. Explain the biochemical functions of ascorbic acid
(4 marks)
- 3N. i) Explain two factors affecting iron absorption
ii) Give two clinical applications of PCR.
(2+2 = 4 marks)
- 3O. Give the biochemical basis / reason for the following:
i) Anion gap is increased in metabolic acidosis
ii) Neurological symptoms are common in pyridoxine deficiency
iii) In diabetes management, total calories is given in small divided doses
iv) Fruits and vegetables contribute little to calories.
(4 marks)

