

SARDAR PATEL UNIVERSITY
Programme: B.Sc (Biochemistry)
Semester: V
Syllabus with effect from: June 2013

Paper Code: US05CBCH02	Total Credit: 3
Title Of Paper: Enzymology	

Unit	Description in detail	Weightage (%)
I	<p>Definition of enzyme, examples of holoenzymes, apoenzyme, coenzyme, cofactors, activators, and inhibitors.</p> <p>Role of coenzymes in enzyme catalysis: NAD⁺/NADP⁺, FMN/FAD, Co-enzyme A, Biotin, Cobalamine, Lipoamide, TPP, Pyridoxal phosphate, Tetrahydrofolate,</p> <p>Metal ions as a co factor- Na⁺, K⁺, Mn⁺², Mg⁺²</p> <p>Properties of enzymes: catalytic activity, regulation, enzyme specificity,</p> <p>Factors affecting enzyme activity:</p> <ul style="list-style-type: none"> • Effect of Enzyme concentration, • Effect of Substrate concentration, • Effect of temperature, • Effect of pH, • Effect of time. • Effect of product concentration, • Effect of activators, • Effect of light and radiation. <p>Unit activity of enzymes.</p> <p>Specific activity of enzymes</p>	25%
II	<p>Enzyme location within the Cell-</p> <ul style="list-style-type: none"> • Nucleus, • Endoplasmic reticulum, • Mitochondria, • Lysosomes, • Cytoplasm, • Cell membrane. <p>Methods for isolation, purification & characterization of enzymes.</p> <p>Methods that based on size/mass</p> <ul style="list-style-type: none"> • Centrifugation, • Gel filtration, Dialysis and • Ultra filtration. <p>Methods that based on polarity</p> <ul style="list-style-type: none"> • Ion exchange chromatography, • Electrophoresis, • Isoelectric focusing, • Hydrophobic interaction chromatography. <p>Methods that based on change in solubility</p> <ul style="list-style-type: none"> • Change in pH change, • In ionic strength, • Decrease in dielectric constant. <p>Methods that based on the possession of specific binding sites or structural</p>	25%



	features Affinity chromatography, Affinity elution.	
III	<p>Factors affecting enzyme activity:</p> <ul style="list-style-type: none"> Derivation of M.M. Equation for uni-substrate reaction, K_m & its significance. <p>Definitions of IU, Katal & enzyme turn over number & specific activity. Line Weaver Burk plot & its limitations, importance of K_{cat}/K_m. Bisubstrate reaction: introduction to sequential & ping pong mechanism with examples. Kinetics of Zero & first order reactions. Significance & evaluation of energy of activation & free energy. Reversible & irreversible inhibition - competitive, non-competitive & uncompetitive. Inhibitions, determination of K_m & V_{max} in presence & absence of inhibitor, Allosteric enzymes.</p>	25%
IV	<p>Clinical applications of diagnosis enzymes (diagnostic utility)</p> <ul style="list-style-type: none"> Aspartate transaminases, alanine transaminases Alkaline phosphatase, acid phosphatases, lactate dehydrogenases, creatine kinases, <p>Use of enzyme to determine the concentration of metabolites of clinical importance fluids, blood glucose, uric acid & cholesterol, TG. Use of glucose oxidase in enzyme electrodes. Enzyme therapy- in treatment of genetics deficiency disease, cancer therapy.</p> <ul style="list-style-type: none"> Industrial application of enzyme. Immobilization of enzyme & its industrial application. Production of glucose from starch, cellulose, dextrin. Uses of lactose in dairy industry, production of glucose -fructose syrup from sucrose. Uses of protease in food, detergent, & leather. Uses of microorganism in brewing & cheese making. Uses of microorganism in production of organic chemicals. 	25%

Basic Text & Reference Books:

- Enzymes - Trever Palmer, Philip Bonner,
- Biochemistry- Donald Voet, Judith G. Voet.
- Text book of medical biochemistry - Dinesh puri.
- Text book of medical biochemistry - M.N. Chatterjea and Rana shinde.
- Text book of biochemistry D.M. Vasudevan.
- Fundamentals of enzymology, Nicholous C. Price & Lewis Stevens.
- Enzymes: Dixon & Webb.

