MANIPAL UNIVERSITY

FIRST MBBS DEGREE EXAMINATION – AUGUST 2013

SUBJECT: BIOCHEMISTRY– PAPER I (ESSAY)
(NEW REGULATION)

Monday, August 19, 2013

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

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1.   A 10 year old boy was brought to the hospital in a comatose state after a bout of vomiting. Laboratory investigation revealed that his blood sugar was 300mg/dl, blood pH was 7.2 and serum HCO_3^- was 20 mEq/L. His urine showed the presence of sugar and ketone bodies.

1A. What is your probable diagnosis?

1B. What are the types and causes of the above disease?

1C. Describe the symptoms and the biochemical basis for the various symptoms of the disease.

1D. Name the biochemical test for long term monitoring and management of this case. What is the normal value of the same?

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

2A. Explain the process of β-oxidation of palmitic acid. Add a note on the energetics.

2B. Describe fatty acid synthase complex with a neat diagram.

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

3A. Write the reactions of the Rapaport – Leubering shunt. What is its significance?

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

3B. Classify phospholipids. Give one example each with their composition.

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

3C. A 2 year old child was brought to the hospital with vomiting and grossly enlarged abdomen. She had a history of frequent episodes of weakness, sweating and pallor that subsided on eating. Lab investigation report revealed low blood glucose, low blood pH, high lactate and ketonuria. Liver biopsy revealed large amounts of glycogen.

   i)   What is your probable diagnosis?

   ii)   What is the biochemical defect?

   iii) Why does glycogen accumulate?

   iv)   What treatment would you suggest?

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

3D. Explain two causes of fatty liver with reasons. Name two lipotropic factors.

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

3E. Write a note on Mitchell's hypothesis.

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

3F. Explain how proteins are digested.

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

3G. Classify immunoglobulins. Explain the basis of the classification. Which part of the immunoglobulin is responsible for binding to the antigen?

(2+1+1 = 4 marks)

3H. i) What are radio isotopes? Give three clinical uses.

ii) Define allosteric enzymes. Give one example.

(2+2 = 4 marks)

3I. Explain transdeamination with reactions.

(4 marks)

3J. Illustrate the use of competitive inhibition in medicine with two examples.

(4 marks)

3K. Enumerate the functions of glycine. Give the reactions of synthesis of any two compounds.

(2+2 = 4 marks)

3L. What are proenzymes? Give two examples. What is their significance?

(1+2+1 = 4 marks)

3M. Indicate the biochemical defect in the following:

i) Albinism

ii) Hartnup's disease

iii) Maple syrup urine disease

iv) Hyper ammonemia type I

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

3N. Give reason for the following:

i) Cataract is seen in galactosemia.

ii) L – DOPA is used in the treatment of Parkinson's disease.

iii) Alkaline phosphatase level is increased in obstructive jaundice.

iv) $FADH_2$ has P:O ratio of 2.

(4 marks)

3O. How are the following synthesized in the body?

i) Tyrosine

ii) Glutamine

(2+2 = 4 marks)

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SUBJECT: BIOCHEMISTRY– PAPER II (ESSAY)
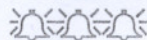### (NEW REGULATION)

Tuesday, August 20, 2013

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

1. What are nucleotides? Write the sources of C and N atoms of purine bases. Explain the catabolism of purine nucleotides. Add a note on gout.

$(1+1½+4+3½ = 10$ marks$)$

2. A 58 year old female has a fractured toe that has not healed completely even after three months. On examination, hemorrhagic patches were seen on her shins and gingivae were swollen. She also had poor healing sores on her body. Histological examination of sores revealed extensive granulation with few collagen fibers.

2A. What is your probable diagnosis?

2B. Give the biochemical explanations for the symptoms.

2C. Add a note on the requirement, dietary sources and functions of the involved dietary component.

$(1+3+1+1+4 = 10$ marks$)$

3A. Explain salvage pathway of purines under following headings:
    i)   Importance
    ii)   Reactions
    iii) Associated disorder

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

3B. Explain the recombinant DNA technology and its clinical significance.

$(2½+1½ = 4$ marks$)$

3C. What are tumour markers? Give three examples with their clinical significance.

$(1+3 = 4$ marks$)$

3D. i)   A 12 year old boy presented at the dermatology clinic with dry, pigmented skin and fungating ulcer. He had always avoided exposure to sunlight. A sample of skin was taken to a radiobiology laboratory, they found that tumor cell DNA contains excessive amount of thymine dimers and it was still increasing on exposure to sun light.
         What is your probable diagnosis and comment on the biochemical defect involved?
    ii) Discuss DNA repair mechanism.

$(2+2 = 4$ marks$)$

3E. Mention the mechanisms of detoxification with one example each.

$(4$ marks$)$

3F. Write a note on balanced diet.

(4 marks)

3G. Name the coenzyme forms of Vitamin B_{12} with the reactions in which they participate. Add a note on its deficiency manifestations.

(2+2 = 4 marks)

3H. What is the normal serum calcium level? Explain the mechanisms involved in its regulation.

(1+3 = 4 marks)

3I. Write a note on sickle cell anemia.

(4 marks)

3J. Classify liver function tests. Name one test to assess each function.

(4 marks)

3K. What is normal blood pH? Explain the renal mechanisms involved in the maintenance of blood pH.

