

Course	Skill Enhancement Course
Semester	III
Paper Number	MBTSE3011T
Paper Title	ENZYMES: Structure and kinetics
No. of Credits	2
Theory/Composite	Theory
No. of periods assigned	2 Theory
Course description/objective	<p>The course aims to</p> <ol style="list-style-type: none"> 1. Teach Students about structure-function relationship in functioning of enzymes, enzyme regulation and enzyme immobilization technique for commercial application of enzymes. 2. Students will learn about kinetic characterization of enzymes and enzyme inhibitors. <p>An overview of multi-substrate systems and multi-enzyme complexes will be provided.</p>
Syllabus	<p>Module A: (40 Marks)</p> <p>UNIT I: Isolation and purification of enzymes, test of homogeneity of enzyme preparation, activity and specific activity, purification table; Enzyme substrate complex: concept of E-S complex, binding sites, active site, specificity, Kinetics of enzyme activity: Michaelis-Menten equation and its derivation, different plots for the determination of K_m and V_{max} (Lineweaver-Burke & Eadie-Hofstee Plots) and their physiological significance, factors affecting initial rate, E, S, temperature & pH; Collision and transition state theories; significance of activation energy and free energy.</p> <p>UNIT II: Two substrate reactions (Random, ordered and ping-pong mechanism); Enzyme inhibition: reversible (competitive, uncompetitive, mixed including non-competitive) and irreversible including suicide inhibition, determination of K_i; Mechanism of enzyme action: general mechanistic principles (acid-base, nucleophilic, covalent and metal ion catalysis), factors associated with catalytic efficiency (proximity, orientation, entropy reduction, desolvation and bond distortion); Techniques for studying mechanisms of action with lysozyme as specific example; Isoenzymes: multiple forms of enzymes with special reference to lactate dehydrogenase.</p> <p>No. of Classes: 1 /week</p> <p>Module B: (40 Marks)</p> <p>UNIT III: Enzyme classification; Zymogens and their activation (Proteases and Prothrombin). Structures and mechanisms of Serine protease (Chymotrypsin), Restriction endonuclease, Metalloenzyme carbonic anhydrase, aldolase and alcohol dehydrogenase. Enzyme regulation: Transition-state analog, product inhibition, feedback control, covalent modification. Allosteric enzymes with special reference to aspartate transcarbamylase. Cooperativity.</p> <p>No. of Classes: 1 /week</p>

Readings	<p>1. Biochemistry – Stryer. 2. Lehninger Principles of Biochemistry - Cox & Nelson (5th ed.) 3. Biochemistry - Voet and Voet (3rd ed.) Biochemistry Berg – Tymoczko & Stryer (6th edition).</p>
	<p>7. Cell and Molecular Biology – Concepts and Experiments – G. Karp (Wiley). 8. Text Book of Medical Physiology – A. C. Guyton (Holt Saunders). 9. Basic Histology – L. C. Janqueira, J. Carneiro & R. O. Kelly (Appleton & Lange). 10. Histology and Histological techniques – Bankroft (Elsevier). 11. Histology: A text and atlas – M. H. Ross & E. J. Reith (Williams & Wilkins). 12. NanoBioTechnology: Bioinspired devices and materials of the future. (Shoseyov, Oded, Levy, Ilan Eds.). Humana Press.</p>
Evaluation	<p>Continuous Internal Assessment: 20 marks End-Semester Theory Examination: 80 marks</p>
Paper Structure for End Sem Theory	<p>Module A</p> <p>2 questions of 15 marks (2 out of 3) 2 questions of 5 marks (2 out of 4) [(15x2)+(5x2)=40]</p> <p>Module B</p> <p>2 questions of 15 marks (2 out of 3) 2 questions of 5 marks (2 out of 3) [(15x2)+(5x2)=40]</p>