

DEPARTMENT OF BIOTECHNOLOGY
B.Sc- Mb.Bc.C and Bt.Mb.C

PROGRAMME OUTCOMES

At the end of the programme students will have:

PO1: Essential Knowledge:

Comprehensive discipline knowledge and understanding of biological mechanisms, chemistry involved in living creatures from unicellular organisms to humans and to apply their knowledge in practical.

PO2: Creative and critical thinking and problem solving abilities:

Be effective problem solvers, able to apply critical and evidence-based thinking and to put in front the experiential evidences in life sciences and to conceive innovative responses to future challenges.

PO3: Teamwork and communication skills:

Be able to convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving goals.

PO4: Professionalism and leadership readiness:

Be able to engage in professional behaviour and have the potential to take leadership roles in their chosen occupations and communities.

PO5: Intercultural and ethical competency:

Be responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.

PO6: Social responsibility:

Be sensitive to and demonstrate experimental evidences which does not effect the society.

**SPECIFIC PROGRAM OUTCOMES FOR
B Sc. BIOTECHNOLOGY**

- SPO1:** A student should be able to recall basics about concepts in life sciences and should be able to display knowledge of conventions such as, terminology.
- SPO2:** A student should get adequate exposure to global and local concerns that explore them many aspects of life sciences.
- SPO3:** Student is equipped with creative talent and power of communication necessary for various kinds of employment.
- SPO4:** Student should be able to apply their skills and knowledge in practical's.
- SPO5:** Enabling students to develop a positive attitude towards microorganisms as an interesting and valuable subject of study.
- SPO6:** Think in a critical manner.
- SPO7:** Acquire good knowledge and understanding in advanced areas of life sciences chosen by the student from the given courses.
- SPO8:** The skills and knowledge gained has intrinsic beauty, which also leads to proficiency. This can be utilized in modelling and solving real life problems.
- SPO9:** To recognize patterns and to distinguish between essential and irrelevant aspects of problems.
- SPO10:** Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society.
- SPO11:** This Program will also help students to enhance their employability for jobs in research institutes, pharma companies and teaching fields, scientific data analyst and in various other public and private companies.

DEPARTMENT OF BIOTECHNOLOGY (2016-19)
COURSE OUTCOMES

SEM-I CELL BIOLOGY AND GENETICS (2016-17)
<p>After the completion of the course, Students will be able to</p> <p>C01: Understand cell as basic unit of life . C02: Learn and differentiate between the structure of prokaryotic and eukaryotic cell. C03: Understand cell division in prokaryotes and eukaryotes. C04: Learn cell death mechanisms. C05: Revise Mendelian mechanisms of inheritance. C06: Understand deviation from Mendel's laws C07: Learn Extension to Mendel's laws</p>
SEM-II NUCLEIC ACIDS AND BIOINFORMATICS (2016-17)
<p>After the completion of the course, Students will be able to</p> <p>C01: Understand concept of genetic material with experiments C02: Learn about organization of genome . C03: Learn the concepts of DNA replication, damage and repair. C04: Explore various tools in Bioinformatics. C05: Learn applications of bioinformatics.</p>
SEM-III BIOCHEMISTRY AND BIOSTATISTICS (2017 -18)
<p>After the completion of the course, Students will be able to</p> <p>C01: Understand basics of biomolecules. C02: Learn about bioenergetics and basic bioanalytical techniques. C03: Learn the basic concepts of biostatistics C04: Understand the applications of biostatistics.</p>
SEM-IV MICROBIOLOGY AND IMMUNOLOGY (2017 – 18)
<p>After the completion of the course, Students will be able to</p> <p>C01: Know about Historical development of microbiology. C02: Understand basics of microscopy. C03: Learn about classification of microorganisms. C04: Learn about culturing of microorganisms and their identification. C05: learn about basics of immunity and immune system. C06: Understand about different aspects of cell mediated and humoral immunity.</p>

SEM-III SEC I – ENZYME TECHNOLOGY (2017 -18)

After the completion of the course, Students will be able to

- C01:** Understands about production and isolation of enzymes.
- C02:** Learn about applications of isolated and immobilized enzymes.
- C03:** Determination of enzyme activities for clinical diagnosis of some important diseases.
- C04:** Understand enzymes in determination of metabolites of clinical importance
- C05:** Learn about therapeutic uses of enzymes.

SEM-IV SEC II- IMMUNOTECHNOLOGY (2017 -18)

After the completion of the course, Students will be able to

- C01:** Understands about antigen antibody reactions.
- C02:** Understand antibody assays.
- C03:** Learn different cellular assays with human peripheral blood.

SEM-5: PAPER-V MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY

After the completion of the course, Students will be able to

- C01:** Understand Structure of gene – prokaryotic and eukaryotic.
- C02:** Understand expression of genes – prokaryotes and eukaryotes.
- C03:** Understand Regulation of gene expression.
- C04:** Know about enzymes required in recombinant DNA technology.
- C05:** Learn about different vectors required for rDNA technology.
- C06:** Learn about applications of rDNA technology.

