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FOR MANIPUR CLASS 11 PREPARATION

Manipur Board Class 11 Syllabus 2027 Biotechnology

EXAM	YEAR	TYPE	SUBJECT
Manipur Class 11	2027	Syllabus	Biotechnology

BIOTECHNOLOGY

An unprecedented growth of human knowledge in the field of Biological Sciences coupled with equally significatn developments in the field of technology have brought significant changes into existing social and economic systems. The emerging field of Biotechnology is likely to further enhance the applications of Science and Technology in the service of human welfare. Modern Biotechnology processes encompass a wide range of new products such as antibiotics, vaccines, monoclonal antibodies and many more. Furthermore, developments in recombinant DNA technology have yielded numerous new useful products in the fields of healthcare and agriculture.

The present syllabus takes care of all these aspects. Due emphasis has been laid on familiarizing the learners with the fundamental concepts, basic techniques and their applications. It is expected that the knowledge gained through the study of different topics and the skills acquired through the prescribed practical work will make the learners competent to meet the challenges of academic as well as professional courses after studying the subject at senior secondary stage.

OBJECTIVES

The broad objectives of teaching Biotechnology at senior secondary level are :

- To help the learners know and understand basic facts and concepts in the subject at elementary stage.
- To expose the students to different basic processes and basic techniques used in Biotechnology
- To familiarize the learners to understand the relationship of the subject to health, nutrition, environment, agriculture and industry etc.
- To develop conceptual competence in the learners so as to cope up with professional courses in future career.
- To acquaint students with different applications of Biotechnology in everyday life. To develop an interest in students to study biotechnology as a discipline.

BIOTECHNOLOGY

THEORY

COURSE STRUCTURE

CLASS - XI

One Paper *Time : 3 Hours* *70 Marks*

Unit	Contents	Marks
I.	Introduction to Biotechnology	10
II.	Biomolecules	20
III.	Cell and Development	20
IV.	Genetics and Molecular Biology	20
	Total	**70**

Unit-I : Introduction to Biotechnology **10**

Fundamentals of Biochemical Engineering
Biotechnology and Society.

Unit-II : Biomolecules **20**

Building Bliocks of Biomolecules-Structure and dynamics
Structure and function of Macromolecules.
Biochemical Techniques

Unit-III : Cell and Development **20**

The basic unit of life
Cell Gowth and development
Cellular Techniques

Unit-IV: Genetics and Molecular Biology **20**

Principles of Genetics
Genome Function
Genetical Techniques

PRACTICALS

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

1. Preparation of buffers and pH determination.
2. Sterlization techniques (Wet and Dry Sterlization, Chemical sterlization and Utrafiltration)
3. Media preparation (Solid and Liquid LB medium)
4. Isolation of bacterial from curd and staining of bacteria.
5. Determination of bacterial growth curve.

6. Study of various stages of mitosis and calculation of mitotic index.
7. Preparation of Karyotype.
8. Cell counting (using Haemocytometer)
9. Isolation of genomic DNA.
10. Detection of DNA by gel electrophoresis.
11. Isolation of milk protection (casein).
12. Estimation of protein by Biuret method.
13. Assaying the enzyme acid phosphate.

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 Marks

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DESIGN OF QUESTION PAPER

Subject : **BIOTECHNOLOGY**
Paper : Theory
Class : XI
Full Mark : 70
Time : 3 Hours

I — WEIGHTAGE TO OBJECTIVES:

Objectives	Marks	Percentage
Knowledge (K)	10	15
Understanding (U)	35	50
Application (A)	21	30
Skill (S)	4	5
Total :	**70**	**100**

II — WEIGHTAGE TO FORM OF QUESTIONS:

Form of Questions	No. of Question	Time (in minute)	Marks	Percentage
Essay/Long Answer(E/LA)	3	60	15	21
Short Answer(SA-I)	6	37	18	26
Short Answer(SA-II)	10	40	20	29
Very Short Answer(VSA)	7	21	7	10
MCQ	10	22	10	14
Total:	**36**	**180**	**70**	**100**

III — WEIGHTAGE TO CONTENT:

	UNIT/CONTENTS:	Marks	Percentage
I.	Introduction to Biotechnology	10	14
II.	Biomolecules	20	29
III.	Cell and Development	20	28
IV.	Genetics & Molecular Biology	20	29
	Total :	**70**	**100**

IV — SCHEME OF SECTIONS : Nil

V — SCHEME OF OPTIONS :
i) Internal option will be given in Essay Type Question
ii) Internal option will be given in three questions of SA-I including one case study based question.

VI — DIFFICULTY LEVEL :
Difficult : 35% of the total marks
Average : 50% of the total marks
Easy : 15% of the total marks

Abbreviation : K(Knowledge), U(Understanding), A(Application), Skill(S), E/LA (Essay/Long Answer Type), SA (Short Answer Type), VSA (Very Short Answer Type), MCQ(Multiple Choice Question)

NOTE- (i) Two questions out of 10 (ten) questions of MCQ will be assertion & reason type question.
(ii) Only one question of SA-I will be Case Study based question.

PRACTICALS

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

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 and comment on it.
6. Cell viability assay (using Evans blue Stain)
7. Determination of blood groups.
8. Estimation of DNA
9. Ion-exchange chromatography for proteins.
10. Reading of a DNA sequencing gel and 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 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**

Recommended Books :

1. A Textbook of Biotechnology-Class XI : published by CBSE, New Delhi.
2. A Laboratory Manual of Biotechnology-Class XI : Published by CBSE, New Delhi.
3. A Textbook 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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