**DEPARTMENT OF BIOCHEMISTRY**
**B.Sc., BIOCHEMISTRY DEGREE**

**COURSE OUTCOME 2016-2019**

## Core Paper -1 Nutritional Biochemistry TAP1A

At the end of the course students will be able to,

1. Relate the calorific and nutritive value of foods.
2. Describe the Physiological role of nutrients.
3. Design the types of balanced diet for all age groups.
4. Assess the RDA, deficiency, toxicity of vitamins and minerals.
5. Value the need for the study of human rights and relations.
6. Investigate the role of nutrients in maintaining proper health.

## Core Paper -2 Cell Biology TAP2A

1. Summarize that the cell is the fundamental unit of life.
2. Describe the ultra structure and functions of sub-cellular organelles.
3. Classify the transport mechanism across Biomembrane.
4. Differentiate the structure, functions of chromosomes and phases of cell cycle.
5. Explain the communication between the cells.
6. Distinguish the structure and functions of prokaryotic and Eukaryotic cells.

## Core Paper -3 Chemistry of Biomolecules I TAP3A

1. Identify the structure, types and functions of Biomolecules.
2. Summarize classification, structure and role of carbohydrate.
3. Interpret, structure and function of polysaccharides.
4. Illustrate, properties, types and biological role of amino acids.
5. Predict the properties, quantification of protein, peptides and peptidases.
6. Adapt protein structure, sequencing, forces and bonds.

## Core Paper -4 Chemistry of Biomolecules II TAP4A

1. Discuss the role of lipids, nucleic acid and heterocyclic compounds.
2. Relate chemical nature, function, types properties and isolation of lipids.
3. Interpret, structure, classification function, of sterols and complex lipids.
4. Predict the structure, composition, properties and types of DNA.
5. Distinguish structure, types, of RNA and action of nucleases.
6. Summarize the significance of heterocyclic compounds and antibiotics.

## Core Paper -5 Enzymes /TAP5A

1. Define the properties, Classification and regulation of enzymes.
2. Describe the methods of isolation and purification techniques of enzymes.
3. Interpret functions of coenzymes and the application of enzymes
4. Relate enzyme kinetics and its activity.
5. Discuss the enzyme inhibition and the mechanism of enzyme catalysis.
6. Explain the essential functions and applications of enzymes.

**Core Paper -6 Metabolism /TAP5B**

1. Adapt Knowledge on metabolic profile of biomolecules.
2. Describe synthesis and oxidation of fatty acids.
3. Distinguish biosynthesis and degradation of lipids.
4. Relate the synthesis of essential amino acids and significance of enzymes.
5. Differentiate interconversion of enzymes of amino acids and amines.
6. Adapt facts about integration of metabolism.

**Core Paper -7 Analytical Biochemistry /TAP5C**

1. Describe the basic principle of analytical biochemistry, electrodes, and its applications.
2. Explain the principles, types, and its applications of centrifugation.
3. Distinguish the instrumentation principles, and application ofchromatography.
4. Demonstrate the principle, instrumentation, and applications of electrophoresis.
5. Illustrate the different types of spectroscopies.
6. Relate the in-depth knowledge applications of analytical instrumentation.

**Core Paper -8 Physiology /TEP5A**

1. Explain the structure function of digestive and excretory system.
2. Describe the circulatory system.
3. Illustrate nervous system, and the role of neurotransmitters.
4. Distinguish the mechanism of respiratory and buffer systems.
5. Summarize about the reproductive systems.
6. Correlate the different systems function in human body.

**Core Paper -9 Clinical Biochemistry /TAP6A**

1. Outline the scope of clinical Biochemistry.
2. Assess the changes in various metabolic and clinical abnormalities,
3. Detect various biochemical parameters in the diagnosis of diseases.
4. Find the clinical manifestations in kidney function and liver function test.
5. Categorise the hormonal disorders and its clinical abnormalities.