SEM V, PAPER-VI: PLANT BIOTECHNOLOGY (DSE A) (2018 -19)

After the completion of the course, Students will be able to

- **C01:** Understand basic requirement of plant tissue culture media and preparation of media.
- **C02:** Learn about callus culture and organogenesis and embryogenesis.
- C03:** Understands about applications plant tissue culture.
- C04:** Learn the concept of transgenic plants.
- C05:** Know about applications of transgenic plants.

SEM -V, PAPER-VI : MEDICAL BIOTECHNOLOGY (DSE B) (2018 -19)

After the completion of the course, Students will be able to

- C01:** Understands about different methods for diagnosis of human diseases.
- C02:** Understand about the chromosomal disorders due to different chromosomal abnormalities
- C03:** Knows about mitochondrial disorders.
- C04:** Understands concept of gene therapy.
- C05:** Learn about stem cells and stem cell based therapies.

SEM -V SEC- MOLECULAR PLANT BREEDING (2018 -19)

After the completion of the course, Students will be able to

- C01:** Understands about Molecular markers in plant breeding.
- C02:** Understand marker assisted selection for plant breeding.
- C03:** Understand the marker assisted backcrossing.
- C04:** Find out improved varieties using MAS

SEM -V GE -FUNDAMENTALS OF BIOTECHNOLOGY (2018 -19)

After the completion of the course, Students will be able to

- C01:** Learn about the historical developments in Biotechnology
- C02:** Learn about genes , chromosomes ,DNA sequencing
- C03:** Know about genetically modified organisms.
- C04:** Understand the genetic modifications in plants.
- C05:** Know about the ethical issues in Biotechnology.

SEM -VI , PAPER -VII MICROBIAL TECHNOLOGY (2018 -19)

After the completion of the course, Students will be able to

- C01:** Explore the microorganisms of industrial use.
- C02:** Learn the methods for isolation and screening of industrially important microbes.
- C03:** Understand the concept of Good Manufacturing Practices, intellectual property rights and patenting.
- C04:** Understand concept of fermentation.
- C05:** Understand the types and design of fermentation
- C06:** Learn about the products from microbes and their applications.

SEM -VI PAPER -VIII ANIMAL BIOTECHNOLOGY (DSE A) (2018 -19)

After the completion of the course, Students will be able to

- C01:** Understand the animal cell lines, genetic manipulations of cells.
- C02:** Understand commercial applications of cell culture.
- C03:** Know about model organisms and their significance.
- CO4:** Understand about DNA micromanipulation.
- CO5:** Understand development in molecular markers.

SEM -VI PAPER -VIII ENVIRONMENTAL BIOTECHNOLOGY (DSE B) (2018 -19)

After the completion of the course, Students will be able to

- C01: Understand** Concept of pollution, types and sources
- C02: Learn about types of pollutants**
- C03: Understand** concept of Global warming and green house gases and its effect
- CO4:** Know about Impact of pollution on environment and different monitoring methods of pollution
- CO5:** Learn about Impact of pollution on environment and different monitoring methods of pollution.
- CO6: Understand Solid and Liquid** waste management and treatment methods
- CO7:** Understand Concept of Bioremediation of inorganic compounds like pesticides using microbes.
- CO8: Know** Phytoremediation and Xenobiotics
- CO9: Understand** Biodiversity types and its Conservation methods .

SEM-VI SEC-4 INTELLECTUAL PROPERTY RIGHTS (IPR) - BS601(2018 -19)

After the completion of the course, Students will be able to

- C01 :** know about IPR, its types. Trademark , Copyrights , Patents, Geographical indications and International organizations
- CO2:** Understands Plant varieties protection, animal breeders right, patenting microbes and organisms, patenting genes, markers and Variants.
- CO3:** Understand procedure for processing of Patents.

SEM-VI GE-2 APPLICATIONS OF BIOTECHNOLOGY (BS 602) (2018 -19)

After the completion of the course, Students will be able to

- CO1 :** Learn Molecular diagnosis methods, gene therapy, recombinant therapeutic proteins and medicines.
- CO2:** Understands the examples and use of transgenic plants for improving crop quality
- CO3:** Understand the concept of Bioremediation , biofertilizers , biopesticides , biological pest control

DEPARTMENT OF BIOTECHNOLOGY (2020-23)

SEM-I CELL BIOLOGY AND GENETICS (2020 – 21)

After the completion of the course, Students will be able to

- C01: Understand cell as basic unit of life .**
- C02: Learn and differentiate between the structure of prokaryotic and eukaryotic cell.
- C03: Understand cell division in prokaryotes and eukaryotes.
- C04: Learn cell death mechanisms.
- C05: Revise Mendelian mechanisms of inheritance.
- C06: Understand deviation from Mendel's laws
- C07: Learn Extension to Mendel's laws

SEM-II BIOLOGICAL CHEMISTRY AND MICROBIOLOGY (2020 -21)

After the completion of the course, Students will be able to

- C01:** Understand importance, structure and classification of biomolecules
- C02: Learn bioenergetics of cell with important cycles.**
- C03: Learn the concepts microscopy.
- C04: Learn the classification and structure of different microorganisms.
- C05: Understand the sterilization methods.
- C06: Learn the techniques for culturing and identification of microorganisms.

