

## **B.Sc. (Honours) Programme in Biochemistry**

### **Programme Specific Outcomes (PSO)**

1. Demonstrate experiential learning and critical thinking of the structure and function of both prokaryotic and eukaryotic cells.
2. Understand the principles, and have practical experience of, a wide range of biochemical techniques, data analysis and competent interpretation.
3. Analyze Biochemical mechanisms and processes in specific areas of Biochemistry and its application related to industrial production, health, agriculture, community development, etc.
4. Collaborate, cooperate and apply the relevant knowledge, techniques and managerial skills to manage research projects of multidisciplinary nature.
5. Employ skills to publish research findings, awareness of IP rights, scientific publication ethics and problems of plagiarism articulation of ideas, scientific writing and authentic reporting, and effective presentation skills.

### **DSC-1: Chemical foundation of Biochemistry -1 (Semester 1)**

#### Course Outcomes (CO)

1. To gain insights on milestone discoveries in life sciences that led to establishment of Biochemistry as separate discipline.
2. To understand chemical bonding, strong and weak interactions, hydrogen bonding and to apply these principles in various biomolecules and biological reactions.
3. To understand concepts of acids, bases, indicators, pKa values, etc and acquiring skills to determine pKa value of amino acids.
4. To analyze the significance of organic reactions with reference to biological systems and to apply the principles of electrochemistry and thermodynamics to biological systems.

### **DSC-2: Microbial and Plant Diversity (Semester 1)**

#### Course Outcomes (CO)

1. To explore taxonomic strategies and approaches used to name microorganisms, and the criteria used to define bacterial species
2. Students will acquire knowledge to apply the techniques of microscopy to identify different microbes.
3. They will get acquainted with routine microbiological practices including sterilization, media preparation, maintenance of microbial culture, staining etc.
4. Acquisition of knowledge on the structure, life cycle and life processes that exist among bacteria, fungi and lichens.

### **DSC-3 : Cell Biology (Semester 1)**

#### Course Outcomes (CO)

1. Understand the historical aspects of cell theory and structural classification of different types of cells.
2. Recognize the structural and functional aspects of bacterial cell walls and plant cell walls.
3. Describe different organelles, their structure and function.
4. Explain the significance of events of the cell cycle, types, and cell division.
5. Demonstrate familiarity with various components of the cytoskeleton.
6. Understand the composition and structure of Tissues and Extracellular matrix.

### **OE-1: Biochemistry in Health and Disease (Open Elective) (Semester 1)**

#### Course Outcomes (CO)

1. Students will understand the significance of hygiene, sanitation, vaccination in prevention of infectious diseases.
2. Students will get acquainted with various classes of microbial infectious agents, their mode of action, biology of the diseases, transmission of diseases, the concepts of treatment.
3. Students will get acquainted with various types of human diseases and their biochemical basis. They will know about disorders due to improper dietary constituents and lifestyle changes.
4. To understand the diverse perspectives of mental health and distress.

#### **DSC-4: Chemical Foundation of Biochemistry – 2 (Semester 2)**

##### Course Outcomes (CO)

1. To understand the fundamentals of chemical processes in biological systems.
2. To analyze the concepts of chemical kinetics and to understand applications of colloids in Biochemistry.
3. To appreciate the roles of metals, non-metals, transition metals and coordination compounds in biological systems.
4. To develop understanding of aliphatic and aromatic compounds, IUPAC nomenclature, reactivity of functional groups and the importance of stereoisomers in biological systems.

#### **DSC-5: Plant Physiology and Phytochemistry (Semester 2)**

##### Course Outcomes (CO)

1. To understand the importance of water and the mechanism of transport.
2. To gain conceptual clarity of various physiological processes in plants and understand the interconnections of the processes thereby gaining idea about the importance of plants in the dynamicity of nature
3. Preliminary understanding and appreciation of the basic functions and metabolic process taking place in plant body such as respiration, photosynthesis, nitrogen fixation etc., which are important for life
4. To gain knowledge on the role, functions and importance of mineral nutrients in plant metabolism and crop yield.
5. To understand biosynthesis, breakdown and energetics of biomolecules in plants
6. Understand and evaluate the role of plant hormones in plant development and about secondary metabolites.
7. To understand and analyse the importance of Sensory Photobiology, Plant movements and Programmed cell death
8. To analyse and appreciate the types of stresses and their effect on plants
9. To understand the structure, biosynthesis and role of secondary metabolites (phytochemicals) in plants and as defence molecules
10. Evaluate the importance of secondary metabolites for humans

#### **DSC-6: Biomolecules 1 (Semester 2)**

##### Course Outcomes (CO)

1. Understand the structure, properties of carbohydrates and their importance in biological systems.
2. Exemplify the functions of glycoproteins, glycolipids and its applications.
3. Analyze the structure, function and acid base properties of amino acids and proteins
4. Develop skills to elucidate the structure and sequence of proteins and the synthesis of peptides.

