Q.4	i.	What is enzyme inhibition? Cite with example.	**3**	2	1	3	1
	ii.	Explain the reversible enzyme inhibition.	**7**	2	1	3	1
OR	iii.	Differentiate between reversible and irreversible enzyme inhibition with suitable examples.	**7**	2	1	3	1
Q.5	i.	What is affinity chromatography?	**4**	2	1	4	1
	ii.	Write down different methods used in enzyme analysis.	**6**	2	1	4	1
OR	iii.	Write about site-directed mutagenesis & its role in genetic/enzyme engineering.	**6**	2	4	7	1
Q.6		Attempt any two:					
	i.	Write down the role of enzymes in industries.	**5**	2	3	5	3
	ii.	How enzymes can be use in disease diagnosis?	**5**	2	4	5	3
	iii.	How enzymes can be used in environmental management? Write with classic examples.	**5**	2	3	5	1

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrolment No.....

Faculty of Science
End Sem Examination Dec 2024
BT3SE02 Enzymology

Programme: B.Sc. Biotechnology/Specialisation: Biotechnology

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	**BL**	**PO**	**CO**	**PSO**
Q.1	i.	An allosteric inhibitor of an enzyme typically- (a) Changes the shape of the enzyme, affecting the active site. (b) Binds to the active site, directly blocking substrate binding. (c) Increases the affinity of the enzyme for its substrate. (d) Increases the vmax of the enzyme reaction.	**1**	1	1	1	1
	ii.	According to the transition state theory, the transition state- (a) Has the same free energy as the reactants. (b) Is more stable than the product. (c) Represents the highest energy point on the reaction pathway. (d) Is a permanent intermediate.	**1**	2	1	1	1
	iii.	In the general mechanism of enzyme catalysis, the enzyme primarily lowers which of the following to increase the reaction rate? (a) The free energy of the products. (b) The free energy of the reactants. (c) The equilibrium constant. (d) The activation energy.	**1**	1	1	2	1

iv. Ubiquitination as a means to regulate enzyme levels works by- **1** 2 1 2 1
(a) Promoting enzyme assembly into multienzyme complexes.
(b) Marking enzymes for degradation via the proteasome pathway.
(c) Facilitating enzyme activation by co-factors.
(d) Reducing enzyme synthesis at the transcriptional level.

v. A suicide inhibitor is distinct from other types of inhibitors because it- **1** 2 1 3 1
(a) Acts reversibly to reduce enzyme activity.
(b) Competes with the substrate for the active site.
(c) Inhibits the enzyme only in the presence of cofactors.
(d) Undergoes a reaction with the enzyme, resulting in a permanently inactivated enzyme.

vi. In the determination of the inhibition constant (Ki) for a competitive inhibitor, a smaller Ki value indicates- **1** 2 1 3 1
(a) Weaker binding affinity between the inhibitor and enzyme.
(b) Stronger binding affinity between the inhibitor and enzyme.
(c) That the inhibitor only binds to the enzyme substrate complex.
(d) A decrease in Vmax with increasing substrate concentration.

vii. Which of the following techniques is most commonly used as an initial step in isolating enzymes from a complex cell lysate.? **1** 2 1 4 1
(a) Affinity chromatography
(b) Size-exclusion chromatography.
(c) Ammonium sulphate precipitation.
(d) Reverse-phase HPLC.

viii. When analysing enzyme activity, a spectrophotometric assay might be chosen because- **1** 2 1 4 1
(a) It provides a direct measure of substrate concentration.
(b) It allows for continuous measurement of reaction rate in real-time.
(c) It is the most cost-effective method regardless of enzyme type.
(d) It requires enzymes to be immobilized on a solid phase.

ix. In the leather industry, proteases are employed during the "bating" process to- **1** 1 5 4 1
(a) Soften hides by breaking down non-collagenous proteins.
(b) Remove natural fats and oils from hides.
(c) Prevent microbial growth on leather surfaces.
(d) Dye the leather fibers.

x. Which of the following enzymes is widely used in the pharmaceutical industry to dissolve blood clots? **1** 1 5 4 1
(a) Protease (b) Lipase
(c) Catalase (d) Streptokinase

Q.2 i. What is the meaning of enzyme active site? **2** 2 1 1 1
ii. Mention different factors affecting enzyme activities **3** 2 1 1 1
iii. Derive Michaelis-Menten equation. **5** 2 1 1 1
OR iv. Derive lineweaver burk plot for the determination of enzyme K_m and V_{max}. **5** 2 1 1 1

Q.3 i. What is nucleophilic catalysis in enzymology? **2** 2 1 2 1
ii. Write down the mechanism of enzyme action. **8** 2 1 2 1
OR iii. What are collision and transition state theory in enzymology? **8** 2 1 2 1

Answers Of Multi-choice questions
Faculty of Science
Dept. of Biotechnology
End Sem Examination Dec 2024
Enzymology BT3SE02

Q. No 1	Answer	Answer Explanation
I	A	Changes the shape of the enzyme, affecting the active site.
II	C	Represents the highest energy point on the reaction pathway.
III	D	The activation energy
IV	B	Marking enzymes for degradation via the proteasome pathway
V	D	Undergoes a reaction with the enzyme, resulting in a permanently inactivated enzyme.
VI	B	Stronger binding affinity between the inhibitor and enzyme.
VII	C	Ammonium sulphate precipitation
VIII	B	It allows for continuous measurement of reaction rate in real-time.
IX	A	Soften hides by breaking down non-collagenous proteins
X	D	Streptokinase

Q2 i. Enzyme catalysis – 2
ii. Factors (Name) – 3
iii Drive MMC – 5
iv Lineweaver Burk – 5

Q 3 i. Uni Nucleophilic – 2
ii. Mechanism of EA – 8
→ Intro – 3
– explan. – 5
iii Transition state the = 8

Q 4 i. Enzyme inhibition definition – 3
ii Reversible eyme inhibition –
discription 7
Diagram 3
iii. Difference R and Ir –
2 point 2 marks

Q 5
↳ i. Affinity Chromatography – 4
ii. methods – two method – 6
3 marks for each method
iii site directed mutagenesis –
Discription 3
Diagram 3

Q 6. i. Role of enzyme in indu – 5
ii. use of eyme in dreas degrs – 5
iii Enzyme mangmnt – 5