

**DEPARTMENT OF BIOCHEMISTRY**  
**B.Sc- Mb.Bc.C and Bt.Mb.C**

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

- 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 CHEMISTRY OF BIOMOLECULES (2016-17)**

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

- CO1: understand the scope of biochemistry
- CO2: what are buffers, pH, stereochemistry of carbohydrates and amino acids
- CO3: what are carbohydrates its types, and their importance
- CO4: what are lipids, their types and importance
- CO5: what are amino acids, types and their importance

**SEM-II CHEMISTRY OF NUCLEIC ACIDS AND BIOCHEMICAL  
TECHNIQUES (2016-17)**

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

- CO1:** Understand composition and nature of nucleic acids
- CO2: structure of nucleic acids, about DNA, types of RNA, kinetics of nucleic acids
- CO3: spectrophotometry, centrifugation and its types
- CO4: what is chromatography and various types of chromatography techniques

**SEM-III BIOENERGETICS, BIOLOGICAL OXIDATION AND  
ENZYMOLGY (2017 -18)**

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

- CO1:** learn about bioenergetics
- CO2:** Learn about biological oxidation, ETC, oxidative phosphorylation, ROS
- CO3:** classification of enzymes, methods of enzyme purification, enzyme substrate interactions, enzyme units
- CO4:** enzyme kinetics and enzyme action, enzyme inhibition, enzyme activity, zymogen activation, isoenzymes.

**SEM-IV INTERMEDIARY METABOLISM (2017 – 18)**

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

- CO1:** amino acid metabolism
- CO2: carbohydrate metabolism
- CO3: Lipid metabolism
- CO4: Nucleic acid metabolism.



### **SEM-III SEC I – COMPUTATIONAL BIOCHEMISTRY (2017 -18)**

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

- CO1:**computational science and application of computer in biochemistry
- CO2:** Learn about spreadsheets and databases.
- CO3:** visualization of biomolecules by computer graphics,drawing and display structures.
- CO4:** study of enzymes kinetics,metabolic database,gene identification
- CO5:** protein sequence analysis, principles of molecular modeling

### **SEM-IV SEC II- MEDICAL LAB TECHNOLOGY( 2017 -18)**

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

- CO1:**clinical laboratory principles and tests
- CO2:**microbiology and immunology
- CO3:**histopathology and cytopathology, immumno-histochemical staining methods.

### **SEM-5: PAPER-V PHYSIOLOGY AND CLINICAL BIOCHEMISTRY**

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

- CO1:** Human physiology, digestion, cardiac cycle, physiology of vision , muscles
- CO2:** different types and endocrine glands , functions, importance and disorders
- CO3:** organs and organ function tests
- CO4:** LFTs, RFTs, biochemical tests for heart diseases

### **SEM V, MOLECULAR BIOLOGY (DSE A) (2018 -19)**

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

- **CO1:** DNA replication,enzymes of replication ,inhibitors of replication.
- **CO2:** transcription,promoters,initiation, elongation,termination.
- CO3:** post transcriptional modification,inhibitors of RNA synthesis
- CO4:** translation , genetic code, protein synthesis, post translational modifications
- CO5:** inhibitors of translation, lac operon,tryptophan operon