6. Elaborate awareness about different life style diseases.

**Core Paper -10 Molecular Biology /TAP6B**

1. Define the experiments, significanceof DNA the unit of inheritance and genome organization.
2. Explain the prokaryotic replication, enzymology and its inhibition.
3. Describe the prokaryotic transcription and its inhibitors.
4. Summarize the genetic code, biosynthesis and inhibition of protein.
5. Distinguish between DNA damage and DNA repair mechanisms.
6. Relate the biological processes through molecular mechanisms**.**

**Core Paper -11 Immunology/TEP6A**

1. Demonstrate the basic knowledge of Immunology.
2. Compare key mechanism of innate and adaptive immunity.
3. Explain the structure and functions of antigen and antibody.
4. Describe the antigen and antibody interaction.
5. Summarize the principle of Vaccination and the mechanism of protection against the diseases.
6. Explain the basis of hypersensitivity and autoimmunity.

**Core Paper -12 Biotechnology /TEP6B**

1. Define the basic techniques and enzymes involved in rDNA technology.
2. Explain the different types of cloning vectors and its application.
3. Distinguish between plant tissue culture and protoplast culture.
4. Describe the animal cell culture and protoplast culture.
5. Summarize the microbial application in biotechnology.
6. Relate the biotechnology process through analytical techniques.

**ALLIED CHEMISTRY-1 SBADA 2016-2017**

1. Interpret the nuclear reactions taking place in various fields.
2. Identify the water technology required to the analysis.
3. Summarize the organic compounds and organic reactions.
4. Prepare the simple organic compounds.
5. Point out the heterocyclic compounds in everyday life.
6. Explain the photochemical reactions around us.

**ALLIED CHEMISTRY-2 SBADB 2016-2017**

1. Analyze the co-ordination compounds in various fields.
2. Point out the proteins present in the food.
3. Distinguish the carbohydrates according to their structure.
4. Choose the catalyst based on the reaction conditions.
5. Relate the electro chemical reactions in everyday life.
6. Explain the analytical techniques in various fields.

**ALLIED CHEMISTRY-1 TBTAA 2017-2018, 2018-2019, 2019-2020**

1. Interpret the nuclear reactions in various fields.
2. Identify the sources of fuel and fertilizer.
3. Summarize the organic compounds and organic reactions.
4. Prepare the simple organic compounds.
5. Point out the inter halogen compounds in various reactions.
6. Explain the photochemical reactions around us.

**ALLIED CHEMISTRY-2 TBTAB**

1. Analyze the co-ordination compounds in various fields.
2. Point out the proteins present in the food.
3. Distinguish the carbohydrates according to the structure.
4. Choose the catalyst based on the reaction conditions.
5. Relate the electro chemical reactions in everyday life.
6. Explain the analytical techniques using in various fields.

**ALLIED CHEMISTRY-1 SD3AA / 2020-2021, 2021-2022**

1. Interpret the nuclear reactions taking place in various fields.
2. Identify the sources of fuel and fertilizer.
3. Summarize the organic compounds and organic reactions.
4. Prepare the simple organic compounds.
5. Point out the polymers using in everyday life.
6. Explain the photochemical reactions around us.

**ALLIED CHEMISTRY-2 SD3AC / 2020-2021, 2021-2022**

1. Analyze the co-ordination compounds in various fields.
2. Point out the proteins present in the food.
3. Distinguish the carbohydrates according to the structure.
4. Choose the catalyst based on the reaction conditions.

5. Relate the electro chemical reactions in everyday life.
6. Explain the analytical techniques using in various fields.

**ALLIED BIOCHEMISTRY-1 TBPBA (From 2016-2017)**

1. Explain the classification of carbohydrates.
2. Describe the monosaccharides,oligosaccharides and polysaccharides.
3. Define the classification of aminoacids.
4. Illustrate the structure classification and functions of proteins.
5. Distinguish the types of bonds stabilizes the structure of proteins.
6. Relate the structure, functions, classification of carbohydrates and proteins.

**ALLIED BIOCHEMISTRY-2 TBPBA (From 2016-2017)**

1. Illustrate the structure, classification and functions of lipids.
2. Explain the functions of genetic code and biosynthesis of nucleotides.
3. Define the classification and functions of enzymes.
4. Distinguish the types of inhibitory mechanism of enzymes.
5. Describe the classification and functions of vitamins.
6. Correlate the importance of fats, nucleotides and vitamins.

