

CLASS XII (2021-22)
COURSE- STRUCTURE- (THEORY)

One Paper

Max. Marks 70+30
Time: 3 hrs.

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

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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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
	Total	30

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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Assessment Areas (Theory) 2021-22

Class XII

**Time : 3 hrs.
Marks**

Maximum Marks: 70

Competencies	
Demonstrate Knowledge and Understanding	50%
Application of Knowledge / Concepts	30%
Analyze, Evaluate and Create	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.

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.