

BIOTECHNOLOGY (Code No. 045)

CLASS XII (2019-20) COURSE- STRUCTURE-(THEORY)

One Paper

Max. Marks 70+30
Time: 3 hrs.

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

One paper
Total Marks: 70

Time: 3 hrs.

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

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

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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

PRACTICALS

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 gelelectrophoreses
4. Isolation of Genomic DNA (CTAB method)
5. Estimation of DNA
6. Bacterial transformation using any plasmid
7. Restriction digestion of plasmid DNA & its analysis by gelelectrophoresis
8. Isolation of bacteria from curd & staining of bacteria
9. Cell viability assay
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

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

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Prescribed Books:

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

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QUESTION PAPER DESIGN

Class – XI/XII (2019-20)

1) Board Examination – Theory

Time: 3 Hours

Max. Marks: 70

S. No.	Typology of Questions	VSA (1 Marks)	SA-I (2 Marks)	SA-II (3 marks)	LA (5 marks)	Total Marks	Percent -age
1.	Remembering- Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	5	1	2	1	9 (18)	25.7%
2.	Understanding- Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions and stating main ideas	4	1	2	1	8 (17)	24.3%
3.	Applying: Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	3	1	1	1	6 (13)	18.5%
4.	Analyzing & Evaluating: Examine and break information into parts by identifying motives or causes. Make inferences and evidence to support generalizations Present and defend opinions by making judgment about information, validity of ideas or quality of work based on a set of criteria.	2	2	1	1	6 (14)	20%
5.	Creating: Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions	1	2	1	-	4 (8)	11.5%
	TOTAL	15x1=15	7x2=14	7x3=21	4x5=15	70	

2) Practical : 30 marks

Duration : 3 hours