

BHARATHIAR UNIVERSITY : COIMBATORE – 641 046
M.PHIL./Ph.D – (FT/PT) - BIOCHEMISTRY
PART-I SYLLABUS (effective from the academic year 2006-07 onwards)

PAPER – I RESEARCH METHODOLOGY

UNIT I: Biostatistics:

Scientific writing - writing, methodology, results & discussion.

Sampling distribution - Students 't' test.

Correlation & regression.

Experimental design - CRD, RBD

Analysis of experimental results - ANOVA and its interpretation, critical difference.

Duncan's Multiple Range Test.

UNIT-II: Immunotechnology:

Fluorescent antibody assay - histochemical localisation.

ELISA techniques - Principles & applications.

Immunoradiometric assay - Principles & applications.

Natural Products- Detection of bioactive molecules by gas chromatography.

Bioassays- chemotherapeutic assays, assays using animals, enzymatic assays.

UNIT-III: DNA Technology:

Flow cytometry - Principle, abnormal chromosomes analysis, karyotyping, COMET assay.

DNA fragmentation analysis, Microfabrication techniques & uses in biological applications.

PCR methodology - design of primers - R-PCR, PCR in genomic analysis and diagnostic applications.

PFGE - Principles, techniques and applications.

UNIT-IV: Protein Technology:

Mass spectrometry- MALDI & Electrospray ionization (ESI).

HPLC & HPTLC - Principle, instrumentation and applications.

Capillary electrophoresis - Principle, instrumentation and applications.

Emission spectroscopy - fluorescence, phosphorescence & chemiluminescence.

X ray, NMR & their uses in protein structure prediction.

Flow injection analysis - Principle & applications.

UNIT-V: Bioinformatics:

Biological databases- DNA sequence databases & Protein sequence databases.

SRS- Similarity searching BLAST, FASTA.

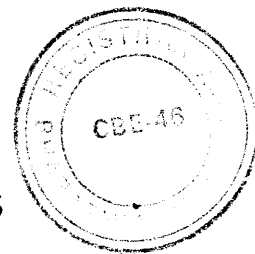
Multiple sequence alignment-Phylogeny.

Structure databases-Secondary structure prediction.

Predicting three dimensional folds (Threading).

References:

1. D.A. Skoog & J.J. Leary, 1992. Principles of Instrument analysis (4th Edition), Saunders College Pub (1992).
2. C.W. Sensen, 2002. Essentials of Genomics and Bioinformatics. Wiley-VCH Pub
3. Robert. A. Day, 1984. How to write and publish a scientific paper. (4th Edition)
4. Trends in Biotechnology from 1999 onwards.
5. Trends in Biological Sciences from 1999 onwards.
6. L.S.English,1994. Technological applications of immunochemicals. BIOTOL Series.
7. Nature Biotechnology from 1999 onwards.
8. Current opinion in Biotechnology from 1999 onwards.



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PAPER – II ADVANCED PAPER IN BIOCHEMISTRY

UNIT-I

Metabolism

Carbohydrate metabolism : TCA cycle, glycolysis, HMP, gluconeogenesis,
Lipid metabolism : Fatty acid synthesis and β -oxidation and chain elongation
Nucleic acid metabolism : Purine and pyrimidine metabolism
Protein metabolism : urea cycle, aliphatic and aromatic amino acid metabolism

UNIT II

Cell Biology and Molecular Biology

Replication, transcription and translation in pro and eukaryotes.
RNA editing, mi RNA and RNAi, and its applications
Antisense RNA technology, Signal sequence hypothesis, protein glycosylation,
protein degradation – ubiquitin pathway.
General principles of cell communication, G Protein-coupled receptors-structure
and functions, cAMP and other second messengers- phosphatidylinositol, diacyl
glycerol, inositol 1,4,5 triphosphate, Ca^{2+} ; Receptor Tyrosine Kinases - structure
and functions, importance of Ras, MAP Kinase cascade.

UNIT III

Genomics and Proteomics

Human Genome Project - history, techniques and applications; Anatomy of
prokaryotic and Human Genome; Genetic mapping and genetic markers- RFLP,
Mini- and Micro satellite, STS and EST, SSCP, RAPD, AFLP, SNPs. Analyzing
gene expression – DNA microarray.
Proteome analysis- 2D gel electrophoresis; Mass Spectrometry – ESI MS and
MALDI techniques and applications; Protein-protein interactions- yeast two-
hybrid system and protein microarrays.

UNIT IV

Plant Biotechnology

Tissue culture media, composition and preparation, Primary culture, cell lines, cell clones, callus and suspension cultures, somaclonal variation, Micropropagation, Organogenesis, Somatic embryogenesis, Artificial seeds, Transfer and establishment of whole plants in soil, Haploidy: Protoplast fusion and Somatic hybridization.

UNIT V

Animal Biotechnology : Media: Natural media, balanced salt solution and simple media, serum and protein free chemically defined media. Primary cell culture (Chick, mouse and human biopsy) and methods of desegregations of tissues; continuous or established cell culture, tissue culture, organ culture; three dimensional culture; Feeder layer; cell separation; cell synchronization; cryopreservation and revival.

Reference:

1. Gerald Karp (2004). Cell and Molecular Biology, concepts and Experiments. 4th edition, John Wiley & Sons, New York.
2. Lodish et.al. (2004) Molecular Cell Biology, 5th edition, W.H. Freeman and Company, New York.
3. Bruce Alberts et.al. (2002) Molecular Biology of the Cell, 4th edition, Garland Science, New York.
4. Adrian Slater, Nigel Scott and Mark Fowler. (2003). Plant Biotechnology - The genetic manipulation of plants, Oxford University Press, New York.
5. Gupta, P.K. (2004). Biotechnology and Genomics, Rastogi and Co. Meerut.
6. Davis, J.M. (2002). Basic Cell Culture, A Practical Approach, Oxford University Press, Oxford.
7. Freshney.R.I. (2000) Animal Cell Culture, A Practical Approach, John Wiley Publications, New York.
8. John R.W. Masters (2000) Animal Cell Culture, Practical Approach. Oxford Publishing Press, Panima Publishing Corporation, New Delhi.