3-3-101

B.Sc -BIOCHEMISTRY (CBCS) SYLLABUS

SEMESTER III – W.E.F. 2016-17

60 hrs
(5 periods/week)

Theory : BCT-301 Enzymology and Bioenergetics

Unit-I: Classification of Enzymes and Structure **12 hours**

Introduction to biocatalysis, differences between chemical and biological catalysis. Nomenclature and classification of enzymes. Enzyme specificity. Active site. Principles of energy of activation, transition state. Interaction between enzyme and substrate- lock and key, induced fit models. Definition of holo-enzyme, apo-enzyme, coenzyme, cofactor. Fundamentals of enzyme assay, enzyme units.

Unit II: Influence of Physical factors and Inhibitors on Enzyme activity. **12 hours**

Factors affecting the catalysis- substrate concentration, *p*H, temperature. Michaelis - Menten equation for uni-substrate reaction (derivation not necessary), significance of K_M and V_{max}. Enzyme inhibition- irreversible and reversible, types of reversible inhibitions- competitive and non-competitive.

Unit-III: Mechanism of enzyme action **12 hours**

Outline of mechanism of enzyme action- acid-base catalysis, covalent catalysis, electrostatic catalysis, and metal ion catalysis. Regulation of enzyme activity- allosterism and cooperatitvity, ATCase as an allosteric enzyme, covalent modulation- covalent phosphorylation of phosphorylase, zymogen activation- activation of trypsinogen and chymotrypsinogen. Isoenzymes (LDH). Multienzyme complxes (PDH). Ribozyme .

Unit- IV: Bioenergetics **12 hours**

Bioenergetics: Thermodynamic principles – Chemical equilibria; free energy, enthalpy (H), entropy (S). Free energy change in biological transformations in living systems; High energy compounds. Energy, change, oxidation-reduction reactions.

Unit V : Biological Oxidations in Mitochondria **12 hours**

Organization of electron carriers and enzymes in mitochondria. Classes of electron-transferring enzymes, inhibiters of electron transport. Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation. Mechanism of oxidative phosphorylation.

Practical – BCP-301: Enzymology

List of Experiments:

45 hrs
(3 periods/week)

1. Assay of amylase
2. Assay of urease
3. Assay of catalase.
4. Assay of phosphatase
5. Determination of optimum temperature for amylase.
6. Determination of optimum *p*H for phosphatase.

MODEL QUESTION PAPER FOR END SEMESTER EXAM
B.Sc Degree Course
(Semester-III) Enzymology and Bioenergetics
B.Sc Biochemistry

Timer: 3hrs **Max marks: 75**

Section-A (5X5=25 marks)

Attempt any **Five** of the following

1. Free energy.
2. Redox potential
3. Substrate level phosphorylation
4. Uncouplers.
5. Co-enzyme.
6. Enzyme specificity
7. Enzyme inhibition.
8. Isozymes.

Section-B (5X10=50 marks)

Attempt all the following questions

9. List out high energy compounds and explain the reason for their energy rich nature.

(OR)

10. Write short notes on
    a) principles of thermodynamics.
    b) Free energy change in biological transformation

11. Explain the organization of electron carriers in mitochondrial membrane.

(OR)

12. Discus the mechanism of oxidative phosphorylation.

13. Describe the IUB classification of enzymes.

(OR)

14. How to assay the enzymes activity by spectroscopic methods.

15. What are the factors influence enzyme activity.

(OR)

16. Explain the different types of enzyme inhibition.

17. Describe the mechanism of action of enzymes.

(OR)

18. How the enzymes activities are regulated.