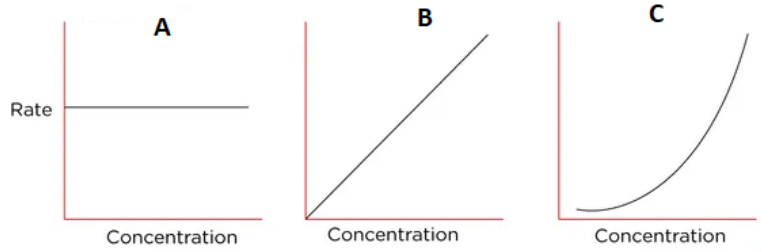
Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2025

Course: Enzymology — **Semester : VI**
Program: Int BSc MSc Microbiology — **Duration : 3 Hours**
Course Code: HSMB3020 — **Max. Marks: 100**

Instructions:

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	Cos
Q 1	Cofactors are essential for enzyme activity because (A) inhibit enzyme activity (B) provide structural support to enzyme (C) Assist enzymes in catalyzing reaction (D) All of the above	1.5	CO1
Q 2	A sigmoidal curve of substrate concentration [S] Vs reaction velocity (V) may indicate (A) Michaelis -Menten kinetics (B) Co-operativity binding (C) Competitive inhibition (D) Non-competitive inhibition	1.5	CO1
Q 3	Which of the following statements about abzymes is true? (A) They are artificial enzymes (B) They have high specificity but no catalytic activity (C) They are natural enzymes with altered function (D) They only work with one substrate	1.5	CO1
Q 4	What is the significance of the catalytic efficiency (kcat/Km) ratio? (A) Measures enzyme specificity (B) Determines enzyme inhibition (C) Indicates Vmax (D) Shows pH dependence	1.5	CO1
Q 5	Which plot is used to linearize the Michaelis-Menten equation? (A) Lineweaver-Burk plot (B) Scatchard plot (C) Eadie-Hofstee plot (D) Hill plot	1.5	CO1
Q 6	When the velocity of enzyme reaction equals to Vmax, substrate concentration [S] is (A) Half of Km (B) Equal to Km	1.5	CO1

	(C) Twice the Km **(D) Far above the Km**		
Q 7	**What is the unit of enzyme activity defined as one micromole of product formed per minute?** **(A) Katal** **(B) IU (International Unit)** **(C) Turnover number** **(D) Specific activity**	**1.5**	**CO1**
Q 8	**Recall the formula of Arrhenius equation.**	**1.5**	**CO1**
Q 9	**Lineweaver-Burk plot is also known as_____** **(A) Double reciprocal plot, (B) Hanes-Woolf plot** **(C) Eadie-Hofstee plot, (D) Steady-state equation**	**1.5**	**CO1**
Q 10	**Define the term specific activity.**	**1.5**	**CO1**
Q 11	**Recall the formula for fold purification.**	**1.5**	**CO2**
Q 12	**Which of the following represents a random bi-substrate reaction?** **(A) One substrate must bind first** **(B) Either substrate can bind first** **(C) Substrates do not interact** **(D) Reaction follows an irreversible path**	**1.5**	**CO2**
Q 13	**In enzyme substrate interactions, Enzyme led to change in reaction equilibrium (True/False)**	**1.5**	**CO2**
Q 14	**Which type of inhibition can be overcome by increasing substrate concentration?** **(A) Non-competitive** **(B) Competitive** **(C) Irreversible** **(D) Allosteric**	**1.5**	**CO2**
Q 15	**What does a low Km value indicate about an enzyme affinity for its substrate?** **(A) High affinity** **(B) Low affinity** **(C) No effect** **(D) Depends on pH**	**1.5**	**CO2**
Q 16	**Recall the formula of Arrhenius equation.**	**1.5**	**CO2**
Q 17	**Enlist name of enzyme and its microbial source used in poultry industry.**	**1.5**	**CO2**
Q 18	**Identify the order of reaction and label A, B and C** 	**1.5**	**CO2**
Q 19	**Define turnover number (kcat).**	**1.5**	**CO2**

Q 20	**The minimum amount of energy needed for a process to occur is called the ?** **(A) Minimal energy theory** **(B) Process energy** **(C) Kinetic energy** **(D) Activation energy**	**1.5**	**CO2**
Section B **(4Qx5M=20 Marks)**			
Q 1	**Discuss isozymes with suitable example.**	**3+2**	**CO1**
Q 2	**Derive Lineweaver-Burk equation and write its significance.**	**3+2**	**CO1**
Q 3	**Compare and contrast the roles of hydrolases and ligases in biological systems, providing one specific example for each enzyme class.** **Or** **Compare Metal activated enzymes with Metalloenzymes with suitable examples.**	**2.5+2.5**	**CO2**
Q 4	**Discuss cooperativity with help of Hill equation.**	**5**	**CO2**
Section C **(2Qx15M=30 Marks)**			
Q 1	**(A) A patient is admitted after accidental methanol ingestion. The attending physician decides to administer ethanol as an antidote. Based on your understanding of alcohol dehydrogenase activity, explain why ethanol is used in this treatment."** **(B) Differentiate between competitive, non-competitive and un -competitive inhibitions.**	**5+10**	**CO3**
Q 2	**Derive Michalis-Menten equation and discuss the significance of Km and Vmax.**	**10+5**	**CO4**
Section D **(2Qx10M=20 Marks)**			
Q 1	**Define allosteric enzymes. How they differ from enzymes which follow the Michaelis-Menten equation.** **Discriminate between concerted and sequential model.**	**2+2+6**	**CO3**
Q 2	**Define allosteric enzymes. Discuss the regulation of enzyme activity by feedback inhibition with an example.** **Or** **Define allosteric enzymes. Differentiate between homotropic and heterotropic effectors with suitable examples. Explain different types of feedback inhibitions with examples**	**2+5+3** **2+2+6**	**CO4**