### **OE-2: Biochemistry of Functional Foods (OE) (Semester 2)**

#### Course Outcomes (CO)

1. To understand health promoting nutritional factors and bioactive constituents in nutraceuticals.
2. The students will acquire an understanding of functional foods and nutraceuticals, be able to classify functional foods, discuss their potential health implications and the effect of processing.
3. To understand the mechanism of action of nutraceuticals.
4. To understand the antinutrients and their physiological role and applications.

### **DSC-7: Bioorganic Chemistry (Semester 3)**

#### Course Outcomes (CO)

1. Understand the fundamentals of organic chemistry pertinent to their importance in understanding biochemical reactions.
2. Acquire knowledge of reaction mechanisms with relevance to metabolic reactions.
3. Elucidate the properties, composition and function of the natural compound classes terpenoids, steroids, phenols and alkaloids.

### **DSC-8 : Plant Systematics and Medicinal Botany (Semester 3)**

#### Course Outcomes (CO)

1. To recognise and understand the fundamental concepts involved in plant taxonomy and features in Angiosperm evolution.
2. Acquire the skill to identify, classify and describe a plant in scientific terms, thereby and Identification of plants using dichotomous keys.
3. Acquire skills to utilize computational software tools for analysis of data pertaining to phylogenetic relationship of angiosperms.
4. Learning skills to use phylogenetic tools to understand the evolutionary relationship with reference to ancestry of a group.
5. Analyse and evaluate the application of Phytochemistry, cytotaxonomy and computer application in taxonomy.
6. Skill development for identification of medicinal plant and the active principles present in them.
7. Analyse the drugs for its authenticity using physical, chemical and biological methods
8. Understand and appreciate the biosynthesis of active principles in drugs and interrelationship existing between metabolic pathways.
9. Create awareness of interdisciplinary approach of modern plant systematics.
10. Understanding importance of applied aspects of plant science in developing and conceptualising approach towards the development of science of plant systematics.,

### **DSC-9 : Biomolecules II (Semester 3)**

#### Course Outcomes (CO)

4. To understand and exemplify the relation between structure, function and biological role of lipids
5. Ability to extend knowledge on the role of biomolecules for a better understanding as therapeutic tools.

### **OE-3 : Food and Drug Toxicity (Semester 3)**

#### Course Outcomes (CO)

1. Introduction to the various facets and the common terminologies used in the study of toxicology.
2. Knowledge of various food additives, animal and plant toxins and their impact on health.
3. Understanding the physiological impact and risk factors affecting heavy metal and drug toxicity on various organs.

### **DSC-10: Analytical Biochemistry (Semester 4)**

#### Course Outcomes (CO)

1. To understand the concepts related to biochemical investigations involving cell disruption and extraction methods and operating principles behind various separation methods.
2. To understand the principle and instrumentation of Centrifugation and ability to explain, evaluate principles of chromatography in industry.
3. To learn the concept of Biochemical analysis and characterization of biomolecules using electrophoretic techniques.
4. Ability to discuss and demonstrate a working knowledge of spectrophotometric techniques and its application in industry.
5. Ability to outline principle and practical application of radio-isotope labelling processes in biological system.

### **DSC-11 : Plant Physiology and Phytochemistry (Semester 4)**

#### Course Outcomes (CO)

11. To understand the importance of water and the mechanism of transport.
12. To gain conceptual clarity of various physiological processes in plants and understand the interconnections of the processes thereby gaining idea about the importance of plants in the dynamicity of nature
13. Preliminary understanding and appreciation of the basic functions and metabolic process taking place in plant body such as respiration, photosynthesis, nitrogen fixation etc., which are important for life
14. To gain knowledge on the role, functions and importance of mineral nutrients in plant metabolism and crop yield.
15. To understand biosynthesis, breakdown and energetics of biomolecules in plants
16. Understand and evaluate the role of plant hormones in plant development and about secondary metabolites.
17. To understand and analyse the importance of Sensory Photobiology, Plant movements and Programmed cell death
18. To analyse and appreciate the types of stresses and their effect on plants
19. To understand the structure, biosynthesis and role of secondary metabolites (phytochemicals) in plants and as defence molecules
20. Evaluate the importance of secondary metabolites for humans

### **DSC-12 : Human Physiology (Semester 4)**

#### Course Outcomes (CO)

1. Explain homeostatic and altered physiology of blood and body fluids.
2. Explain the physiology of digestive system, digestion, absorption and transport of biomolecules and its disorders.
3. Demonstrate an understanding of the physiology of respiration, transport of gases and related disorders.
4. Understanding of renal structure, function, and its disorders.
5. Understanding the histological aspects of blood vessels, heart structure; function, regulation and disorders of cardiovascular system.
6. Comprehend the functional aspects of brain structure, divisions of CNS and ANS.
7. Structure-functional relationship of muscle contraction and associated diseases.

