Reg. No.										

MANIPAL UNIVERSITY

FIRST MBBS DEGREE EXAMINATION – SEPTEMBER 2015

SUBJECT: BIOCHEMISTRY– PAPER I (ESSAY)

Monday, September 14, 2015

Time: 10:20 – 13:00 Hrs. Maximum Marks: 80

✍ **Answer ALL the questions.**

✍ **Long Answer Questions:**

1. A 52 year old man was brought to the hospital in coma. Following are the biochemical findings in the blood and urine:
   Blood sugar: 570 mg%, serum HCO_3^- : 17 mEq/L, Blood pH: 7.28
   Urine: Rothera's test: positive, Benedict's test: Brick red color

1A. Give probable diagnosis. Comment on two biochemical parameters of this case report that support your diagnosis.

1B. Briefly explain the biochemical mechanism that supports your diagnosis.

1C. Explain the synthesis and utilization of the compound/s responsible for the positive Rothera's test in urine.

(2+3+5 = 10 marks)

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

2A. Urea cycle

2B. Synthesis of catecholamines from phenylalanine

(5+5 = 10 marks)

3. **Short Answers:**

3A. Write the reactions of glycolysis in mature red blood cells.

(4 marks)

3B. What is competitive enzyme inhibition? With the help of a graph, describe changes in K_M and V_{max} produced by competitive enzyme inhibitors. Mention one therapeutic use of competitive inhibitor.

(1+2+1 = 4 marks)

3C. i) Ten days old male infant was brought to the paediatrician with complaints of frequent vomiting, particularly after breast feeding. Urine was positive for Benedict's test. Sugar in urine was identified as galactose.

a) Name the possible enzyme defect.

b) Write one clinical manifestation of this disease explaining the biochemical basis.

ii) The plasma and urine glucose levels in a patient after oral glucose tolerance test is as follows:

	Fasting (0 hour)	1hour	2 hours
Plasma glucose (mg/dl)	139	190	210
Urine glucose	-	-	+

a) Interpret the OGTT results.

((1+1)+2 = 4 marks)

3D. Describe the changes in enzyme patterns seen in liver diseases.

(4 marks)

3E. Explain the digestion of dietary proteins in gastrointestinal tract.

(4 marks)

3F. Write the reactions of β –oxidation of palmitoyl CoA in mitochondria.

(4 marks)

3G. **Answer briefly:**

i) Chylomicrons ii) von Gierke's disease

(2+2 = 4 marks)

3H. Schematically represent the components of electron transport chain indicating the various complexes.

(4 marks)

3I. Classify lipids giving examples for each class.

(4 marks)

3J. **Write notes on:**

i) Denaturation of proteins ii) Malate-aspartate shuttle

(2+2 = 4 marks)

3K. **Explain the biochemical relation between:**

i) Hyperammonemia and mental retardation
ii) Albumin and nephrotic syndrome
iii) Tyrosine and catecholamines
iv) LDL and atherosclerosis

(1 mark × 4 = 4 marks)

3L. **Write briefly on:**

i) Effect of temperature on the velocity of an enzyme catalyzed reaction
ii) Primary structure of proteins

(2+2 = 4 marks)

3M. Write the reaction catalyzed by the following enzymes indicating their significance:

i) Lipoprotein lipase
ii) Glutamate decarboxylase

(2+2 = 4 marks)

3N. Name two disaccharides mentioning their composition. Write a note on absorption of glucose from GIT.

(1+3 = 4 marks)

3O. **Give biochemical basis for the following:**

i) Cyanide poisoning causes death
ii) Steatorrhea is observed in obstructive liver disorders
iii) Sodium benzoate is administered as a treatment for hyperammonemia
iv) Upon standing, urine collected from alkaptonuric patient turns black

(1 mark × 4 = 4 marks)

Reg. No.										

MANIPAL UNIVERSITY

FIRST MBBS DEGREE EXAMINATION – SEPTEMBER 2015

SUBJECT: BIOCHEMISTRY– PAPER II (ESSAY)

Tuesday, September 15, 2015

Time: 10:20 – 13:00 Hrs. Maximum Marks: 80

✍ **Answer ALL the questions.**

✍ **Long answer questions:**

1. A 21-year-old male college student was brought to the casualty complaining of severe abdominal pain. He was also showing neuropsychiatric symptoms. Serum and urine aminolevulinic acid (ALA) and prophobilinogen (PBG) were both found to be elevated. The patient was kept under observation. When the patient became agitated, he was given mild sedative containing phenobarbitone upon which his condition worsened.

1A. What is the likely diagnosis and the possible biochemical defect?

(½+½ = 1 mark)

1B. Describe the biosynthesis of heme. Add a note on its regulation.

(4+2 = 6 marks)

1C. Write the biochemical basis behind worsening of condition upon treatment with phenobarbitone.

(2 marks)

1D. Which enzyme/s of heme biosynthetic pathway are sensitive to lead inhibition?

(1 mark)

2. **Describe:**

2A. The process of DNA replication. Name two inhibitors of replication.

2B. Describe the salient features of genetic code.

((6+1)+3 = 10 marks)

3. **Short answer questions:**

3A. A 38 year old strict vegetarian suffering from the disorder of ileum was presented to the doctor with pallor and weakness. Upon investigations the peripheral blood smear showed large immature RBC's.

i) What is the probable diagnosis? Name the deficient vitamin that is responsible for this condition of the patient.

ii) Name two coenzymes of this deficient vitamin and write one reaction each in which they take part.

((½+½)+3 = 4 marks)

3B. Explain the formation of bilirubin from heme. Add a note on van den Bergh test.

(2+2 = 4 marks)

3C. Give two examples of mutagens. Explain one point mutation and one frameshift mutation with an example for each.

(1+1½+1½ = 4 marks)

3D. **Giving two examples each explain the following:**

i) Post transcriptional modifications ii) Inhibitors of protein synthesis

(2+2 = 4 marks)

3E. Explain the lac operon concept.

(4 marks)

3F. Describe recombinant DNA technology with the help of diagrams. Mention any two applications of the technique.

(3+1 = 4 marks)

3G. **Write notes on:**

i) Beriberi ii) Co-enzyme functions of biotin

(2+2 = 4 marks)

3H. **Explain vitamin A under the following aspects:**

i) Visual cycle ii) Deficiency manifestations

(2½+1½ = 4 marks)

3I. **Explain:**

i) Biological role of vitamin K ii) Wilson's disease

(2+2 = 4 marks)

3J. What is the normal blood level of calcium? What are the mechanisms by which calcium homeostasis is maintained?

(½+3½ = 4 marks)

3K. Define BMR. Explain four factors affecting and significance of BMR.

(1+2+1 = 4 marks)

3L. Name two buffer systems in the body. Describe the role of kidney in the maintenance of acid-base balance.

(1+3 = 4 marks)

3M. **Write briefly on:**

i) Metabolic alkalosis ii) Nitrogen balance

(2+2 = 4 marks)

3N. **Write notes on:**

i) Two metabolic roles of glucuronic acid ii) Kwashiorkor

(2+2 = 4 marks)

3O. **Give biochemical basis for the following:**

i) Vitamin C deficiency causes bleeding gums

ii) Methotrexate is used in the treatment of cancer

iii) HIV tested positive with ELISA is confirmed by western blot technique

iv) Anion gap is increased in diabetic ketoacidosis

(1 mark × 4 = 4 marks)