

# BIOTECHNOLOGY

## SEMESTER-1

**Theory Paper**

**Time: 3 hrs**

**Marks-70**

**Internal Assessment**

**Marks-10**

### Structure of Question Paper (Theory)

1. There will be one theory paper comprising of 30 questions. All questions will be compulsory.
2. Marks of each question are indicated against it.
3. Question Nos. 1-10 are very short answer type questions carrying 1 mark each, Answer to each question will be in one line or few words only.
4. Question Nos. 11-18 are short answer type questions carrying 2 marks each, Answer to each question will be in 20-30 words.
5. Question Nos. 19-26 are short answer type questions carrying 3 marks each, Answer to each question will be in 40-50 words.
6. Question Nos. 27-30 are long answer type questions carrying 5 marks each, Answer to each question will be in 80-100 words.
7. In question Nos. 27-30 there will be 100% internal choice.
8. The question paper should be strictly from the prescribed syllabus based on above mentioned guidelines.
9. Candidates will be provided with one answer book of 32 pages only. No extra/continuous sheet will be provided.

### Syllabus (Theory)

#### UNIT-CELL CULTURE TECHNOLOGY

Chapter I	Microbial Culture and Applications	24 marks
	<ul style="list-style-type: none"><li>• Introduction,</li><li>• Microbial Culture Techniques,</li><li>• Measurement and Kinetics of microbial growth.</li><li>• Scale up of microbial process.</li><li>• Isolation of microbial products,</li><li>• Strain isolation and improvement.</li><li>• Applications of microbial culture technology.</li><li>• Bioethics in microbial technology.</li></ul>	
Chapter II	Plant Cell Culture and Applications	23 marks
	<ul style="list-style-type: none"><li>• Introduction,</li><li>• Cell and Tissue Culture Techniques.</li><li>• Applications of Cell and Tissue Culture.</li><li>• Gene Transfer Methods in Plants.</li><li>• Transgenic in Agriculture and Molecular Breeding.</li><li>• Bioethics in Plant Genetic Engineering.</li></ul>	
Chapter III	Animal Cell Culture and Applications	23 marks
	<ul style="list-style-type: none"><li>• Introduction,</li></ul>	

- Animal Cell Culture Techniques,
- Characterization of Cell Lines,
- Scale-up of Animal Culture Process,
- Applications of Animal Cell Culture.
- Stem Cell Technology.
- Bioethics of Genetic Engineering in Animals.

## **SEMESTER-II**

<b>Theory Paper</b>	<b>Time: 3 hrs.</b>	<b>Marks-70</b>
<b>Practical Paper</b>	<b>Time: 3 hrs</b>	<b>Marks-30</b>
<b>CCE/Internal Assessment</b>		<b>Marks-20</b>

**The structure of Question Paper will be same as given for Semester-I. Question No.1 to 10 (very short answer type) will be asked from the whole syllabus.**

### **Syllabus (Theory)**

#### **UNIT-PROTEIN AND GENE MANIPULATION**

Chapter-I: Protein Structure and Engineering 26 marks

- Introduction to the world of Proteins,
- 3-D shape of Proteins,
- Structure Function relationship in Proteins,
- Purification of Proteins,
- Characterization of Proteins,
- Protein based products,
- Designing Proteins,
- Proteomics,

Chapter-II : Recombinant DNA Technology 26 marks

- Introduction,
- Tools of DNA Technology,
- Making Recombinant DNA,
- DNA Library,
- Introduction of Recombinant DNA into host cells.
  
- Identification of recombinants.
- Polymerase Chain Reaction (PCR).
- DNA Probes,
- Hybridization Techniques.
- DNA Sequencing.
- Site directed mutagenesis,

Chapter-III Genomics and Bioinformatics 18 marks

- Introduction,
- Genome Sequencing projects,
- Gene Prediction and counting,
- Genome similarity, SNP's and comparative genomics,
- Functional Genomics,
- History of Bioinformatics,

- Sequences and Nomenclature,
- Information Sources,
- Analysis using Bioinformatics, tools.

## SMESTER-II PRACTICAL

**One practical Paper**

**Time: 3 Hours**

**Marks: 30**

### Structure of Question Paper

Distribution of marks:

- |                               |          |
|-------------------------------|----------|
| 1. One experiment.            | 7 marks. |
| 2. Practical record           | 4 marks. |
| 3. Viva on practical,         | 4 marks  |
| 4. Project work: (a) Write up | 10 marks |
| (b) Viva                      | 5 marks  |

**Note:** The maximum number of students to be examined by the practical examiner should not be more than 20 students per group.

**Note:** Practical Examination will be held at the end of IInd Semester on the basis of 100% syllabus (Semester-I & Semester-II )

### Syllabus (Practical) (Semester-I)

**Note-** Every student is required to do the following experiments during the Semester-I.

List of Experiments

1. Bacterial transformation using any plasmid.
2. Multiplication of tobacco by nodal bub culture
3. Data retrieval and database search using internet site NCBI
4. Production and estimation of ethanol from microbial culture
5. Determination of LCG in Urine (Pregnancy Test)
6. Project Work.

### Syllabus (Practical) (Semester-II)

**Note:** Every student is required to do the following experiments during the Semester-II

#### **LIST OF EXPERIMENTS:**

1. Isolation of bacterial plasmid DNA and its detection by gel electrophoresis.

2. Restriction digestion of plasmid DNA and its analysis by gel electrophoresis,
3. Download a DNA and protein sequence from internet, analysis and comment on it.
4. Determination of N-terminal of a protein.
5. Ion-exchange chromatography for proteins.
6. Reading of DNA sequencing gel and arrive at the sequence,
7. Project Work.

**Note:-** Practical will be conducted from syllabus of Semester-I during Ist Semester but no examination will be conducted by the board at the end of Semester-I. Practical examination by the Board will be held at the end of Semester-II on the basis of 100% Syllabus.