



## ISLAMIAH WOMEN'S ARTS AND SCIENCE COLLEGE

Accredited by the NAAC with 'B' Grade  
Vaniyambadi – Tamil Nadu

### DEPARTMENT OF BIOCHEMISTRY

#### PSOs, COs

#### PROGRAM SPECIFIC OUTCOME (PSO)

PSO1: Students will gain knowledge of cytology, biomolecules

PSO2: Practical skill of Microbial culture and antimicrobial chemotherapy

PSO3: Students will be able to apply analytical instruments in the field of research for Isolation, Separation and Purification of organelles and protein, DNA and RNA

PSO4: Student will be able to understand the Role of enzymes in Metabolism and as Marker for Disease and Industrial application enzymes

PSO5: Students will be able to understand the mechanism of Molecular biology and applications in Recombinant DNA technology, Fingerprinting, Human genome project, Plant and animal cell culture.

PSO6: Students will be able to understand about Etiology of Disease, Diagnosis using laboratory technology and Treatment procedure.

PSO7: Students will be able to understand the concept of Immune system which protects the body from disease and Immunological disorders and production of vaccines.

PSO8: Role of computer and Statistics in data analysis in clinical epidemiology and Research.

## **COURSE OUTCOMES (CO)**

### **UG COURSE OUTCOME**

#### **SEMESTER-I**

**Course: CELL BIOLOGY**

**Credit-4**

CO1: Identify the view of cells origin and the solution of cell theory.

CO2: Compare and contrast of prokaryotic and eukaryotic cells.

CO3: Explain the sub organelles and its type of cell

CO4: Define the nature and role of organelles such as endoplasmic reticulum, ribosome, mitochondria and plasma membrane.

CO5: Outline about chromosomes, chloroplast cell communication.

**Course: ALLIED CHEMISTRY I**

**Credit-4**

CO1: Explain the terms and process used in Metallurgy

CO2: Compare the types of effects of polarisation plays the role in organic reactions.

CO3: Determine the rate of reaction and to compare the types of catalysis.

CO4: Evaluate the types of nuclear reaction and applications of radio-isotopes.

CO5: Classify the types of hybridization and shapes of molecules.

#### **SEMESTER-II**

**Course: BIOMOLECULES**

**Credit-4**

CO1: Classify of carbohydrates, isomerism of sugars, reactions of carbohydrates.

CO2: Explain about amino acid, protein and its structure.

CO3: Define the functions of lipids with classifications.

CO4: Determine the nature of genetic materials purine and pyrimidine bases

CO5: Design Watson and Crick model of DNA and types of RNA

CO6: Outline of dietary sources, deficiency and biological functions of fat & water soluble vitamins.

**Course: ALLIED CHEMISTRY II**

**Credit-4**

CO1: Describe the coordination compounds and their applications.

CO2: Evaluate the role of carbohydrate, Amino acid, proteins and vitamins.

CO3: Determine the types of conduction in electrochemistry.

CO4: Explain the application of points, chromatographic techniques.

CO5: Evaluate the types of drugs applied for diseases.

**Course: Chemistry I & II (Allied Practical)**

**Credit: 2**

CO1: Analyze and identify the functional groups present in the given substance.

CO2: Understand types of reaction

CO3: Determine the strength of the solutions.

**Course: LANGUAGE SKILLS AND COMMUNICATION-I (NME) Credit-2**

CO1: Understand the importance of Language and communication

CO2: Able to understand and apply the knowledge of human communication and language

CO3: Acquire skills like interpersonal, intra personal and intra cultural communication.

**Course: Core Practical - Practical I**

**Credits -4**

CO1: Analyze qualitative tests of carbohydrates

CO2: Describe about reducing sugar, osazone formation with conformation test

CO3: Analyze qualitative test of amino acids

CO4: Determine quantitative test of sugar, amino acids & ascorbic acids

**Course: Allied Practical - Chemistry Practical I & II**

**Credits 2**

CO1: Understand the lab safety & handling the apparatus

CO2: Compare the properties of organic substances

CO3: Evaluate the normality of the solutions

**Course: Core Practical - Practical II**

**Credits 4**

CO1: Understand the concept of isolation process of lipids, cholesterol from egg

CO2: Isolate starch from potato

- CO3: Demonstrate colorimetry & chromatographic techniques
- CO4: Estimate the quantity of amino acid, protein by colorimetrically
- CO5: Preparation of buffer

**Course: Allied Practical - Microbiology I & II**

**Credits 2**

- CO1: Understand the sterilization techniques
- CO2: Evaluate the soil microorganisms
- CO3: Explain staining Techniques
- CO4: Explain serial dilution techniques
- CO5: Analyze puncture techniques

**Course: Core Practical - Practical III**

**Credits 5**

- CO1: Analyze creatinine, urea, glucose by colorimetrically
- CO2: Analyze biological samples of salivary amylase
- CO3: Estimate enzyme activity of urease
- CO4: Analyze serum samples (SGOT, SGPT)
- CO5: Demonstration of electrophoretic techniques
- CO6: Understand the concept of sample separation by electrophoretic techniques

**Course : Elective Practical - Practical IV Medical Lab Technology**

**Credits 3**

- CO1: Acquire phlebotomy skills
- CO2: Evaluate the haematology parameters
- CO3: Identify the normal & abnormal constituents of urine
- CO4: Understand microbiological concept of staining, streaking & culturing.

