

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

CBCS / Semester System

(W.e.f. 2015-16 Admitted Batch)

III Semester Syllabus

BIOCHEMISTRY

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, pH , 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 cooperativity, ATCase as an allosteric enzyme, covalent modulation - covalent phosphorylation of phosphorylase, zymogen activation - activation of trypsinogen and chymotrypsinogen. Isoenzymes (LDH). Multienzyme complexes (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 transport chain and enzyme complexes, inhibitors of electron transport. Oxidative phosphorylation. Uncouplers and inhibitors of oxidative phosphorylation. Mechanism of oxidative phosphorylation.

Practical – BCP-301: Enzymology

List of Experiments:

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 *pH* for phosphatase.

45 hrs
(3 periods/week)

Recommended books for Enzymology & Bioenergetics

1. Fundamentals of Enzymology – Price.N.C.and Stevens.L., Oxford University Press.
2. Understanding Enzymes – Palmer.T., Ellis Harwood.
3. Enzymes – Biochemistry, Biotechnology, Clinical Chemistry – Palmer.T., Affiliated East-West Press.
4. Lehninger’s Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
5. Biochemistry – Berg.J.M., Tymoczko.J.L. and Stryer.L., Freeman & Co.
6. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons

Distribution of Practical Exam Marks

Practical Exam Time: 3 Hrs

Max marks: 50

1. Major Experiment	20 (Principle -5M, Methodology-10M, Results-05)
2. Minor Experiment	10 (Principle -2M, Methodology-05M, Results-03)
3. Spotters	10 (5 nos. x 2 M)
4. Record	05
5. Viva-voce	05

MODEL QUESTION PAPER FOR SEMESTER END PRACTICAL EXAMINATIONS

B.Sc., Course Semester End Practical examination

B.Sc., Biochemistry

TIME: 3 hours

Max. Marks: 50

1. Major experiment.	20 marks
2. Minor experiment	10 marks
3. Identify the given spotter and write a brief note on it- A, B, C,D,E, F (5x2M)	10 marks
4. Record	05 marks
5. Viva-voce	05 marks

MID TERM EXAMINATIONS

(Ist and IInd Internal Assessment Examinations)

Internal assessment; after completion of two Units one internal test will be conducted

No. of internal tests; Two

Average two internal tests will be taken

Total no. of Marks 25

Pattern; out of five short answers three questions have to be attempted each carries 5 Marks.

In essay questions out of two questions, one has to be attempted which carries 10 marks.

MID SEM EXAM MODEL QUESTION PAPER
Ist INTERNAL ASSESMENT EXAMINATION
B. Sc Degree Course (CBCS-Semester pattern)
B. Sc., Biochemistry

Time : 1 Hr

Max marks : 25

SECTION -A

(3 x 5 M= 15M)

Attempt any **THREE** short questions of the following

- 1.
- 2.
- 3.
- 4.
- 5.

SECTION – B

(1x 10M = 10 marks)

Attempt any **ONE** essay question of the following

- 6.
- 7.