(1+3 = 4 marks)

3L. Give the normal levels of following in serum:
   i) HCO_3^-
   ii) Creatinine
   iii) Uric acid
   iv) Sodium

(4 marks)

3M. Classify dietary fibers and explain their importance.

(4 marks)

3N. Explain the process of heme catabolism.

(4 marks)

3O. Give reasons:
   i)   Puromycin cannot be used as an antibiotic in humans
   ii) Prolonged vomiting results in metabolic alkalosis
   iii) Histidine load test is performed to assess folate deficiency
   iv) Iron overload leads to bronze diabetes

(4 marks)

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FIRST MBBS DEGREE EXAMINATION – AUGUST 2013

SUBJECT: BIOCHEMISTRY– PAPER I (ESSAY)
(OLD REGULATION)

Monday, August 19, 2013

Time: 10:20 – 13:00 Hrs.   Maximum Marks: 40

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1. Write the reactions of citric acid cycle mentioning the enzymes and coenzymes. Add a note on the regulation of the above pathway.

(4+1 = 5 marks)

2. Write the reactions involved in the synthesis and utilization of ketone bodies. Add a note on ketosis.

(3+1 = 4 marks)

3. With the help of one example, explain the regulation of enzyme activity by reversible covalent modification.

(2 marks)

4. How ammonia is detoxified in the body? Write the biochemical basis of ammonia toxicity.

(3+1 = 4 marks)

5. Write short note on the following:
5A. Competitive inhibition of enzymes
5B. Denaturation of proteins

(1½×2 = 3 marks)

6. Write relationship between:
6A. Phenylalanine and tyrosine
6B. Insulin and blood glucose
6C. Hemoglobin and 2, 3 BPG
6D. Pancreatic lipase and dietary fat

(1×4 = 4 marks)

7. Give biochemical explanation for the following:
7A. ATP is a high energy compound
7B. Proteolytic enzymes are secreted as zymogens
7C. Methionine is a lipotropic factor
7D. Fluoride is used in collection of blood for glucose estimation

(½×4 = 2 marks)

8. Write note on:

8A. Absorption of dietary glucose

8B. Essential fatty acids

8C. Chemiosmotic hypothesis

(2×3 = 6 marks)

9. Name the defective enzyme and compounds accumulating in the following disorders

9A. Alkaptonuria

9B. Niemann-Pick`s disease

9C. Von-Gierkes disease

(1×3 = 3 marks)

10. Write the reaction catalysed by the following enzymes:

10A. Lecithin cholesterol acyl transferase (LCAT)

10B. Acetyl coA carboxylase

(1×2 = 2 marks)

11. Glycine is nonessential amino acid. Why? Explain the synthesis and significance of two biologically important compounds formed from glycine .

(1+2 = 3 marks)

12. Briefly explain how would you biochemically investigate a patient with suspected diabetes mellitus.

(2 marks)

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FIRST MBBS DEGREE EXAMINATION – AUGUST 2013

SUBJECT: BIOCHEMISTRY– PAPER II (ESSAY)
(OLD REGULATION)

Tuesday, August 20, 2013

Time: 10:20 – 13:00 Hrs.   Maximum Marks: 40

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1. Long answer questions:

1A. Describe the process of translation. Add a note on post-translational modifications of proteins.

(4+2 = 6 marks)

1B. Describe the regulation of serum calcium levels. Mention the causes of altered serum calcium levels.

(4+2 = 6 marks)

2. Short answer questions:

2A. Write the principle, technique and uses of Polymerase Chain Reaction.

(4 marks)

2B. Dietary sources and any THREE biochemical reactions involving thiamine as a coenzyme.

(1+3 = 4 marks)

2C. Explain how bilirubin is formed. What is the role of enzymes in the diagnosis of liver diseases?

(4 marks)

3. Brief answers questions:

3A. Types and benefits of dietary fibers.

(3 marks)

3B. An 18-year-old female was brought to the casualty with complaint of severe abdominal pain. She also had neuropsychiatric symptoms. The patient was kept under observation. When the patient became agitated, she was given mild sedative containing phenobarbitone upon which her condition worsened.
   i)   What is your diagnosis? Name the defective enzyme.
   ii)   Explain the biochemical basis for various symptoms seen in the above patient.
   iii) Explain the reason for worsening of condition after ingestion of phenobarbitone.

(($\frac{1}{2}$+$\frac{1}{2}$)+1+1 = 3 marks)

3C. Hybridoma technology.

(3 marks)

3D. Hyperuricemia

(3 marks)

4. Give biochemical reasons for the following:

4A. Sulfonamides and salicylates should not be given in patients with jaundice.
4B. Patients with biliary tract obstruction may show prolonged prothrombin time.
4C. Atrophic gastritis can cause both iron and vitamin B_{12} deficiency.
4D. Point mutation need not produce a defective protein.

(1×4 = 4 marks)

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8.   Write note on:

8A.   Absorption of dietary glucose

8B.   Essential fatty acids

8C.   Chemiosmotic hypothesis

(2×3 = 6 marks)

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10A.   Lecithin cholesterol acyl transferase (LCAT)

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(1×2 = 2 marks)

11.   Glycine is nonessential amino acid. Why? Explain the synthesis and significance of two biologically important compounds formed from glycine .

(1+2 = 3 marks)

12.   Briefly explain how would you biochemically investigate a patient with suspected diabetes mellitus.

(2 marks)

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