**SEMESTER-III**

**Course: Fundamentals of Computer I (SBS) Credit: 3**

CO1: Acquire basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing, as well as how to include some graphics such as pictures and charts.

CO2: Evaluate information on the Web (learn how to be critical and evaluate what is valid and reliable).

CO3: Explain the basics of e-mail, such as sending, forwarding and receiving mail, attaching documents, creating mailboxes, filters, and address books.

CO4: To be able to describe why computer systems are important needed to be reliable.

CO5: Explain Fundamental concepts related to computer system.

### **Course: Biophysical and Biochemical Techniques I Credit: 3**

CO1: Students will demonstrate a core knowledge base in the theory and practice of modern Biochemistry and biophysical (BB)

CO2: Understand Units of solute measurement in solution.

CO3: Explain about the Concept and application of pH in the buffer.

CO4: Illustrated the Instrumentation and application of electrode

CO5: Understand the partition and abstraction Chromatography Technique.

CO6: Acquire knowledge on Preparative and differential certification technique.

### **Course: Microbiology (ALLIED)**

**Credits: 4**

CO1: Understand the microscopic techniques

CO2: Classify the structure and functions of cell organelles

CO3: Understand animal cell culture techniques

CO4: Acquire skills on the classical techniques of microbial identification

CO5: Analyze microbial growth determination

### **Course: LANGUAGE SKILLS AND COMMUNICATION-II (NME) Credit-2**

CO1: Acquire skills on technology mediated communication

CO2: Able to improve the fluency of speaking

CO3: Analyze the correct usage of grammar in writing and speaking.

## SEMESTER-IV

### Course: BIOPHYSICAL TECHNIQUES –I

Credit-3

CO1: Create a practical knowledge on the separation of biological sample by centrifugation

CO2: Create analytical skills to separate samples by chromatography.

CO3: Acquire knowledge of spectroscopy.

CO4: Explain about the radiation and types of radio decay.

### Course: MICROBIOLOGY

Credit-4

CO1: Understand the Microbial waste treatment methods.

CO2: Explain about the food prevention techniques.

CO3: Illustrate the distribution and source of airborne microorganisms.

CO4: Design the industrial production of penicillin.

CO5: Theorize the cloning techniques and gene therapy methods.

### Course: COMPUTER APPLICATION

Credit-3

CO1: Understand operating system, MS DOS and Windows XP opening and closing.

CO2: Construct electronic mailing and web page.

CO3: Solve computer virus and components failure then downloading files.

CO4: Defend computer applications in educational institutions.

## SEMESTER-V

### Course: ENZYMES AND INTERMETIARY METABOLISM

Credit-6

CO1: Classify and nomenclature specificity of enzymes.

CO2: Analyze the factors affecting enzymes activity –pH, temperature, enzyme concentration.

CO3: Formulate metabolic pathways of carbohydrate metabolism.

CO4: Evaluate high energy components of metabolites.

CO5: Explain about the oxidation of fatty acids-  $\beta$ - oxidation,  $\alpha$ - oxidation and  $\omega$ - oxidation.

CO6: Define the degradation of proteins.

CO7: Explain about the biosynthesis and degradation of purine and pyrimidine metabolism.

**Course: HUMAN PHYSIOLOGY AND NUTRITIONAL BIOCHEMISTRY**

**Credit-4**

CO1: Explain the components of transport of O<sub>2</sub> and CO<sub>2</sub> role of Hb mechanism of respiration.

CO2: Define digestive system, digestion and absorption of nutrients.

CO3: Outline of excretory system and function of urine.

CO4: Design Endocrine glands and their function of nervous system and neurotransmission.

CO5: Analyze basic food groups' role and nutritional significance and malnutrition.

**Course: MEDICAL LAB TECHNOLOGY**

**Credit- 3**

CO1: Understand about the code of conduct for lab personnel.

CO2: Design and handle the basic instruments for laboratory usages.

CO3: Collect and analyze biological samples like urine, blood, fecal sample and its analysis.

CO4: Explain about the CSF, other body fluids and parasites.

**Course: GENETICS and MOLECULAR BIOLOGY**

**Credit-4**

CO1: Understand the concept of hereditary in plant and human being.

