

# BIOTECHNOLOGY

## (Code No. 045)

### Scheme of Evaluation

**Time: 3 Hours**

**Max. Marks 30**

**The scheme of evaluation at the end of session will be as under:**

Two experiments : 20  
Marks Viva on experiments : 5  
Marks Practical record : 5 Mark

CLASS XII (2020-21)

### COURSE- STRUCTURE- (THEORY)

**One Paper**

**Max. Marks 70+30**

**Time: 3 hrs.**

Units		Marks	No. of Periods
<b>Unit V</b>	Protein and Gene Manipulation	40	100
<b>Unit VI</b>	Cell Culture and Genetic Manipulation	30	80
	<b>Practicals</b>	30	60
	<b>Total</b>	<b>100</b>	<b>240</b>

**One paper**

**Time: 3 hrs.**

**Total Marks: 70**

### **Unit-V Protein and Gene Manipulation**

**40 Marks**

#### **Chapter-1: Recombinant DNA Technology**

Introduction, Tool of DNA technology, Making DNA, Introduction of recombinant DNA into host cells, Identification of recombinants, Polymerase Chain Reaction (PCR), Hybridization techniques, DNA library, DNA Sequencing, Site-directed Mutagenesis

#### **Chapter-2: Protein Structure and Engineering**

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 (Protein Engineering)

#### **Chapter-3: Genomics, Proteomics and Bioinformatics**

Introduction, Genome, Sequencing projects, Gene prediction and counting, Genome similarity, SNPs and Comparative genomics, Functional genomics, Proteomics, History of bioinformatics, Sequences and nomenclature, Information sources, Analysis using bioinformatics tools

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## **(Code No. 045)**

### **Unit-VI Cell Culture and Genetic Manipulation**

**30 Marks**

#### **Chapter-1: Microbial Cell Culture and its Applications**

Introduction, Microbial nutrition and culture techniques, Measurement and kinetics of microbial growth, Scale-up of microbial process, Isolation of microbial products, Strain isolation and improvement, Applications of microbial culture technology, Biosafety issues in microbial technology

#### **Chapter -2: Plant Cell Culture and Applications**

Introduction, Cell and tissue culture techniques, Applications of cell and tissue culture, Gene transfer Methods in plants, Transgenic plants with beneficial traits, Biosafety of transgenic plants

#### **Chapter-3: Animal Cell Culture and Applications**

Introduction, Animal cell culture techniques, Characterization of cell lines, Methods of gene delivery into cells, Scale-up of animal culture process, Applications of animal cell culture, Stem cell technology, Tissue engineering

### **PRACTICAL**

**30 Marks**

**Note: Every student will be required to do the following experiments during the academic session.**

1. Use of special equipment in biotechnology experiments
2. Isolation of bacterial plasmid DNA
3. Detection of DNA by gel electrophoresis
4. Isolation of genomic DNA (CTAB method)
5. Estimation of DNA by UV spectroscopy
6. Bacterial transformation using any plasmid
7. Restriction digestion of plasmid DNA & its analysis by gel electrophoresis
8. Isolation of bacteria from curd & staining of bacteria
9. Cell viability assay using Evan's blue dye exclusion method
10. Data retrieval and database search using internet site NCBI and download a DNA and protein sequence from internet, analyze it and comment on it
11. Reading of a DNA sequencing gel to arrive at the sequence
12. Project work

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**Scheme of Evaluation**

**Time: 3 Hours**

**Max. Marks 30**

**The scheme of evaluation at the end of the session will be as under:**

A	Two experiments	6+6 (only one computer based practical)
	Practical record	04
	Viva on Practical	04
B	Project work	
	Write up	05
	Viva on project	05
	<b>Total</b>	<b>30</b>

**Note:-** More emphasis should be given on hands on work in projects.

**Prescribed Books:**

1. **A Text Book of Biotechnology** - Class XI : Published by CBSE, New Delhi
2. **As reference- Biotechnology** - Class XI : Published by NCERT, New Delhi
3. **A Laboratory Manual of Biotechnology** - Class XI : Published by CBSE, New Delhi
4. **A Text Book of Biotechnology** - Class XII : Published by CBSE, New Delhi
5. **A Laboratory Manual of Biotechnology** - Class XII : Published by CBSE, New Delhi

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**(Code No. 045)**

**Assessment Areas (Theory) 2020-21**  
**Class XII**

**Time : 3 hrs.**

**Maximum Marks: 70 Marks**

Competencies	
<b>Demonstrate Knowledge and Understanding</b>	50%
<b>Application of Knowledge / Concepts</b>	30%
<b>Analyse, Evaluate and Create</b>	20%

**Note:**

- Typology of questions: VSA including MCQs, Assertion – Reasoning type questions; SA; LA-I; LA-II; Source-based/ Case-based/ Passage-based/ Integrated assessment questions.
- An internal choice of approximately 33% would be provided.

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**Suggestive verbs for various competencies**

- **Demonstrate, Knowledge and Understanding**  
State, name, list, identify, define, suggest, describe, outline, summarize, etc.
- **Application of Knowledge/Concepts**  
Calculate, illustrate, show, adapt, explain, distinguish, etc.
- **Analyze, Evaluate and Create**  
Interpret, analyse, compare, contrast, examine, evaluate, discuss, construct, etc.