Five Year Integrated M.Sc. Examinations 2024

SEMESTER - V

Paper LS-3-5-2

(Metabolism of Carbohydrates, Proteins, Lipids and Nucleic acids)

Time: 4 hours **Full Marks: 80**

Questions are of values as indicated in the margin.

*(Answer **Question No. 1** and **any six** from the rest)*

1. Answer ***any ten*** of the following: 10x2=20

    a. What are zymogens? Give examples.
    b. Name the different cell types of stomach and their secretions. How is the stomach lining protected from gastric juice?
    c. Where is bile secreted from and stored? State the composition and functions of bile.
    d. Name the causes of peptic ulcers. How are these treated?
    e. What makes the pancreatic juice alkaline? Mention names and functions of digestive enzymes present in the pancreatic juice.
    f. Distinguish between symport and antiport citing one example of each.
    g. Name two uncouplers of oxidative phosphorylation and state their modes of action.
    h. Name two inhibitors of electron transport chain, and mention their modes of action.
    i. What are ionophores? Give one example.
    j. What is the biological role of glycogenin?
    k. Contrast between glucokinase and other hexokinases.
    l. Where is glucose-6-phosphatase located in the liver cells? How does it function?

2. What are the allosteric regulators of PFK-1? Differentiate between PFK-1 and PFK-2. How does PFK-2 regulate the activity of PFK-1? Elucidate the role of insulin and glucagon in this regulation. 2+2+3+3=10

3. Name the enzymes involved in glycogenolysis. Discuss the sequential steps in glycogen breakdown. Why is gluconeogenesis not the reversal of glycolysis? Mention the reactions in gluconeogenic pathway that are different from that of glycolytic pathway. 2+3+2+3=10

4. With the help of neat labeled diagram, describe the structure of mitochondrial ATP synthase. Elucidate the mechanism of rotational catalysis in oxidative phosphorylation. 5+5=10

5. What is Q cycle? Discuss the events in Q cycle. Elaborate the process of electron flow through mitochondrial Complex IV. 2+4+4=10

6. How are dietary carbohydrates digested? Which transporter facilitates absorption of glucose from the intestinal tract, and how? Write the functions of gastrin, secretin and cholecystokinin. 3+4+3=10

7. Briefly discuss the activation of fatty acids. How are fatty acids transported into the mitochondria? Describe the breakdown of fatty acids with an even number of carbon atoms. 2+3+5=10

8. Explain the phenylalanine degradation pathway. What is phenylketonuria? How is it linked with this pathway? Name and draw the structures of the α-keto acids resulting when the following amino acids undergo transamination with α-ketoglutarate:
   (i) Aspartate
   (ii)Alanine
   Write the complete reaction for each.

   3+1+1+(2.5+2.5)=10

9. Outline of the reactions of urea cycle. Add a note on its regulation. Discuss the Glucose-Alanine cycle.

   5+2+3=10