SEM-III MOLECULAR BIOLOGY AND RECOMBINANT DNA TECHNOLOGY(2021-22)

After the completion of the course, Students will be able to

- C01:** Understand Structure of gene – prokaryotic and eukaryotic.
- C02: Understand expression of genes – prokaryotes and eukaryotes.
- C03: Understand Regulation of gene expression.
- C04: Know about enzymes required in recombinant DNA technology.
- C05: Learn about different vectors required for rDNA technology.
- C06: Learn about applications of rDNA technology.

SEM-IV BIOINFORMATICS AND BIOSTATISTICS (2021 - 22)

- C01: Understand the historical development of bioinformatics.
- C02: learn the tools and databases in bioinformatics.
- C03: Learn the basics of sequence alignment and scoring matrices
- C04: Learn the basic terms in biostatistics
- C05: Understand the calculation of measures of central tendency and measures of dispersion.
- C06: Learn the different applications of biostatistics.

SEM-III SEC I -INDUSTRIAL FERMENTATION (2021-22)

After the completion of the course, Students will be able to

C01: Learn the procedures for production of industrial chemicals

C02: Learn about the production of biochemicals and therapeutic products .

C03: Learn about the purification of proteins.

C04: Understands about Learn about the microbial products of pharmacological interest.

SEM-III SEC II- IMMUNOLOGICAL TECHNIQUES(2021-22)

After the completion of the course, Students will be able to

C01: Understands about antigen antibody reactions.

C02: Understand antibody assays.

C03: Learn different cellular assays with human peripheral blood.

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SEM-IV SEC III MOLECULAR MARKERS IN PLANT BREEDING(2021-22)

After the completion of the course, Students will be able to

C01 : Understands about Molecular markers in plant breeding.

C02: Understand marker assisted selection for plant breeding.

C03: Understand the marker assisted backcrossing.

C04: Find out improved varieties using MAS

SEM – IV SEC IV DRUG DESIGNING (2021-22)

After the completion of the course, Students will be able to

C01 : Learn about historical perspective and challenges in drug discovery.

C02: Learn Bioinformatic prediction of 3D structure of protein .

C03: Learn about the structure based drug designing.

C04 : Learn the strategies of drug designing.

C05: Understand the concept of pharmacogenomics.

SEM -V PLANT BIOTECHNOLOGY (DSE I) (2022 -23)

After the completion of the course, Students will be able to

- **C01:** Understand basic requirement of plant tissue culture media and preparation of media.
- **C02:** Learn about callus culture and organogenesis and embryogenesis.
- C03:** Understands about applications plant tissue culture.
- C04:** Learn the concept of transgenic plants.
- C05:** Know about applications of transgenic plants.

SEM -V MEDICAL BIOTECHNOLOGY (DSE II) (2022-23)

After the completion of the course, Students will be able to

- C01:** Understands about different methods for diagnosis of human diseases.
- C02:** Understand about the chromosomal disorders due to different chromosomal abnormalities
- C03:** Knows about mitochondrial disorders.
- C04:** Understands concept of gene therapy.
- C05:** Learn about stem cells and stem cell based therapies.

SEM -V GE BASICS IN BIOTECHNOLOGY (2022-23)

After the completion of the course, Students will be able to

- CO1:** Understand basics in plant biotechnology.
- CO2:** Learn the basics of microbial and industrial biotechnology
- CO3:** Know the basics of animal medical biotechnology
- CO4:** Understands Computer applications of biotechnology.

SEM-VI :IPR, BIOSAFETY AND ENTERPRENEURSHIP(2022-23) ELECTIVE AGAINST PROJECT

After the completion of the course, Students will be able to

- C01 :**In detail know about IPR, its types. Trademark , Copyrights ,Patents, Geographical indications and International organizations
- C02:** Understands Plant varieties protection, animal breeders right, patenting microbes and organisms, patenting genes, markers and Variants.
- C03:** processing of Patents.

SEM-VI : ANIMAL BIOTECHNOLOGY – OPTIONAL II A(2022-23)

After the completion of the course, Students will be able to

C01: Understand the animal cell lines, genetic manipulations of cells.

C02: Understand commercial applications of cell culture.

C03: Know about model organisms and their significance.

CO4: Understand about DNA micromanipulation.

CO5: Understand development in molecular markers.

SEM-VI : ENVIRONMENTAL BIOTECHNOLOGY – OPTIONAL II B(2022-23)

After the completion of the course, Students will be able to

C01: Understand Concept of pollution, types and sources

C02: Learn about types of pollutants

C03: Understand concept of Global warming and green house gases and its effect

CO4: Know about Impact of pollution on environment and different monitoring methods of pollution

CO5: Learn about Impact of pollution on environment and different monitoring methods of pollution.

CO6: Understand Solid and Liquid waste management and treatment methods

CO7: Understand Concept of Bioremediation of inorganic compounds like pesticides using microbes.

CO8: Know Phytoremediation and Xenobiotics

CO9: Understand Biodiversity types and its Conservation methods .