**SEM -V, PAPER-VI : CELL BIOLOGY AND GENETICS (DSE B) (2018 -19)**

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

**CO1:**ultrastructure of prokaryotes and eukaryotes, chromosomes

**CO2: mitosis,cell cycle and cell death**

**CO3:** basics of genetics

**CO4:** Understands concept of gene therapy.

**CO5: mutations, mutagens.**

**SEM -V SEC- APPLIED BIOCHEMISTRY (2018 -19)**

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

**CO1:** Enzyme and protein purification, methods

**CO2:** nucleic acid analysis and cell cultures.

**SEM -V GE- PHYSIOLOGY AND BIOCHEMISTRY (2018 -19)**

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

**CO1:** human physiology,hormones of pituitary, thyroid and pancreatic gland.

**CO2:** biomolecules (carbohydrates,amio acids,lipids, nucleic acids)

**CO3:** metabolism of carbohydrates, amino acids, lipids and nucleic acids

**SEM -VI , PAPER -VII NUTRITION AND IMMUNOLOGY (2018 -19)**

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

**CO1:** Balance diet, BMR,RDA, malnutrition, vitamins .

**CO2:** organization of immune system, organs and cells of immune system

**CO3:**classification of immunoglobulins ,haptens, epitopes, adjuvants, monoclonal antibodies

**CO4:**anitigen-antibody reactions, blood group antigens, RIA,ELISA

**CO5:** vaccines, morden vaccines

**CO6:** outlines of hypersensitivity, graft rejection and MHC

**SEM -VI PAPER -VIII MICROBIOLOGY AND r-DNA TECHNOLOGY (DSE A)  
(2018 -19)**

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

**CO1:** classification of microorganisms, isolation and cultivation , Grams's staining

**CO2:** industrial uses of A.niger, yeast,spirulina,structure and composition of virus, viral life cycle.

**CO3:** cloning strategy, DNA sequencing, r-DNA technology enzymes, restriction mapping.

**CO4:** cloning vectors, molecular markers

**CO5:** c-DNA libraries, PCR, blotting techniques, production of insulin GH, Bt cotton, edible vaccines.

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

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

**CO1:** plant biotechnology

**CO2:** animal biotechnology

**CO3:** microbial biotechnology

**CO4:** environmental biotechnology

**SEM-VI SEC-4 MINI PROJECT - BS601(2018 -19)**

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

**CO1:** The course is aimed to make students do live or review based projects to enhance their practical skills

**SEM-VI GE-2 NUTRITION IN HEALTH DISEASE (BS 602) (2018 -19)**

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

**CO1:** Nutrition ( balance diet, SDA of foods, BMR, BMI, RDA, foods and their nutrition)

**CO2:** malnutrition, vitamins, trace elements, obesity and diabetes, probiotics in human health, functional foods

## DEPARTMENT OF BIOCHEMISTRY (2020-23)

### SEM-I CHEMISTRY OF BIOMOLECULES (2020 – 21)

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

- CO1: understand the scope of biochemistry
- CO2: what are buffers, pH, stereochemistry of carbohydrates and amino acids
- CO3: what are carbohydrates, their types, and their importance
- CO4: what are lipids, their types and importance
- CO5: what are amino acids, their types and importance

### SEM-II CHEMISTRY OF NUCLEIC ACIDS AND BIOCHEMICAL TECHNIQUES(2020 -21)

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

- CO1:** Understand composition and nature of nucleic acids
- CO2: structure of nucleic acids, about DNA, types of RNA, kinetics of nucleic acids
- CO3: spectrophotometry, centrifugation and its types
- CO4: what is chromatography and various types of chromatography techniques

### SEM-III ENZYMOLOGY, CARBOHYDRATE AND LIPID METABOLISM (2021-22)

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

- CO1.** classification of enzymes, methods of enzyme purification, enzyme substrate interactions, enzyme units
- CO2: enzyme kinetics and enzyme action, enzyme inhibition, enzyme activity, zymogen activation, isoenzymes.
- CO3: carbohydrate metabolism
- CO4: lipid metabolism

### SEM-IV AMINO ACID, NUCLEIC ACID METABOLISM, BIOENERGETICS AND BIOLOGICAL OXIDATION(2021-22)

- **CO1:** amino acid metabolism and disorders.
- **CO2:** nucleic acid metabolism and disorders.
- **CO3:** learn about bioenergetics
- **CO4:** Learn about biological oxidation, ETC, oxidative phosphorylation, ROS
- **CO5:** ultrastructure and function of chloroplast, cyclic and non cyclic phosphorylation.
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**SEM-III SEC I -BASICS IN BIOCHEMICAL CALCULATIONS AND BIOSTATISTICS  
(2021-22)**

