

6. Attempt any **three** questions. $6 \times 3 = 18$

- (a) Calculate the energetics of complete oxidation of one acetyl-CoA molecule in the TCA cycle.
- (b) The HMP pathway is very important in the RBCs. Explain why?
- (d) Explain why a deficiency in urea cycle enzyme(s) results in hyperammonaemia and what dietary adjustment might minimise the associated toxicity.
- (d) Gel Filtration Chromatography determines the molecular weight of a protein to be 300 kDa. When analysed by SDS-PAGE (in the presence of beta-Mercaptoethanol), three bands: 90, 80 and 40 kDa are observed. Explain this observation and discuss the principle of SDS-PAGE.

[This question paper contains 4 printed pages]

Your Roll No. :

Sl. No. of Q. Paper : 1782 I

Unique Paper Code : 3182011201

Name of the Paper : Biochemistry

Name of the Course : **B.Sc. (Hons.) Biomedical Sciences**

Semester : II

Time : 3 Hours **Maximum Marks : 90**

Instructions for Candidates :

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
 - (b) Attempt any **FIVE** questions in **all**. Question **NO.1** is compulsory.
 - (c) Give illustrations, biochemical reactions, and examples wherever required.
1. (a) Justify the following statements:
 - (i) Palmitic acid undergoes 7 rounds of β -oxidation to yield 8 molecules of Acetyl CoA. $2 \times 6 = 12$
 - (ii) PFK-1 is the key regulatory enzyme in glycolysis.

- (iii) Beer's law is disobeyed at high concentrations of molecules.
 - (iv) Enzymes catalyse biochemical reactions by lowering the activation energy.
 - (v) Oligomycin inhibits ATP synthesis.
 - (vi) Oxidation of FADH_2 yields less energy than that obtained from NADH.
- (b) Define the following: 1.5×4=6

- (i) Michaelis-Menten Constant (K_m)
- (ii) Anaplerotic reactions
- (iii) Isoelectric point (pI)
- (iv) Hyperurecemia.

2. Differentiate between the following (any three):
6×3=18

- (i) Hyperbolic & Sigmoidal Enzyme Kinetics
- (ii) Cori's cycle & the Glucose-Alanine cycle
- (iii) Glycolysis & Gluconeogenesis
- (iv) Oxidative & Non-oxidative phase of HMP Shunt.

3. Write short notes on the following (any three):
6×3=18

- (i) Oxidative phosphorylation.
- (ii) Ketone bodies
- (iii) Beta-oxidation of fatty acids
- (iv) Regulatory enzymes

4. Give complete biochemical reactions catalysed by the following enzymes:

- (i) Hexokinase. 3×6=18
- (ii) Succinate Dehydrogenase
- (iii) Malonyl CoA synthetase
- (iv) Pyruvate carboxylase
- (v) Lactate dehydrogenase
- (vi) IMP dehydrogenase

5. (a) Explain the principle and applications of spectrophotometry in biomolecule analysis.
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- (b) Giving any two biochemical reactions, describe the role of NADH and ATP as metabolic regulators. 6
- (c) Why have we evolved to metabolise glucose under anaerobic conditions also? Explain the regulation and significance of glycolysis. 6