

### SEMESTR – III

#### **SUBJECT TITLE: ENZYME AND ENZYME TECHNOLOGY** (for B.Sc. Bio-Chemistry 2010-11 & B.Sc. Bio-Chem. With Nanotech. 2010-11)

#### **SUBJECT DESCRIPTION:**

Enzymes are protein catalyst that regulates the rates at which physiological process takes place. Consequently defects in enzyme function frequently cause diseases. Hence, sound knowledge about enzymes is essential for life science students.

**GOALS:** To enable the students to learn about the different types of enzymes and its isolation and purification which will pave the ways in which the students can enter in research field.

#### **OBJECTIVES:**

- On successful completion of the course the students will acquire knowledge about
- ❖ Techniques of isolation & purification of the enzymes.
  - ❖ Kinetics of the enzymes
  - ❖ Enzymes that are used in medicine and industry

#### **CONTENTS:**

##### **UNIT – I**

**Enzymes:** Introduction, Definition, International Classification of enzymes, Numbering and nomenclature. Enzyme units.

Definition of active sites. Theories proposed – Lock and Key or template model and induced fit model, ordered and random binding of substrate. Enzyme specificity – Group specificity, optical specificity.

Enzyme as proteins Structure: Primary, Secondary, Tertiary and Quaternary structure with reference to examples.

##### **UNIT – II**

###### **Enzyme kinetics and enzyme inhibitors:**

Enzyme Kinetics: Derivation of Michalies-Mentons equation, transformation of MM equation, Line-Weaver Burk plot and Eadie Hoffste plot. Effect of pH, Temperature, enzyme activity, turn over number of enzymes.

Enzyme Inhibition: Competitive, non-competitive and un-competitive inhibition.

Regulatory enzymes, allosteric enzymes with reference to aspartate transcarbamoylase, covalent by modulate enzymes and Isoenzymes. Ribozymes, Abzymes.

##### **UNIT – III**

**Coenzymes:** Definition, Structure and functions of TPP, NAD, NADP, FAD, FMN, Coenzyme A, Metal cofactors.

Multienzyme Complex: Pyruvate dehydrogenase.

Mechanism of enzyme action: General acid bas ecatalysis, covalent catalysis, Proximity orientation. Mechanism of action of Lysozyme and chymotrypsin.

Measurement of enzymatic reactions: Spectrophotometry and radio assay.

#### **UNIT – IV**

**Enzyme Technology:** Immobilized enzymes: Source and techniques of immobilization. Effect of immobilization on enzyme activity. Application of immobilized enzymes. Industrial Production of enzymes: Amylase, Proteases, Pectinases. Industrial uses of enzymes.

#### **UNIT –V**

Uses of Enzymes in analysis: Enzymes as Biosensors – Calorimetric biosensors, Potentiometric biosensors, Amperometric biosensors, Optical biosensors and immunosensors. It's Principle, technique, mechanism and examples.

**Enzyme engineering:** Artificial enzymes. Enzymes used in diagnosis and various diseases with normal and abnormal values. Antioxidant enzymes.

#### **REFERENCES:**

1. Trevor Palmer, 3<sup>rd</sup> edition, 1991. Understanding enzymes. Ellis-Horwood Limited.
2. Enzymes – Dixon and Webb.
3. Enzyme Technology – Chapline & Bucke.
4. Alan Welshman, 2<sup>nd</sup> edition, Hand book of enzyme biotechnology.