

M.A. M.Sc. Bio-Tech Exam May/June-2017  
Second/Fourth Semester  
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## 401. EMERGING TRENDS IN BIOTECHNOLOGY

### UNIT I

1. Stem cell technology
2. Manipulation of stem cells and applications in medicine
3. *In vitro* fertilization: Principle, Methods, applications and ethics
4. Cloning of animals: Methods and applications

### UNIT II

1. Genome & Genomics: Concept and methods of genome analysis
2. Transcriptome & Transcriptomics: Concept and methods
3. Proteome and Proteomics: Concept and methods
4. Metabolome and Metabolomics

### UNIT III

1. Nano biotechnology: Introduction and biological materials-example and uses
2. DNA nanotechnology:-Structural DNA assembly
3. Nanoparticles-biological arrays-nano probes for analytical applications
4. Nano biosensors-nano scale organization-characterization-quantum size effects-sensors of the future

### UNIT IV

1. Biochemical diagnostics: Biochemical markers for disease diagnosis
2. Concept of Molecular Diagnostics: DNA diagnostics
3. Microarray Technology, Array-based diagnostics, SNP's (Single Nucleotide Polymorphism) and GMS (Genome Mismatch Signals) and diagnostic significance
4. Western blot diagnostics, Phage display concept and applications of phage display

### UNIT V

1. Biosensors: Concept, principle and types
2. Biosensors in Health and medicine
3. Biosensors in Food technology and environmental monitoring
4. Bacterial biosensors; array biosensors

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**Practical Exercises**

Appropriate exercises based on theory

**Reference Books**

1. DNA Microarrays and gene expression by P. Baldi & GW Hatfield
2. Protein - Protein Interactions by Erica Golemis
3. A passion for DNA (Genes, genomes and Society) By JD Watson
4. Modern Genetic analysis by Anthony JF Griffiths et al.
5. Nanobiotechnology- next big idea by Mark, Ratner, Daniel Ratner
6. Gene cloning by TA Brown
7. Latest information on academic Web sites.

Note: All books are of latest editions

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revised editions

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## 402: BIOINFORMATICS AND ENTERPRENUERSHIP IN BIOTECHONLOGY

### UNIT I

1. Overview of Bioinformatics: Merger of life sciences with computers
2. Search engines: Google Scholar, Pub Med, NCBI, EMBL
3. Protein and DNA databases: Swiss prot, PIR etc. and their applications
4. Softwares for bioinformatics and web based analysis

### UNIT II

1. Sequence Databases: Human Genome Databases, Plant Genome Databases
2. Retrieving and installing a program (Tree Tool), multiple sequence alignment Program- Clustal W & X
3. Genome analysis programs: BLAST and FASTA
4. Phylogenetic analysis: Phylogenetic reconstruction, distance matrices, Parsimony, Phylip

### UNIT III

1. Methods of structure predication of proteins and DNA
2. Computer aided drug designing: Basic principles, docking
3. Functional genomics: EST clustering gene discovery, ORF prediction
4. Use of genome analysis programs, primer designing tools

### UNIT IV

1. Sequence comparison and cluster analysis
2. Homology modeling, protein structure prediction
3. Molecular energy minimization, molecular dynamics simulation
4. Tagging of genes and molecular modeling

### UNIT V

1. Government schemes for commercialization of technology (Eg. Biotech Consortium)
2. Public policy, regulatory and ethical challenges facing in entrepreneurship
3. Biotech enterprises: Small, Medium and Large, Kaizen Quality control in Biotech industries
4. Business development for medical products & consumable products.

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