CO2: Describe the mechanism of DNA, RNA and Protein synthesis.

CO3: Identify the role of Inhibitors in treatment of cancer.

CO4: Compare and contrast role of mutation in genetic disorder and cancer development.

CO5: Explain the role of mutation in genetic disorders and biodiversity.

## SEMESTER VI

### Course: IMMUNOLOGY

Credit-3

- CO1: Compare and contrast innate and adaptive immunity
- CO2: Design a model of immunoglobulin and its role
- CO3: Explain cell types and organ present in the immune response
- CO4: Identify various mechanisms that regulate immune response and its tolerance.

### Course: CLINICAL BIOCHEMISTRY

Credit-6

- CO1: Define the fundamental biochemistry knowledge related to health & diseases
- CO2: Explain diseases related to carbohydrate, amino acid & lipid metabolism
- CO3: Evaluate the clinical importance of inborn errors of metabolism
- CO4: Determine the clinical laboratory procedure and quality control, sign and symptoms, diagnosis & treatment
- CO5: Define clearance test, and explain the clinical interpretation of function tests
- CO6: Outline the functional and non functional plasma enzymes
- CO7: Diagnose of clinical disorder by estimation of biomarkers

### Course: BIOTECHNOLOGY

Credit-4

- CO1: Understand the different vectors plasmid, cosmid and phages with its role.
- CO2: Understand the types of yeast, plant, animal vector and artificial chromosome.
- CO3: Identify selection and screening of recombinant vectors.
- CO4: Understand the mechanism and types of animal and plant tissue culture.
- CO5: To develop therapeutic vaccines, hormone clotting factors, stem cell and animal cloning.

### Course Name: BIOSTATISTICS

Credit-3

- CO1: Understand the collection, classification and tabulation of statistical data.
- CO2: Execute measure of central tendency, mean, median and mode.
- CO3: Analyze standard deviation, variance and coefficient of variation.
- CO4: Define kinds of probabilities, permutation and combination.
- CO5: Compare correlation analysis, partial and total correlation.



## **PG COURSE OUTCOME**

### **SEMESTER I**

#### **Course: CELL DYNAMICS AND ENVIRONMENT BIOLOGY      Credit-4**

- CO1: Understand the regulation of cell growth in prokaryotes and eukaryotes.
- CO2: Define the morphology of cell organelles and its function.
- CO3: Distinguish and differentiate the biotic and abiotic environment
- CO4: Describe the synthesis of organic polymers
- CO5: Understand the concept of evolution, molecular divergence and molecular clock.

#### **Course: CHEMISTRY OF MACROMOLECULES      Credit-5**

- CO1: Describe the structure and function of homo and hetroglycans
- CO2: Understand the structural elucidation of amino acids and proteins
- CO3: Distinguish the Nucleic acids
- CO4: Describe the lipids classification, structure and functions
- CO5: Understand the vitamins deficiency diseases

#### **Course: HUMAN PHYSIOLOGY      Credit-5**

- CO1: Describe the composition of digestive system
- CO2: Understand the cardiac cycle
- CO3: Explain the mechanism of respiration and reproduction
- CO4: Explain endocrine & nervous system
- CO5: Understand the nutritional value & dietary system

#### **Course: PLANT BIOCHEMISTRY AND PLANT MOLECULAR BIOLOGY      Credit-3**

- CO1: Understand the concept of light and dark reaction of photosynthesis in C3 and CAM Plants.
- CO2: Understand the Nitrogen fixation in leguminous and non-leguminous plants.
- CO3: Distinguish and differentiate the role of plant hormones.
- CO4: Understand the DNA polymorphism using RFLP and RAPD in Plant breeding.

## SEMESTER II

**Course: ANALYTICAL BIOCHEMISTRY** **Credit-4**

- CO1: Describe the instrumentation & its application of electrodes
- CO2: Acquire the concept of chromatographic techniques
- CO3: Explain the separation of biological samples by centrifugation techniques
- CO4: Describe the instrumentation & applications of Electrophoretic techniques
- CO5: Distinguish the principles & methodology molecular techniques

**Course: ADVANCED ENZYMOLOGY** **Credit-4**

- CO1: Explain classification, isolation and purification of enzymes
- CO2: Analyze the enzyme kinetics
- CO3: Understand the mechanism of enzymication and inhibition
- CO4: Distinguish the role co enzymes and isoenzymes
- CO5: Understand the uses of enzymes in industrial and clinical

**Course: INTERMEDIARY METABOLISM** **Credit-4**

- CO1: Understand the carbohydrate metabolic pathway
- CO2: Describe the lipid metabolism
- CO3: Explain protein metabolism
- CO4: Understand nucleic acid metabolism
- CO5: Understand prophyrin photosynthesis and metabolic activity

