JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

M.Sc.-Ist Semester (B.T. and Microbiology)

COURSE CODE (CREDITS): **20MS1BT111 (3)** MAX. MARKS: **35**

COURSE NAME: **Biochemistry**

COURSE INSTRUCTOR: **Jitendraa Vashistt** MAX. TIME: **2 Hours**

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to use calculator for solving numerical problems.

Q.No	Question	Marks
Q1.	**a)** Which enzyme converts Fructose-6-phosphate to Fructose1-6-bis-phosphate? **b)** How many ATP molecules are net produced per glucose in glycolysis? **c)** What is the fate of pyruvate in anaerobic medium? **d)** Which complex of electron transport chain is inhibited by cyanide? **e)** Which molecule transports large fatty acids into mitochondria?	**5**
Q2	Differentiate between the following a) Glycoprotein and Proteoglycans b) Competitive inhibitor and Non- Competitive inhibitor	**2.5X2=5**
Q3.	Reduced form of Nicotinamide adenine dinucleotide i.e. NADH can generate approximately 2.5 ATP molecules through oxidative phosphorylation, however, inner mitochondrial membrane is impermeable to NADH and it is needed to transport into the mitochondria using shuttle. Explain a shuttle mechanism for NADH transport and explain the significance of this mechanism.	**5**
Q4.	Explain the biochemical process of β-oxidation of fatty acids. Calculate and compare the ATP yield from β-oxidation of palmitic acid with that from complete oxidation of glucose. (Note: use NADH=2.5 ATP and $FADH_2$= 1.5 ATP).	**5**
Q5.	Explain the formation of ketone bodies and also describe the clinical importance of ketone bodies in conditions such as diabetes mellitus and prolonged fasting/starvation.	**5**
Q6.	If a person is suffering from 'hyperammonemia', then which biochemical pathway is affected? Also explain this metabolic process in humans by which above mentioned problem is taken care by liver.	**5**
Q7.	**a)** Define the mathematical relation of the following (i) Maximum Velocity (V_{max}), enzyme concentration $[E]_T$ and Turn over number K_{cat} (ii) Turn over number K_{cat}, Michaelis constant (K_m) and Catalytic efficiency **b)** You are supplied with two enzymes 'A' and 'B' which have Kcat of $24X10^3\ s^{-1}$ and $16X10^3\ s^{-1}$, respectively. If both enzymes have same Km value of 4 M. Which enzyme show best catalytic efficiency?	**2.5X2=5**