

BIOTECHNOLOGY

SYLLABUS FOR HIGHER SECONDARY FIRST YEAR COURSE

Biotechnology, in its broadest sense, is the technology that provides goods and services by industrial processes using biological organisms, systems and processes. It comprises a number of technologies based upon increasing understanding of biology at the cellular and molecular level. The techniques of biotechnology includes recombinant DNA technology (genetic engineering), hybridoma technology and monoclonal antibody preparation, cell and tissue culture, DNA fingerprinting, protoplast fusion, protein engineering, immobilized enzyme technology, cell catalysis, biosensor and several others. Biotechnology has emerged as one of the frontline technologies in recent times. Biotechnology with its most recent offshoot Bioinformatics is being projected as the technology that would have the greatest impact in the coming years worldwide.

With the exponential growth of human population, it becomes urgent to improve the production process and capabilities for the increased production of food, fuel, medicine, enzymes, fermented items, fibers, vaccines and biofertilizers. It also becomes important to ensure protection, conservation and sustainable utilization of our natural resources. Biotechnology has the answer for these problems. Application of biotechnology has been proved to be fruitful for meeting the need of the modern human society.

Inclusion of Biotechnology in higher secondary level courses is considered as important to create a base and interest among the students for higher education, training and research in Biotechnology. In view of this the present syllabus is designed to cater needs of the Biotechnology education for the higher secondary students of Assam. The theoretical topics and experiments are selected and organized such a way so that the students can earn basic concept and interlink the various topics and techniques. It is expected that the student will gain appropriate knowledge and acquire practical skill on the subject. It is also anticipated that the course will make the students competent to meet up the challenges of both academic and professional courses beyond the secondary level.

Objectives :

The objectives of teaching Biotechnology at Higher Secondary level are :

1. To create an interest among the students of H.S. Classes to study Biotechnology courses.
2. To help the students to know and acquire basic information and concept in the subject.
3. To expose the students to understand the basic techniques and their utilization in various production and service industries.
4. To familiarize the learners to understand the importance and applications of Biotechnology in everyday life.
5. To develop conceptual competence of the students so as to cope-up with technical and professional in future carrier.

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One Paper

Time : Three hours

Marks : 70

Unitwise Distribution of Marks & Periods :

Unit No.	Title	Marks	Periods
Unit-1	Introduction to Biotechnology	10	22
Unit-2	Basic Chemistry of Biomolecules	10	22
Unit-3	Basics of Bio-Chemical Technology	10	16
Unit-4	Cell Biology	15	34
Unit-5	Genetics	10	22
Unit-6	Molecular Biology	15	34
Total		70	150

Unitwise Distribution of Course contents :

Unit-I : Introduction to Biotechnology

**Marks
10**

History and definition
Scope & Importance of Biotechnology
Branches of Biotechnology
Biotechnology and Society

Unit-2 : Basic Chemistry of Biomolecules

10

Building Blocks of Biomolecules : Structure and Dynamics
Structure and function of Molecules
Lipids, Proteins and Nucleic acids
Biochemical Techniques

Unit-3 : Basics of Biochemical Technology

10

Unit-4 : Cell Biology

15

Structural Organization of Prokaryotic and Eukaryotic-cells
Cell, divisions and cell cycle
Plasma membrane : Structural organization and function
Cellular techniques

Unit-5 : Genetics

10

Mendel's law of Inheritance
Chromosome theory of Inheritance
Linkage and crossing over, sex-linked Inheritance
Mutation and mutagenesis
Gene and Genome

Unit-6 : Molecular Biology

15

Nucleic acids as genetic material

Replication of DNA

Gene action : Transcription and Translation

Genetic Code

Molecular Techniques : Electrophoresis, DNA fingerprinting

SYLLABUS FOR BIOTECHNOLOGY PRACTICAL

Total Marks- 30

Scheme of Evaluation:	Marks
1. Two Experiments	20
❖ Preparation of buffers and PH determination	
❖ Estimation of total Carbohydrate by Anthrone method	
❖ Determination of reducing sugar by Nelson-Somogy Method	
❖ Determination of total lipids by Bligh and Dyer Method	
❖ Estimation of Protein by Biuret Method	
❖ Gram staining of bacteria	
❖ Isolation of milk protein (Casein)	
❖ Study of various stages of mitosis	
❖ Preparation of Karyotypes	
❖ Cell counting by haemocytometer	
❖ Isolation of genomic DNA	
❖ Detection of DNA by gel electrophoresis	
2. Viva on practical	05
3. Practical Records	05