**ALLIED BIOCHEMISTRY-1 SC5AA (From 2019-2020 Onwards)**

1. Explain the classification, structure and functions of carbohydrates.
2. Describe the classification, structure and functions of aminoacids.
3. Illustrate the structure, classification and functions of lipids.
4. Distinguish the structure and functions of proteins.
5. Define the functions and RDA of vitamins.
6. Correlate the importance of biomolecules.

**COURSE OUTCOMEFROM 2019 -2020 ONWARDS**

**B.Sc, BIOCHEMISTRY**

**Core Paper -1 Nutritional Biochemistry SB21A**

At the end of the course students will be able to

1. Relate the calorific and nutritive value of foods.
2. Describe the Physiological role of nutrients
3. Design the types of balanced diet for all age groups.
4. Assess the RDA, deficiency, toxicity of vitamins and minerals.
5. Value the need for the study of human rights and relations.
6. Investigate the role of nutrients in maintaining proper health.

**Core Paper -2 Cell Biology SB22A**

1. Summarise that the cell is the fundamental unit of life.
2. Describe the ultra-structure and functions of sub cellular organelles.
3. Classify the transport mechanism across bio membrane.
4. Differentiate the structure and functions of chromosomes and phases of cell cycle.
5. Explain the communication between the cells.
6. Distinguish the structure and functions of prokaryotic and Eukaryotic cells.

**II B.Sc, BIOCHEMISTRY**

**Core Paper 3 Biomolecules (SB23A)**

1. Identify the structure, types and functions of Biomolecules.
2. Demonstrate the chemistry and the role of mono and disaccharides
3. Elucidate the structural conformation and types of polysaccharides
4. Execute the reactivity of amino acids and nutritional importance of proteins
5. Correlate the structure and functions of proteins
6. Adapt the levels of organization of proteins and its biological importance

**Core Paper 4 Biomolecules and Biochemical Techniques**

1. Define about lipids, Nucleic acid, and Biochemical techniques.
2. Relate the classes of lipids and its role
3. Distinguish the role of purine and pyrimidine bases in nucleic acid structure
4. Predict knowledge about principle of various centrifugation types and its applications.
5. Implement the reactivity of lipids in biological membrane and life process.
6. Adopt the principle and instrumentation of spectroscopic methods.

**DEPARTMENT OF BIOCHEMISTRY**

**M.Sc., BIOCHEMISTRY DEGREE**

**COURSE OUTCOME (From 2016-2017 Onwards)**

**Core Paper – Biomolecules/MEN1A**

1. Describe classification and functions of carbohydrates.
2. Explain classifications and functions of lipids.
3. Interpret the classification structure of protein and sequence of amino acid.
4. Illustrate structure, types and sequence of nucleic acids.
5. Adopt the fact of vitamins and antioxidants.
6. Define the structure, types, functions of biomolecules.

**Core Paper – Biochemical Techniques / MEN1B**

1. Describe the basic principles of culture techniques and electrodes.
2. Discuss the basic principles of chromatography and its applications.
3. Distinguish the types of electrophoresis and its applications.
4. Illustrate the spectroscopy, turbidimetry, nephelometry and its applications.
5. Explain the types of microscopy and applications of radioactive isotopes.
6. Correlate the biochemical techniques and its applications.

**Core Paper – Physiology and Cell Biology / MEN1C**

1. Distinguish the types of cell junctions, adhesion molecules, tissue and extracellular matrix
2. Classify the transport mechanism across the biomembrane
3. Explain the role of digestive system and circulatory system
4. Describe the structure and function of each organ in the respiratory system
5. Identify the key role of muscular and central nervous system
6. Summarise the significance of physiology and cell biology.

**Core Paper –Microbiology / MENAA**

1. Adapt interaction of microbes with environment, host, food, and antimicrobials.
2. Elucidate microbial methods, media, life cycle and taxonomy.
3. Describe the importance of food preservation, poisoning and spoilage.
4. Determine the food infection, pathogenic organism disease and fermentation.

