I Year & I Sem.; M.Tech. Biotechnology & Bioprocess Engg.	L	T	P	TO	C
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(BT529) ENZYME TECHNOLOGY

Objectives of the Course:

The aim of the course is to give advanced knowledge about the technical use of enzymes and the possibilities to change and improve enzyme performance for adaptation to technical applications.

UNIT I: Introduction to Enzymes :
Classification of enzymes; Mechanisms of enzyme action; concept of active site and energetics of enzyme substrate complex formation; specificity of enzyme action; principles of catalysis – collision theory, transition state theory; role of entropy in catalysis.

UNIT II: Kinetics of Enzyme Action:
Kinetics of single substrate reactions; Estimation of Michaelis – Menten parameters, Multisubstrate reactions & mechanisms. Turnover number; Types of inhibition & models for substrate and product. Allosteric regulation of enzymes, Monod - Changeux -Wyman model, pH and temperature effect on enzymes, Deactivation kinetics.

UNIT III: Enzyme Immobilization:
Physical and chemical techniques for enzyme immobilization – adsorption, matrix entrapment, encapsulation, cross-linking, covalent binding - examples, advantages and disadvantages. Immobilised enzyme bioreactors and their applications.

UNIT IV: Purification and Characterization of Enzymes from Natural Sources:

Production and purification of crude enzyme extracts from plant, animal and microbial sources; methods of characterization of enzymes; development of enzymatic assays.

UNIT V: Applications of enzymes:
Application of enzymes in industrial, medical, analytical, chemical, pharmaceutical and food sectors. Application of enzymes in analysis; Design of enzyme electrodes and their application as Biosensors in industry, healthcare, food and environment.

TEXT BOOKS :

1. Palmer T. “Enzymes: Biochemistry, Biotechnology and Clinical Chemistry”, First East -West Press Edition, 2004
2. James E Bailey, David F., Ollis, “Biochemical engineering Fundamentals” 2 nd ed., Mc Graw Hill Intl. Edition.

REFERENCE BOOKS :

1. Colin Ratledge and Bjorm Kristiansen, “Basic Biotechnology”, 2 nd ed., Cambridge University Press.
2. Wiseman, Alan. “Handbook of Enzyme Biotechnology”, 3rd ed., Ellis Harwood, 1995.