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

**CO1:** Learn basic biochemical calculations, units and measurements, pH, buffers, construction of calibration curve and absorption maxima

**CO2:** basic statistical concepts, measures of central tendency, measures of dispersion, .

**CO3:** depiction of data by graphical methods, t-Test

**CO4:** regression and correlation , precision and accuracy, ANOVA.

**SEM-IV SEC III APPLIED AND COMPUTATIONAL BIOCHEMISTRY(2021-22)**

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

**CO1:** Homogenization ,centrifugation techniques, enzyme and protein purification methods

**CO2:** computational science and applications, software packages in docking designing

**CO3:** molecular modeling-drug designing, drug-biomolecule, receptor-biomolecule interactions,application in enzyme kinetics

**CO4:** KEGG, gene identification,protein data bank

**SEM -V PHYSIOLOGY, NUTRITION AND CLINICAL BIOCHEMISTRY (DSE I) (2022 -23)**

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

**CO1:** Human physiology, digestion, cardiac cycle, physiology of vision , muscles,structure of heart, neuron and propagation of nerve impulse

**CO2:** different types and endocrine glands , functions, importance and disorders  
Nutrition ( balance diet, SDA of foods, BMR,BMI,RDA,foods and their nutrition)

**CO3:** malnutrition,vitamins,trace elements, obesity

**CO4:** organs and organ function tests

**CO5:** LFTs, RFTs, biochemical tests for heart diseases

**SEM -V CELL BIOLOGY AND GENETICS (DSE II) (2022-23)**

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

**CO1:**ultrastructure of prokaryotes and eukaryotes, chromosomes

**CO2: mitosis,cell cycle and cell death**

**CO3:** basics of genetics

**CO4:** Understands concept of gene therapy.

**CO5: mutations, mutagens.**

**CO6 :**classification of microorganisms, isolation and cultivation , Grams's staining

**CO7 :** industrial uses of A.niger, yeast,spirulina,structure and composition of virus, viral life cycle

**CO8:**TMV ,HIV, PFU, one step growth.

**SEM -V GE BIOCHEMISTRY AND PHYSIOLOGY (2022-23)**

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

**CO1:**what are buffers, pH ,stereochemistry of carbohydrates and amino acids

**CO2:** what are carbohydrates,lipids, amino acids, nucleic acids its types,and their importance,enzymes,vitamins

**CO3:** what are carbohydrates,lipids, amino acids, nucleic acids metabolism and disorders

**CO4:** human physiology and endocrine system

**SEM-VI : MOLECULAR BIOLOGY AND IMMUNOLOGY (2022-2023)**

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

**CO1:** DNA replication,enzymes of replication ,inhibitors of replication.



**CO2:** transcription,promoters,initiation, elongation,termination.

**CO3:** post transcriptional modification,inhibitors of RNA synthesis

**CO4:** translation , genetic code, protein synthesis, post translational modifications

**CO5:** inhibitors of translation, lac operon

organization of immune system, organs and cells of immune system

**CO6:**classification of immunoglobulins ,haptens, epitopes, adjuvants, monoclonal antibodies

**CO7:**antigen-antibody reactions, blood group antigens, RIA,ELISA

**CO8:** vaccines, morden vaccines,outlines of hypersensitivity, graft rejection and MHC

**SEM-VI :r-DNA TECHNOLOGY AND BIOTECHNOLOGY – OPTIONAL B(2022-23)**

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

**CO1:**cloning strategy, DNA sequencing, r-DNA technology enzymes,restriction mapping.

**CO2:** cloning vectors,molecular markers

**CO3:** c-DNA libraries, PCR, blotting techniques, production of insulin GH,Bt cotton, edible vaccines

**CO4:**plant and animal biotechnology

**CO5:**microbial and environmental biotechnology.

**SEM-VI :BIOCHEMISTRY IN HEALTH AND DISEASE – OPTIONAL II(2022-23)**

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

**CO1:metabolic disorders**

**CO2:** genetic disorders

**CO3:** endocrine disorders

**CO4: molecular basis of cancer**