**Course: MICROBIOLOGY (Elective)** **Credit-3**

- CO1: Understand the morphology of ultrastructure of microbes
- CO2: Understand the Calvin cycle
- CO3: Explain the methods microbial media
- CO4: Understand the principle of microbial techniques

**Course: Pratical -I – Isolation and purification** **Credits-5**

- CO1: Analyzing the isolation of Glycogen, DNA,RNA
- CO2: Estimate the quantitatively Pyruvate, Tryptophan,Ascorbic acid
- CO3: Understand the chromatographic techniques

CO4: Understand the separation of Protein and Glutathione

CO5: Estimate the amount of iron, Sodium

**Course: Pratical -II –Enzymology and purification and kinetic studies Credits-5**

CO1: Estimate the amount of isolation of acid phosphates

CO2: Understand the assay of clinical important of enzymes

CO3: Understand the handling and maintance of microbial techniques

CO4: Analyze the assay of serum enzymes

CO5: Understand the various media preparation

CO6: able to know the techniques PCR PAGE TLC

**SEMESTER III**

**Course: ADVANCED ENDOCRINOLOGY**

**Credit-5**

CO1: Discuss the classification of hormones based on receptors

CO2: Illustrate the synthesis of amino acid derived hormones

CO3: Understand cyclic hormonal cascade system and protein kinases

CO4: Execute the role hormone receptors and its regulation

CO5: Categorize the steroid hormones

CO6: Describe the hormonal disorders

**Course: RESEARCH METHODOLOGY**

**Credit-5**

CO1: Discuss the essential features of scientific writing.

CO2: Illustrate the figures, tables and reference style.

CO3: Calculate the test of significance based on large samples.

CO4: Execute the role of computers in biology to find the research articles  
using science direct/PubMed.

CO5: Categorize the database management systems and searching sequence database  
using FASTA, BLAST/CLUSTAL.

CO6: Recognize CPCSEA guidelines and ethics in drug safety.

**Course: BIOTECHNOLOGY**

**Credit-5**

- CO1: Understand the different vectors plasmid, cosmid and phages with its role.
- CO2: Understand the types of yeast, plant, animal vector and artificial chromosome.
- CO3: Seek insertion of foreign DNA using restriction enzyme.
- CO4: Identify selection and screening of recombinant vectors.
- CO5: Understand the mechanism and types of animal tissue culture.
- CO5: Understand the genetically modified organisms

**Course: BIOINFORMATICS**

**Credit-3**

- CO1: Understand the data concept of bioinformatics.
- CO2: Able to know types of alignment of nucleic acid and protein.
- CO3: Analyze the sequences using bioinformatic tools (BLAST, FASTA)
- CO4: Evaluate and predict phylogenetic tree, protein structure and drug designing.

**SEMESTER IV**

**Course: MOLECULAR BIOLOGY**

**Credit-5**

- CO1: Understand the type of DNA replication
- CO2: Able to know types of RNA and its transcription
- CO3: Analyze the genetic codon and its features
- CO4: Describe the protein biosynthesis
- CO5: Analyze the protein transport and gene expression
- CO6: Evaluate type of mutation and repair mechanism

**Course: ADVANCED CLINICAL BIOCHEMISTRY**

**Credit-5**

- CO1: Understand the normal values of clinical parameters
- CO2: Able to know the method of CSF collection
- CO3: Analyze the disorder of carbohydrate metabolism
- CO4: Describe the lipid metabolism
- CO5: Analyze the protein and clinical enzymology
- CO6: Evaluate renal and hepatic function test

**Course: HERBAL TECHNOLOGY**

**Credit-5**

CO1: Understand the Indian system of medicine.

CO2: Distinguish and differentiate the medicinal plant classification.

CO3: Analyze the morphological and histological studies of plant drug.

CO4: Evaluate the medicinal uses and biomedical importance of plants.

CO5: Able to know plant drug used in cardiac disease, cerebral disease and Nasal diseases.

CO6: Able to know conservation of medicinal plants and pharmacological analysis of plant drug.

**Course: Core Practical - Practical III Biochemical Analysis of blood, Immunological and molecular biology techniques**

**Credit: 5**

CO1: Analyze creatinine, urea, glucose by semiautoanalyzer

CO2: Analyze biological samples of serum cholesterol, triglycerides

CO3: Estimate bilirubin and hemoglobin

CO4: Analyze blood grouping and Rh typing

CO5: Demonstration of ELISA

CO6: Understand the concept of immunodiffusion

**Course: Elective Practical - Practical IV Haematological Methods and Urinary analysis**

**Credit: 5**

CO1: Acquire clotting bleeding time

CO2: Evaluate the ESR and PTT

CO3: Identify the RBC and WBC count

CO4: Understand urinary analysis

CO5: Demonstration of urinary culture analysis