

FIVE YEAR INTEGRATED M.Sc. EXAMINATION 2022
SEMESTER - V
Paper LS-3-5-2
(Life Science: Metabolism of Carbohydrates, Proteins, Lipids and Nucleic acids)

Time: 4 hours

Full Marks: 80

Questions are of value as indicated in the margin.
Answer **Question No. 1** and **any six** from the rest.

1. Answer **any ten** from the following: 10x2 = 20
 - a) What is substrate-level phosphorylation? Give one example.
 - b) Which molecule primes glycogen synthesis?
 - c) Name two inhibitors of electron transport and their mode of action.
 - d) What are uncouplers of oxidative phosphorylation? Give two examples.
 - e) Calculate the total yield of ATP when one molecule of glucose is completely broken down in aerobic organisms.
 - f) Differentiate between saturated and unsaturated fatty acids citing examples of each.
 - g) How do cytochromes function as electron carriers?
 - h) What is gout?
 - i) What are ketogenic amino acids? Give two examples.
 - j) State the function of bile.
 - k) How is phenylketonuria caused?
 - l) How are the pancreatic zymogens activated?

2. Taking palmitate as an example, discuss the reactions involved in its activation in the cytosol. Which enzymes facilitate its transport into mitochondrial matrix? How does β -oxidation occur? 2+4+4=10

3. With the help of neat labeled diagram, describe the structure of mitochondrial ATP synthase. Which subunit contains the proton half-channels? Explain the significance of the proton half-channels. 5+1+4=10

4. Discuss the reactions catalyzed by the following enzymes: 5x2=10
(a) Glycogen synthase
(b) Glycogen phosphorylase
(c) Branching enzyme
(d) Debranching enzyme
(e) Phosphoglucomutase
5. Which reactions of glycolysis are irreversible? Why? How are these reactions bypassed in gluconeogenesis? Add a note on the metabolic significance of gluconeogenesis. 3+1+4+2=10
6. What is the role of Coenzyme Q in electron transport? Describe the mitochondrial Q cycle in detail. How is proton gradient formed? 2+6+2=10
7. Which hormones are involved in regulating glycogen metabolism? Discuss in detail the mechanism of such hormonal regulation. 1+9=10
8. Write about the digestion and absorption of carbohydrates in the human digestive system. 10
9. What is transamination reaction? Give one example. Describe the reactions of urea cycle. 1+1+8=10

.....