10. BIOTECHNOLOGY (Code No. 045)

An unprecedented growth of human knowledge in the field of Biological Sciences coupled with equally significant 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 of 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, 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.

COURSE STRUCTURE
CLASS - XI (2017-18)

One Paper   **Time: 3 hrs.**
Max. Marks 70+30

Units		No. of Periods	Marks
Unit-I	Biotechnology: An overview	20	5
Unit-II	Molecules of Life	50	20
Unit-III	Genctics and Molecular Biology	50	20
Unit-IV	Cells and Organisms	60	25
	Practicals	60	30
	Total	**240**	**100**

CLASS XI
(Theory)

One Paper   **Time : 3 Hrs.**

                                                   Total Marks: 70   180 Periods

Unit-I Biotechnology: An overview   **5 Marks   20 Periods**

Chapter-1: Biotechnology : An overview

Historical perspectives, Technology and Applications of Biotechnology, Global Market of Biotech, Products, Public Perception of Biotechnology, Biotechnology in India and Global Trends.

Unit-II Molecules of Life   **20 Marks   50 Periods**

Chapter-1: Biomolecules: Building Blocks

Building blocks of Carbohydrates - Sugars and Their Derivatives, Building blocks of Proteins - Amino Acids, building blocks of Lipids - Simple Fatty Acids, Sphingosine, Glycerol and Cholesterol, Building blocks of Nucleic Acids - Nucleotides, Biochemical Transformations

Chapter-3: Macromolecules: Structure and Function

Carbohydrates - The energy givers, Proteins - The performers, Enzymes - The catalysts, Lipids and Biomembranes - The barriers, Nucleic Acids - The managers

Unit-III Genetics and Molecular Biology   **20 Marks   50 Periods**

Chapter-1: Concepts of Genetics

Historical Perspective, Multiple Alleles, Linkage and Crossing Over, Genetic Mapping, Gene Interaction, Sex-Linked Inheritance, Extranuclear Inheritance, Qauntitative Inheritance, Genes at the Population Level

Chapter-2: Genens and Genomes: Structure and Function

Discovery of DNA as Genetic Material, DNA Replication, Fine Structure of Genes, From Gene to Protein, Transcription – The Basic Process, Genetic Code, Translation, Regulation of Gene Expression, Mutations, DNA Repair, Human Genetic Disorders, Genome Organization

Unit-IV Cells and Organisms   **25 Marks   60 Periods**

Chapter 1: The Basic Unit of Life

Cell Structure and Components, Tissues and Organs, Stem Cells, Biodiversity, Organization of Life.

Chapter 2: Cell Growth and Development

Cell Division, Cell Cycle, Cell Communication, Nutrition, Gaseous Exchange, Internal Transport, Maintaining the Internal Environment, Reproduction, In Vitro Fertilization, Animal and Plant Development, Immune Response in Animals, Programmed Cell Death, Defense Mechanisms in Plants.

PRACTICALS   **60 Periods**

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

1. Recoding Practical results & safety rures in the laboratory.

2. Preparation of buffers and pH determination

3. Sterilization techniques

4. Preparation of bacterial growth medium

5. Determination of bacterial growth curve

6. Cell counting

7. Isolation of milk protein (casein)

8. Estimation of whey protein by biuret method

9. Assaying the enzyme acid phosphate

10. Estimation of blood glucose by enzymatic & glucometer method (GOD/POD)

11. Study of various stages of mitosis and calculation of mitotic index

12. Preparation of karyotype

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

BIOTECHNOLOGY (CODE - 045)
QUESTION PAPER DESIGN
Class - XI (2017-18)

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	1	2	1	15	22%
02	Conceptual Understanding (Application and Reasoning based)	3	4	8	1	40	57%
03	Higher Order Thinking Skills (HOTS)	1	2	-	-	05	07%
04	Skill Based	-	1	1	1	10	14%
	Total	**6**	**8**	**11**	**3**	**70**	**100%**

Total No. of questions = 28

1. *No chapter wise weightage. Care to be taken to cover all the chapters.*

2. *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.*