ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

IV SEMESTER **BIOCHEMISTRY** TIME : 4 Hrs/Week

BCH 4801 (3) **ENZYMOLOGY** Max. Marks : 100

w.e.f 2008-2011(V batch) **SYLLABUS**

OBJECTIVES : To enable the students to :

- Classify enzymes and describe their general effects and regulation
- Understand the process of enzyme catalysis and various factors affecting it.
- Identify methods of enzyme purification
- Describe important biochemical techniques used for the cleansing and characterization of proteins including enzyme kinetic examinations .
- Apply the knowledge of enzyme to Industrial and Clinical processes.

COURSE :

UNIT I : INTRODUCTION - History, general characteristics, nomenclature, IUB enzyme classification (rationale, overview and specific examples) . Significance of numbering system. Definition with examples of holoenzyme, apoenzyme, coenzyme, cofactor, activator, inhibitors, active site (identification of groups excluded) metallo-enzymes, units of enzyme activity, isoenzymes, monomeric enzymes, oligomeric enzymes and multi-enzymes complexes . Enzyme specificity.

UNIT II : ENZYME KINETICS – Factors affecting enzyme activity : enzyme concentration, substrate concentration, pH and temperature. Derivation of Michaelis – Menten equation for uni-substrate reactions. Km and its significance. Line Weaver-Burk plot and its limitations. Importance of K_{cat} /k_m. Bi-substrate reactions-brief Reversible and irreversible inhibition, competitive, non-competitive and uncompetitive inhibitions, determination of K_m & V_{max} in presence and absence of inhibitor.

UNIT III : ENZYME CATALYSIS : Nature of non-enzymatic catalysis, Measurement and expression of enzyme activity-enzyme assays. Definition of IU, katal, enzyme turn over number and specific activity.

Role cofactors in enzyme catalysis : NAD/NADP, FMN/FAD, coenzyme A , biocytin, cobamide, lipoamide, TPP, pyridoxal phosphate, tetrahydrofolate. Mechanism of enzyme action : Acid-base catalysis, electrostatic catalysis & metalion catalysis. Regulation of enzyme activity, covalent modulation. distortion Mechanism of action of trypsin, carboxypeptidase, rinbonuclease and lysozyme.

UNIT IV : Enzyme Purification – Methods for isolation, purification and characterization of enzymes. Allosteric enzymes (Ribozyme, Abzyme) – The role of enzymes – AT case

UNIT V : INDUSTRIAL AND CLINICAL APPLICATION OF ENZYMES- Immobilization of enzyme and their industrial applications. Production of glucose from starch, cellulose and dextran; use of lactase in dairy industry; production of glucose-fructose syrup from sucrose; use of proteases in food, detergent and leather industry; medical application of enzymes ; use of glucose oxides in enzyme electrodes.

REFERENCES :

1. Price, N.C&Stevens, L (II Ed) Fundamentals of Enzymology. Oxford University Press, Chennai.
2. Whitkar, J.R.(1972) Principles of Enzymology for Food Science, M.Dekker Publishers, New York.
3. Stryer, I(III Ed) Biochemistry. W.H.Freeman & Co. San Francisco.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

IV SEMESTER **BIOCHEMISTRY** TIME: 4 Hrs/Week

BCH 4851 (1) **ENZYMOLOGY** Max. Marks: 50

w.e.f 2008-2011(V batch) **PRACTICAL – II B**

OBJECTIVES: To enable the students to:

- Classify enzymes and describe their general effects and regulation
- Understand the process of enzyme catalysis and various factors affecting it.
- Identify methods of enzyme purification.
- Describe important biochemical techniques used for the cleansing and characterization of proteins, including enzyme kinetic examinations.
- Apply the knowledge of enzyme to Industrial and Clinical processes.

COURSE :

Enzyme Assays

a. Salivary amylase using starch as substrate
b. Effect of temperature on enzyme activity and determination of activation energy.
c. Effect of pH on enzyme activity and determination of optium pH.
d. Effect of enzyme concentration on enzyme activity.
e. Effect of substrate concentration on enzyme activity and determination of K_m constant.
f. Assay of acid phosphatase from potatoes.
g. Assay of urease from (horse gram)
h. Determination of proteolytic activity of trypsin.

REFERENCES:

1. Plummer, D.T. (1979) An Introduction to Practical Biochemistry, Tata MC Graw Hill Book Co., Bombay.
2. Oser B.L.(1961) Hawk's Physiological Chemistry, Tata MC Graw Hill Book Co. Bombay.
3. Burtis, C.A & Ashwood, E.R (Eds)(V Edn) Tietz Fundamentals of clinical Biochemistry . WBSaunders & Co. New York.

** ** **