

PROGRAMME OUTCOMES

After successful completion of the Career oriented programme, students will be able to:

PO 1: Scientific Knowledge: Strong foundational understanding of biomolecules, metabolic pathways, cellular processes, and genetic organizations.

PO 2: Laboratory Skills: Proficiency in handling modern instruments, performing quantitative/qualitative biochemical assays, and maintaining biosafety.

PO 3: Analytical Competence: Ability to interpret experimental data and solve research problems logically.

PO 4: Industry & Research Readiness: Preparedness for careers or advanced studies in pharmaceuticals, healthcare diagnostics, agriculture.

PO5: Appreciate the relevance of biochemistry in health, diagnostics, biotechnology, and research.

PO6: Exhibit ethical values, professional competence, and a commitment to lifelong learning

Program Name: B.Sc	Semester: I
Course Title: Haematology	
Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO 1: □ Demonstrate comprehensive understanding of the fundamental principles of hematology, including cell biology, hematopoiesis, hemostasis, blood cell morphology, and the pathophysiology of common hematological disorders.	
CO 2: Apply knowledge of hematological diagnostic techniques and therapeutic strategies, including transfusion medicine, bone marrow examination, immunophenotyping, cytogenetics, molecular genetics, chemotherapy, targeted therapy, and supportive care in clinical practice.	

CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	2	1	2	1
CO2	2	3	3	2	2	2

Course Content	Hours
Unit 1- Basic Hematology:	
Cell Biology: Cell cycle, cell differentiation, and the biology of normal cells. Hematopoiesis: The process of blood cell formation, including stem cells and their regulation. Hemostasis and Coagulation: The mechanisms of blood clotting, including factors involved and disorders related to coagulation. Blood Cell Morphology: Identifying and classifying different types of blood cells under a microscope. Laboratory Hematology: Automation in hematology labs, common tests, and quality control.	16
Unit 2- Clinical Hematology:	
Anemias: Classification, diagnosis (including RBC indices, bone marrow examination, etc.), and management of various types of anemia (iron deficiency, hemolytic, etc.). Bleeding Disorders: Understanding the causes, diagnosis (PT/PTT, platelet count, etc.), and management of bleeding disorders. Thalassemia: Types, diagnosis (electrophoresis, etc.), and management of thalassemia syndromes. Hemoglobinopathies: Abnormal hemoglobins (sickle cell, etc.), diagnosis, and management. Leukemias: Classification (acute, chronic), diagnosis, and management of	16

leukemia. • Lymphomas: Classification, diagnosis, and management of Hodgkin's and non-Hodgkin's lymphoma.	
Unit 3	
• Multiple Myeloma and Plasma Cell Dyscrasias: Clinical and laboratory evaluation, and management. • Transfusion Medicine: Blood banking, ABO and Rh typing, compatibility testing, and transfusion reactions. • Bone Marrow Examination: Aspiration and biopsy techniques, interpretation of results. • Immunophenotyping: Understanding the principles and applications of immunophenotyping in hematological disorders. • Cytogenetics and Molecular Genetics: The role of cytogenetics and molecular techniques in diagnosing and managing hematological diseases. • Principles of Chemotherapy and Targeted Therapy: Understanding the mechanisms of action and side effects of chemotherapy and targeted therapies used in hematology. ○ Supportive Care in Hematology: Management of complications and emergencies related to hematological disorders..	16

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CO1	3	1	2	1	2	1
CO2	2	3	3	2	2	2

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Unit 2- Clinical Hematology:	
• Anemias: Classification, diagnosis (including RBC indices, bone marrow examination, etc.), and management of various types of anemia (iron deficiency, hemolytic, etc.). • Bleeding Disorders: Understanding the causes, diagnosis (PT/PTT, platelet count, etc.), and management of bleeding disorders. • Thalassemia: Types, diagnosis (electrophoresis, etc.), and management of thalassemia syndromes. • Hemoglobinopathies: Abnormal hemoglobins (sickle cell, etc.), diagnosis, and management. • Leukemias: Classification (acute, chronic), diagnosis, and management of	16

leukemia. • Lymphomas: Classification, diagnosis, and management of Hodgkin's and non-Hodgkin's lymphoma.	
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• Multiple Myeloma and Plasma Cell Dyscrasias: Clinical and laboratory evaluation, and management. • Transfusion Medicine: Blood banking, ABO and Rh typing, compatibility testing, and transfusion reactions. • Bone Marrow Examination: Aspiration and biopsy techniques, interpretation of results. • Immunophenotyping: Understanding the principles and applications of immunophenotyping in hematological disorders. • Cytogenetics and Molecular Genetics: The role of cytogenetics and molecular techniques in diagnosing and managing hematological diseases. • Principles of Chemotherapy and Targeted Therapy: Understanding the mechanisms of action and side effects of chemotherapy and targeted therapies used in hematology. ○ Supportive Care in Hematology: Management of complications and emergencies related to hematological disorders..	16

Program Name: B.Sc	Semester: II
Course Title: Clinical pathology	
Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO 1: □ Demonstrate knowledge of various biological specimens, including their collection, labeling, transport, preservation, and storage for accurate laboratory analysis.	
CO 2: Perform and interpret routine clinical chemistry investigations, including urine analysis, stool examination, gastric analysis, and cerebrospinal fluid examination for clinical diagnosis.	

CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	2	1	2	1
CO2	2	3	3	2	2	2

Course Content	Hours
Unit 1- Sample Collection and Handling:	
Specimen Types: Identifying and understanding the various types of biological specimens (blood, urine, stool, tissue biopsies, etc.). Collection Techniques: Proper methods for collecting, labeling, and transporting different specimens. Preservation and Storage: Knowing how to preserve and store specimens to maintain their integrity for analysis.	16
Unit 2-Clinical Chemistry:	
Urine Analysis: Performing and interpreting urinalysis results, including physical, chemical, and microscopic examinations. Stool Examination: Understanding the analysis and interpretation of stool samples for parasites, occult blood, and other indicators of gastrointestinal disorders.	16
Unit 3 Clinical Chemistry:	
Gastric analysis - constituents of gastric juices and total acids, fractional test meal, histamine test, Hollander test, tubeless gastric analysis. CSF – collection, composition, physical, chemical, bacteriological and serological examination.	16

Program Name: B.Sc	Semester: III
Course Title: Hormones - Biochemistry and Function	
Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO 1: Demonstrate understanding of hormone classification, secretion, signaling mechanisms, receptor action, and the physiological roles and disorders of major endocrine glands and hormones.	
CO 2: Apply clinical endocrinology concepts in hormone estimation, interpretation of thyroid and infertility profiles, and identification of endocrine disorders based on biochemical and physiological findings	

CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	2	1	2	1
CO2	2	3	3	2	3	2

Course Content	Hours
Unit 1	
Introduction to the system and concepts of signaling. Classification, intercellular communication, regulation of synthesis and secretion of hormones. Chemical signaling- endocrine, paracrine, autocrine, and neuroendocrine mechanisms. Mechanisms of hormone action: synergism, antagonism, permissive effects. Division of hormones by the origin, chemical structure, location, and mechanism of action. Physiological role and disorders of Pituitary, Pineal, Thyroid and Parathyroid hormones. Introduction to the hypothalamus as the true master gland with Releasing hormones and inhibitory substances. Neurohypophysis and its secretions - ADH and Oxytocin	16
Unit 2	
Physiological role and disorders of hormones of pancreas, adrenal, and placenta. Introduction to gastrointestinal hormones and neurotransmitters (Acetyl choline, GABA, Serotonin). Mechanism of action, target tissues, and the physiological effects of gastrointestinal hormones. Structure and functions of sex hormones. Hormones during ovarian and uterine phases of menstrual cycle; Placental hormones; role of hormones during parturition and lactation. Hormone receptors: receptors in the cell membrane and in the cell. Secondary and tertiary messengers (cAMP and Ca ²⁺). Overview on signal transduction pathways for steroidal and non-steroidal hormones (One example each).	16

Unit 3	
Clinical endocrinology- Blood volume, composition and functions of plasma and serum. Separation and storage of body fluids. Methods of hormone estimation, principles of assay systems, normal range of hormones in tissues and clinical conditions leading to abnormal levels with interpretations. Thyroid function test- Determination of T3, T4, and TSH. Infertility profile: Determination of LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone. Major manifestations of disease of the endocrine pancreas, thyroid, hypothalamus, and pituitary disease. ..	16

Program Name: B.Sc	Semester: IV
Course Title: Clinical Biochemistry	
Course Outcomes (COs): Upon successful completion of this course, students will be able to:	
CO 1: Demonstrate understanding of diagnostic methods, clinical enzymes, coenzymes, isoenzymes, and the biochemical basis of common metabolic and hereditary disorders.	
CO 2: Apply laboratory principles to analyze and interpret urine, blood, serum electrolytes, and biochemical profiles for the diagnosis of metabolic, hormonal, and genetic abnormalities	

CO-PO Mapping Matrix

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	2	1	2	1
CO2	2	3	3	2	3	2

Course Content	Hours
Unit 1	
Diagnostic methods: Glucose tolerance test (GTT), Glycated haemoglobin (HbA1c), Diagnostic kits used in clinical biochemistry laboratories Ex: Glucose test by Glucose oxidase –peroxidase (GOD-POD) method; determination of lipids and lipoproteins. Diagnostic enzymes: Normal range of enzymes and enzyme levels in clinical conditions. SGOT, SGPT, Alkaline Phosphatase. Cardiac injury profile- CPK and LDH. Some diseases: Glycogen storage diseases, lactose intolerance, sickle cell anaemia, thalassemia	16
Unit 2	
Enzymes- definition, characteristics, kinetics and mechanism of enzyme action Coenzymes and isoenzymes. Clinical Enzymes-Introduction to diagnostic enzymes. Clinical significance of amylase ,acid phosphatase, alkaline phosphatase, Urease, Creatine kinase, AST, ALT,glucosidase, lipase, protease, and glucose-6-phosphate dehydrogenase. Serum electrolytes and ions- determination of Na ⁺ , K ⁺ , serum chlorides, Ca and P.	16
Unit 3	
Urine: Normal composition of urine - volume, pH, colour, specific gravity constituents, urea uric, acid creatinine, pigments, abnormal constituents - glucose, albumin, ketone bodies, variations in urea, creatinine, pigments and their clinical significance in brief.	16

Blood: Normal constituents in blood and their variation in abnormal conditions - urea, uric acid creatinine, glucose, bilirubin, total protein, albumin / globulin ratio, Lipid profile - cholesterol, triglycerides, lipoproteins HPL and LDL. Metabolic disorders and their diagnosis: Detection of sickle cell anemia, in-born errors of lipid metabolism and amino acid metabolism - phenyl ketonuria, Nieman - Pick disease. Amniocentesis and diagnosis of fetal abnormalities. Hormonal abnormalities - eg. Dwarfism, acromegaly and diabetes mellitus.	
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