5. Demonstrate the mechanism of antimicrobials.
6. Relate the industrial production of microbial products

**Core Paper –Enzymes and Enzyme Technology / MEN2A**

1. Execute the techniques for isolation , separation and purification of enzymes
2. Describe enzyme kinetics and regulation of enzymes
3. Explain the structure and significance of coenzymes in various biochemical process.
4. Relate mechanism of enzyme action through mapping of active site and enzyme catalysis.
5. Implement the production and the applications of enzymes.
6. Adapt the essential functions and applications of enzymes.

**Core Paper –Intermediary Metabolism I / MEN2B**

1. Explain the carbohydrate metabolic pathway and its regulation.
2. Describe glycogen metabolism and bacterial cell wall polysaccharides
3. Distinguish pathways of purine and pyrimidine metabolism.
4. Discuss the conversion of amino acids to specialized products.
5. Illustrate the biosynthesis, degradation of heme and inorganic Sulphur compounds.
6. Correlate the metabolism of carbohydrate, protein, and nucleic acids etc.,

**Core Paper – Intermediary Metabolism II /MEN2C**

1. Adapt on metabolic profile of biomolecules.
2. Describe synthesis and oxidation of fatty acids.
3. Distinguish biosynthesis and degradation of lipids.
4. Relate the synthesis of essential amino acids and significance of enzymes.
5. Differentiate interconversion of amino acids and amines.
6. Adapt facts about integration of metabolism.

**Core Paper –Energy and Drug Metabolism / MENAB**

1. Adapt thermodynamics, biological oxidation, ETC, Xenobiotics, biomolecules and energetics.
2. Gain insights into high energy compounds detoxification& thermodynamics.
3. Predict the role of ATPase & oxidative phosphorylation
4. Correlate photochemical events.
5. Integrate metabolic pathway in various organs.
6. Interpret biochemical events in Xenobiotics.

**Core Paper –Plant Research Methodology / MENAD**

1. Describe the principles, instrumentation and applications of microscopy in

Histopathology.

2. Explain the principles, instrumentation, applications of centrifugation, chromatography, and electrophoresis
3. Distinguish the principle and applications of spectroscopy and photography.
4. Illustrate the different types of laboratory safety.
5. Discuss the components of research report and dissertation.
6. Correlate the biochemical techniques and its applications.

**Core Paper – Biotechnology /MEN3A**

1. Explain the basic principles involved in Biotechnology.
2. Describe the different types of cloning vectors,and its applications.
3. Discuss the basic principles of animal cell culture and its applications.
4. Distinguish the basic principles of plant cell culture and itd applications.
5. Summarise the applications of molecular techniques and bioinformatics.
6. Write the types of applications in Biotechnology.

**Core Paper – Clinical Biochemistry / MEN3B**

1. Identify biological samples, investigation of diseases and interpretation.
2. Relate the factors influencing biochemical variables.
3. Distinguish types of diabetes, clinical manifestation, diagnosis and management.
4. Interpret disorders of blood clotting and lipid metabolism.
5. Predict the importance & disorders of calcium / phosphorus.
6. Acquire about hyper, hypo lipoproteins and its clinical significance

**Core Paper – Molecular Biology / MEN3C**

1. Define the Mendel laws of inheritance, gene mapping and mode of gene information transfer.
2. Explain the genome organization, mechanism and regulation of prokaryotic and eukaryotic replication.
3. Distinguish between molecular mechanisms of DNA mutation and repair.
4. Summarize the mechanism of prokaryotic and eukaryotic transcription and gene regulation.
5. Describe the genetic code, protein synthesis, sorting and degradation.
6. Relate the enzymology, process and regulation of molecular mechanisms

**Core Paper –Environmental Biotechnology / MDTBB**

1. Relate the causes and effects of biofilm and biomass.
2. Illustrate the principles and design of bioreactors.

3. Explain the types of denitrification and water treatment.
4. Describe the detoxification of hazardous chemicals and biodegradation of environmental contaminants.
5. Interpret the strategies for bioremediation.
6. Execute the technologies, tools and techniques in the field of environmental Biotechnology.

