MANIPAL UNIVERSITY

FIRST MBBS DEGREE EXAMINATION – JUNE/JULY 2016

SUBJECT: BIOCHEMISTRY– PAPER I (ESSAY)

Monday, July 04, 2016

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

✍ **Answer ALL the questions.**

✍ **Long answer questions:**

1. A 62 year old obese, known hypertensive patient was admitted to a hospital with history of chest pain. ECG changes revealed acute myocardial infarction. His plasma cholesterol level was 430mg/dl with an increase in the concentration of LDL. There was a decrease in plasma HDL levels. Triglyceride level was 280mg/dl. Angiogram demonstrated a narrowing of the right coronary artery.

1A. Comment on the lipid profile of this patient emphasizing the serum cholesterol level and the significance of HDL and LDL levels.

1B. Explain the alterations in two plasma enzymes pattern which would support the diagnosis.

1C. What is the mechanism of action of the drug lovastatin used in the treatment? Write the reaction that has been affected by the above drug.

$$(4+3+(1+2) = 10 \text{ marks})$$

2. **Explain:**

2A. How ammonia is detoxified in the body?

2B. The synthesis of catecholamines from phenylalanine indicating enzymes and coenzymes.

$$(5+5 = 10 \text{ marks})$$

3. **Short answer questions:**   .

3A. A 50 year old, moderate drinker was admitted to the emergency department in an unconscious state. His consumption of alcohol had increased markedly over last few weeks. He had also been eating poorly. On examination his breathing was deep and noisy, alcohol could be smelt in his breath. Lab findings revealed: Blood glucose = 50mg/dl and pH 7.21, Benedict's test with urine=negative, Rothera's test with urine=positive

   i)   Comment on the each of the biochemical test results.

   ii)   Write the reactions of synthesis of the compound/s responsible for positive Rothera's test.

$$(2+2 = 4 \text{ marks})$$

3B. Write the reactions of oxidative phase of hexose monophosphate shunt. Explain how this phase of the shunt pathway is related to hemolytic anemia.

$$(2+2 = 4 \text{ marks})$$

3C. Write any four classes of enzymes giving suitable examples and the reactions catalyzed.

$$(4 \text{ marks})$$

3D. Explain glycogenolysis in liver indicating its importance.

(4 marks)

3E. Write one reaction for synthesis of glycine in body. Explain the formation and significance of creatine.

(1+3 = 4 marks)

3F. **Explain:**
   i) Chronic uncontrolled diabetic patients are prone for cataract formation
   ii) Role of citrate in lipid metabolism

(2+2 = 4 marks)

3G. Write the reaction catalyzed by and the significance of the following enzymes:
   i) Glutamate pyruvate transaminase
   ii) Glutamate decarboxylase

(2+2 = 4 marks)

3H. With the help of graphs explain the effect of temperature and substrate concentration on the velocity of an enzyme catalyzed reaction.

(2+2 = 4 marks)

3I. Schematically represent the components of electron transport chain in a sequence indicating the sites of ATP synthesis. With an example explain the mechanism of action of uncouplers.

(3+1 = 4 marks)

3J. Describe β-oxidation of a fatty acid in mitochondria indicating enzymes and coenzymes.

(4 marks)

3K. **Write the biochemical defect in the following:**
   i) von-Gierke's disease   ii) Maple syrup urine disease
   iii) Steatorrhoea   iv) Galactosemia

(1 mark × 4 = 4 marks)

3L. Describe the digestion of dietary proteins in gastro intestinal tract.

(4 marks)

3M. Explain the role of insulin in blood glucose regulation. Add a note on glycated hemoglobin.

(2+2 = 4 marks)

3N. **Explain the biochemical basis of the following:**
   i) Excessive ingestion of fructose may lead to hyperlipidemia
   ii) Excess alcohol metabolism may lead to fatty liver
   iii) Upon standing, urine from patient with alkaptonuria turns black
   iv) Oral rehydration solution is used in treating diarrhea

(1 mark × 4 = 4 marks)

3O. **Write notes on:**
   i) Clinical utility of two radioisotopes in medicine
   ii) High energy compounds

(2+2 = 4 marks)

Reg. No.										

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FIRST MBBS DEGREE EXAMINATION – JUNE/JULY 2016

SUBJECT: BIOCHEMISTRY– PAPER II (ESSAY)

Tuesday, July 05, 2016

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

✍ **Answer ALL the questions.**

✍ **Long answer questions.**

1. A two year old child was hospitalized with features of jaundice. On investigation unconjugated bilirubin was high, hemoglobin was low and peripheral smear showed presence of many sickle shaped RBC's.
1A. What is the probable interpretation?
1B. Explain the molecular defect responsible for sickling.
1C. Outline the steps of heme synthesis indicating the enzymes and coenzymes. Add a note on its regulation

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

2. Describe the features and process of DNA replication. Name two inhibitors for the same.

(8+2 = 10 marks)

3. **Short answer questions:**

3A. Define the following and give its importance:
   i) Nitrogen balance   ii) Mutual supplementation

(2+2 = 4 marks)

3B. Detoxification reactions with examples.

(4 marks)

3C. Mention the normal serum calcium levels and describe the factors regulating it.

(4 marks)

3D. Describe the following and write two suitable conditions for each
   i) Respiratory acidosis   ii) Metabolic alkalosis

(2+2 = 4 marks)

3E. Discuss thiamine as follows:
   i) Two functions   ii) Deficiency manifestations

(4 marks)

3F. Explain post translational modifications.

(4 marks)

3G. **Give biochemical basis for the following statements:**
    i)   Gall stones cause conjugated hyperbilirubinemia
    ii)   Vitamin C deficiency manifests as bleeding gums
    iii)   Nascent mRNA is modified by polynucleotide addition
    iv)   Iron deficiency is associated with lethargy

(1 mark × 4 = 4 marks)

3H. Define the following and give its significance:
    i)   Alkali reserve   ii)   Anion gap

(2+2 = 4 marks)

3I. A 20 year old college student weighing 75 Kg comes to the dietician for consultation on weight reduction.
    i)   Mention the biochemical indicator of obesity.
    ii)   Calculate the protein and energy requirement for this student.

(1+3 = 4 marks)

3J. **Mention:**
    i)   One enzyme containing: a)   Molybdenum   b)   Selenium
    ii)   One protein containing: a)   Copper   b)   Iodine

(2+2 = 4 marks)

3K. i)   Enumerate the functions of Pyridoxine.
    ii)   Justify the statement 'Vitamin K deficiency causes anaemia'.

(2+2 = 4 marks)

3L. Describe the Watson and Crick model of DNA.

(4 marks)

3M. What is the normal serum uric acid level? Explain the causes for gout.

(1+3 = 4 marks)

3N. Mention the applications of the following:
    i)   Restriction endonucleases   ii)   Polymerase chain reaction

(2+2 = 4 marks)

3O. Folate and vitamin B_{12} deficiencies are interrelated. Justify.

(4 marks)