**PAPER-VI:**

COURSE NAME: **BIOINFORMATICS**

TOTAL MARKS: **50**

SPECIFIC OBJECTIVES OF COURSE:

 To acquaint the students with fundamental concepts in Molecular Biology

 To acquaint the students with bioinformatics tools, databases, algorithms and applications.

**COURSE OUTLINE:**

 Introduction to Bioinformatics

 Applications of Bioinformatics

 Genomics

 Transcriptomics

 Proteomics

 Metabolomics

 Biochemical Genetics (Informational Flow in the Cell)

 The structural basis of cellular information

 DNA, Chromosomes

 Discovery and organization of DNA in Genomes

 A, B, Z, and H, DNA

 Super coiling of DNA

 The replication of DNA (DNA dependent DNA synthesis)

 DNA polymerase, its components and functions

 Initiation, elongation and termination of Replication

 DNA Repair, and Recombination, Transposition

 Mutation and Cancers

 The Transcription (DNA dependent DNA synthesis)

 RNA polymerase, its components and functions

 Initiation, Elongation and termination of transcription

 RNA processing, and editing

 RNA dependents synthesis of RNA and DNA

 Reverse transcription-DNA synthesis from viral RNA

 Retroviruses in relation to cancer and AIDS

 Translation (Protein Synthesis)

 The genetic codes and their characteristics

 Initiation, Elongation, and termination of protein synthesis

 Post-translational modification

 Regulation of Gene-Expression

 Molecular biology technology

 DNA isolation

 DNA-recombinant technology

 Hybridization, blotting techniques

 Genetic Disorders

 Physical Map of genome

 Genome mapping

 Multiple sequence alignment

 Gene and protein relationships

 Neuroinformatics in biology, application of genome analysis and genomics

 Introduction to principle of gene therapy and gene delivery system

 Micro-array development

 Computer programming for bioinformatics

 Software development for bioinformatics

 Molecular programming

 Perl Programming for Bioinformatics

 Operating System (Windows, Linux)

 Biological Databank

 Database Management System

 Molecular Imaging & Drug Designing

 Pharmacogenomics & Pharmacogenetics

 BLAST

 PubMED

 EMBL

 GenBanK

 PDB

 Swiss-Port

 Medical records

 Clinical Database and Database models

 Medical Imaging and Digital imaging

 Data acquisition

 Patient machine interface

 Networks

 Data-exchange

 Automated Diagnostic systems

**PAPER-X:**

COURSE NAME: **BIOINFORMATICS (PRACTICAL)**

TOTAL MARKS: **50**

COURSE OUTLINE:

Basic principle of computing in bioinformatics, Web retrieving for genomic and proteomic data, Basic molecular techniques.

**Reference Books:**

1. Attwood Teresa K. Introduction to Bioinformatics. Pearson Education, 1999. New Delhi

2. Bansal, Mohan. Medical Informatics: A Primer. Tata McGraw-Hill Pub, 2003. New Delhi

3. Baxevanis, Andreas D. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. 3rd Edition John Wiley and Sons, 2005. New Jersey

4. Brown, Stuart M. Bioinformatics: A Biologist‟s Guide to Biocomputing and the Internet. Eaton Publishing, 2000. New York

5. Campbell, Peter N.Biochemistry Illustrated: Biochemistry and Molecular Biology in the Post-Genomic Era. 5th Edition Elsevier, 2005. London

6. D. Andreas, Baxevanis and B.F. Francis Ouellette Bioinformatics: A Practical Guide to the Analysis of Gene and Proteins, Second edition, (2000).

7. Feng, David Dagan. Biomedical Information Technology. Elsevier, 2008. Boston Mahesh, S. Biotechnology. New Age International, 2006. New Delhi

8. Krishna, V. Sree. Biotechnology: Including Cell Biology Genetics Microbiology and Immunology. New Age International, 2006. New Delhi

9. Kuppuswamy, C. Encyclopedia of Bioinformatics. 5vol set. Dominant Publishers, 2006. New Delhi

10. Malcolm Campbell, Laurie J. Heyer, Discovering Genomics, Proteomics and Bioinformatics.

11. Rang, H. P. Drug Discovery and Development: Technology in transition. Churchill Livingstone, 2006. London

12. Rastogi, S. C. Bioinformatics: Concepts Skills and Applications. CBS Publishers, 2004. New Delhi

13. Singh, Bimla. Biochemistry and Genomic Revolution. Vista International, 2006. New Delhi

14. Teesa Attwood, David Parry-Smith, Introduction to Bioinformatics (2001).

15. Voet, Donald. Fundamentals of Biochemistry: Life at the Molecular Level. 2nd Edition John Wiley and Sons, 2006. New York.