**Core Paper –Hormones / MEN4A**

1. Describe the different classes, structure, mechanism of action and regulation of endocrine system.
2. Discuss the biochemical, physiological effects, regulation of pancreatic hormones.
3. Illustrate the types, role and effects of thyroid hormones.
4. Identify the chemical nature, action, metabolism of Adrenal hormones.
5. Explain the biochemical changes regulation of gonadal hormones.
6. Summarise the role of endocrinology in health and diseases.

**Core Paper –Clinical Biochemistry II /MEN4B**

1. Identify biochemical markers, organ function, disfunction and hormone disorders.
2. Predict enzyme markers and its application.
3. Implement in born errors of carbohydrate and amino acid metabolism.
4. Illustrate LFT and liver diseases.
5. Evaluate renal function, renal failure and prenatal diagnosis.
6. Adapt disorders related to hormones.

**Core Paper –Signal Transduction /MENAD**

1. Define the Functions, Structure and mechanism of intracellular and inter cellular signaling pathways.
2. Describe structure and regulation of protein kinases and phosphatases
3. Classify Structure classification and mechanism of G-protein coupled Signal transduction pathways
4. Distinguish signaling, gene Control and down modulation of receptor signaling.
5. Illustrate the classification structure and transcriptional regulation by nuclear receptor and Steroid hormone
6. Explain the signaling molecules in the cell

**Core Paper –Immunochemistry / MENAE**

1. Discuss the scope and achievement in the field of immunology
2. Describe the role of antibody and antigen

3. Illustrate the antigen and antibody interaction with its significance
4. Distinguish the key mechanism between hum oral and cell mediated immunity.
5. Understand the basis of allergy and autoimmunity
6. Demonstrate the immunological process at a cellular and molecular level.

## DEPARTMENT OF BIOCHEMISTRY

## PROGRAMME OUTCOME / OBJECTIVES (PO)
## BSc BIOCHEMISTRY

After completion of the programme the students were able to,

1. Execute in depth theoretical and practical knowledge of Biochemistry and to apply the skills to provide cost efficient solutions.

2. Evaluate solutions for complex scientific problems, taking into account public health, safety, culture, society and the environment.

3. Equip effective communication skills and a sense of teamwork along with values that respond to the need of a professional life for their successful career.

4. Interpret scientific concepts and clinical skills, graduates work collaboratively in a laboratory as a team or individually.

5. Facilitate to pursue post-graduation in life sciences and contribute their knowledge to the betterment of the society in various research and health care sectors.

6. Transfer and empower the graduates to meet global challenges in research and careers in industry or in academic setup.

## PROGRAMME SPECIFIC OBJECTIVES (PSO)
## BSc BIOCHEMISTRY

After completion of the programme the students were able to,

1. Provide the basic objective of education and understanding of scientific terms, concepts, facts, phenomenon and their relationships.

2. Execute the latest assortment of tools and equipment and try to solve difficulties for precise diagnostic and therapeutic applications.

3. Implement their biochemistry skills to be an entrepreneur and contribute professional growth to society.

## DEPARTMENT OF BIOCHEMISTRY

## PROGRAMME OUTCOME / OBJECTIVES (PO)
## MSc BIOCHEMISTRY

After completion of the programme the students were able to,

1. Analyze logical principles, validate assumptions, solve problems, analyze ideas, develop perspective, and develop originality.

2. Communicate the utmost attentiveness and listening, reading, understanding, transfer the gathering information through oral and written forms.

3. Examine contemporary research methods, skills and techniques to conduct an independent inquiry in a chosen scientific discipline.

4. Appreciate the views of others, mediate disagreements, promote interdependence and help reach conclusions in group settings.

5. Exhibit empathetic social concern, equity-focused national development, and act with awareness of issues and participate in civic life through volunteering.

6. Recognize the issues of environmental contexts and sustainable development to engage independent and life-long learning.

## PROGRAMME SPECIFIC OBJECTIVES (PSO)
## MSc BIOCHEMISTRY

After completion of the programme the students were able to,

1. Inculcate the basic principles of biochemistry, scientific advancement and enhance their technical skills in the various fields.

2. Develop problem solving skills utilizing the conceptual of knowledge, analytical techniques and statistical approaches.

3. Implement the concepts of biochemistry to environmental, intellectual, societal and ethical issues.