

ENZYMOLGY

Semester	Subject Code	Category	Lecture		Theory		P	C
IV	21CABT4A	Allied theory - IV	4hrs per week	60	4hrs per week	60	0	4

COURSE OBJECTIVE: In this course, students will

- Understand the fundamentals of enzymology and demonstrate enzyme catalysis and analyze enzyme kinetics, inhibition, and demonstrate 30 immune 30 ia 30 tion and applications of enzymes.

COURSE OUTCOMES:

Up on successful completion of course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL (K1-K4)
CO1.	Understand classification of enzymes and also terms used in enzymology	K2
CO2.	Demonstrate how enzyme works and explain the various mechanisms of enzyme catalysis	K3
CO3.	Compare various factors affecting enzyme activity and categorize different types of enzyme inhibition.	K4
CO4.	Remember enzyme engineering principles and immobilisation	K1
CO5.	Summarize various applications of enzymes	K2

Knowledge level: K1- Remember; K2- Understand; K3- Apply; K4- analyse

Mapping with Programme Outcomes

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	M	M	M	M
CO2	M	S	M	M	M	M
CO3	M	M	S	M	M	M
CO4	M	M	M	S	M	M
CO5	M	M	S	S	S	S

S-strong; M- medium; L-low

UNIT I INTRODUCTION TO ENZYMES**12 Hours**

Enzymes- nomenclature and classification of enzymes, chemical nature of enzymes, intracellular enzymes and extracellular enzymes, specific activity, Enzyme assay, Enzyme Units- Katal and IU, abzymes, ribozymes, DNazymes, isozymes, synzymes.

UNIT II ENZYME CATALYSIS**12 Hours**

Enzyme catalysis-Reaction rate, activation energy, free energy, binding energy, Enzyme catalysis models- Mechanism of enzyme catalysis-Acid base catalysis, covalent catalysis, metal ion catalysis, proximity and orientation effects, examples of catalytic reactions -serine proteases- chymotrypsin, lysozyme, carboxypeptidase, ribonucleases.

UNIT III ENZYME KINETICS AND INHIBITION**12 Hours**

Factors affecting the enzyme activity, Kinetics of a single-substrate enzyme catalysed reaction, Michealis-Menten Equation, K_m , V_{max} , Lineweaver Burk Plot, Turnover number, Reversible Inhibition- Competitive, Non Competitive, Uncompetitive, Mixed, Substrate, Allosteric and Product Inhibition, Irreversible Inhibition- Suicide inhibition

UNIT IV ENZYME ENGINEERING AND IMMOBILISATION**12 Hours**

Introduction to enzyme engineering, steps involved in enzyme engineering, Immobilisation of enzymes- advantages and disadvantages, supports or matrix used in immobilization technology, methods of immobilization- adsorption, entrapment, cross linking, covalent bonding, microencapsulation

UNIT V APPLICATIONS OF ENZYMES**12 Hours**

Uses of enzymes in clinical diagnosis- alkaline phosphatase, Creatine kinase, Alanine aminotransferase, Aspartate aminotransferase, Lactate dehydrogenases, Cholinesterase, Lipase, Amylase, Glutamyl transferase, trypsin, Glutathione peroxidases, enzymes as therapeutic agents, thrombolytic agents and anti-inflammatory agents, uses of enzymes in industries.

Distribution of Marks: Theory 80% and Problems 20%

TEACHING METHODOLOGY

- Class room teaching
- Assignments
- Discussions
- Home work
- PPT presentations
- Seminars
- Models/Charts

TEXT BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Trevor Palmer	Enzymes: Biochemistry, Biotechnology, Clinical Chemistry.	Chichester: Horwood	2007
2.	Lehninger Principles of Biochemistry	Freeman, W. H. & Company	David L Nelson and Micheal Cox	2012

REFERENCE BOOKS:

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Biochemistry	Donald Voet and Judith Voet	John Wiley and Sons	2004
2.	Biochemistry	Lubert Stryer; Jeremy Berg; John Tymoczko; Gregory Gatto	W.H. Freeman	2002
3.	Fundamentals of Enzymology: Cell and Molecular Biology of Catalytic Proteins	Nicholas Price and Lewis Stevens	Oxford Science publications	1989

WEB SOURCES:

1. <https://www.biotopics.co.uk/A15/Enzymes.html>
2. <https://www.youtube.com/watch?v=vTQybDgweiE>
3. <https://www.youtube.com/watch?v=a1cAW6x8n9M>
4. <https://www.youtube.com/watch?v=-DwQMzq0kgU>
5. <http://www.biology-pages.info/E/EnzymeKinetics.html>

Syllabus Designer:

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