

**CLASS XII (2014-15)
(THEORY)
COURSE STRUCTURE**

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
	Practical	60	30
Total		240	100

One paper

Time: 3 hrs.

Total Marks : 70

180 Periods

Unit V: Protein and Gene Manipulation **40 Marks** **100 Periods**

Chapter I: Recombinant DNA Technology **40 Periods**

Introduction, Tool of rDNA technology, Making rDNA, Introduction of recombinant DNA into host cells, Identification of recombinants, Polymerase chain reaction (PCR), Hybridization techniques, DNA library, DNA sequencing, Site-directed mutagenesis

Chapter II: Protein Structure and Engineering **35 Periods**

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 III: Genomics and Bioinformatics **25 Periods**

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** **80 Periods**

Chapter I: Microbial Culture and Applications **26 Periods**

Introduction, Microbial 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 II: Plant Cell Culture and Applications **27 Periods**

Introduction, Cell and tissue culture techniques, Applications of cell and tissue culture, Gene transfer methods in plants, Transgenic plants with beneficial traits, Biosafety in plant genetic engineering

Chapter III: Animal Cell Culture and Applications **27 Periods**

Introduction, Animal cell culture techniques, Characterisation 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 60 Periods

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

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. Bacterial transformation using any plasmid
4. Data retrieval and data base search using internet site NCBI
5. Download a DNA and protein sequence from internet, analyse it and comment on it
6. Cell viability assay
7. Determination of blood groups
8. Estimation of DNA
9. Ion-exchange chromatography for proteins
10. Reading of DNA sequencing gel to arrive at the sequence
11. Estimation of blood glucose by enzymatic method (GOD/POD)
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 Practicals	:	04
B.	Project work	:	
	Write up	:	05
	Viva on project	:	05
	Total		30

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

BIOTECHNOLOGY (CODE - 045)
QUESTION PAPER DESIGN
Class - XII (2014–15)

Time 3 Hours

Max. Marks: 70

S. No.	Typology of Questions	Very Short Answer (VSA) (1 mark)	Short Answer-I (SA-I) (2 marks)	Short Answer -II (SA-II) (3 marks)	Long Answer (L.A.) (5 marks)	Total Marks	% Weightage
01	Knowledge Based	2	2	2	--	12	17%
02	Conceptual Understanding	--	1	3	1	16	23%
03	Application Based and Inferential type	1	2	3	--	14	20%
04	Reasoning Based	2	2	1	1	14	20%
05	Skill Based	1	1	2	1	14	20%
	Total	6	8	11	3	70	100%

Total No. of questions = 28

- No chapter wise weightage. Care to be taken to cover all the chapters.*
- The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.*