Jyoti Novas College Autonomous
Medical Laboratory Technology
Syllabus (2022 – 2023)

Duration 50 hrs.

Course Objectives: Through this course, the student is imparted knowledge of:

- Physiology of the human system, endocrine glands and theirhormones.
- Basic concepts of immunology, collection and preservation of biologicalfluids.
- Learning the process of analyzing the laboratory report.
- Reagent preparations, quality control, photometry and stainingtechniques.
- The major organs and their assessment by various biochemicaltests.
- Metabolic disorders of carbohydrates, lipids, amino acids and nucleotides and theircase studies.
- Tissues biopsies, preparation and fixing of slides usingcryostat.
- Routine urine analysis, and the various biochemical tests performed to analyze the abnormal constituents of urine.

Learning Outcomes: By the end of the course students should be able to:

- To understand the physiology of the human system, the functioning of the endocrine hormones and to have knowledge about various aspects of immunology such as blood transfusion, hypersensitivity, organ transplantation and tumourimmunity.
- Study the clinical report and understand the importance of referencevalues.
- Know the importance of antiseptics and disinfectants for the treatment and healing of wounds.
- Understand the metabolic disorders of biomolecules such as diabetes mellitus, phenylketonuria, alkaptonuriaetc.
- Study the clinical manifestations of majororgans.
- Know the importance of enzymes as diagnostic markers like SGOT,SGPT, aminotransferases etc.

Unit 1: Introduction to Biochemistry 5 hrs

General introduction to carbohydrates, proteins, lipids (Classification with examples) and enzymes.

Buffer and pH- Henderson Hasselbalch equation, physiological buffers. Preparation of reagents : Normal , per cent and Molar solution - normal saline - Methods of measuring liquids- Clinical Laboratory records- Quality control: accuracy, precision, and reference values.

Introduction and definition of photometry. Colorimetry - Lambert Beer's Law - Parts of photo colorimeter. Spectrophotometer.

Unit 2 : Introduction to Physiology 15 hrs

Physiology of the human system (brief account of digestive system, liver and kidneys, reproductive system and nervous system). Function of liver in health and disease: Jaundice, Hepatitis; liver function test.

Assessment and clinical manifestation of kidney (Tests for abnormal constituents of urine – sugars, proteins, bile acids, ketone bodies.) liver and pancreas. Biochemical tests for myocardial infarction.

Endocrine glands their hormones and functions of the

thyroid, parathyroid, pituitary and thymus glands. Endochondral disturbance: thyroid function tests. In born errors in metabolism: Metabolic disorders of carbohydrates- hypoglycemia, Diabetes mellitus (Type I and type II). Metabolic disorder of lipid: Tay-Sachs disease, Niemann Pick disease. Metabolic disorder of amino acid: phenylketonuria, alkaptonuria, Maple syrup urine disease. Metabolic disorder of nucleotides: gout, Lesch-Nyhan Syndrome (case studies)

Unit 3 Composition and functions of blood 5 hrs

Types of blood elements.Composition of body fluids. Blood collection - Phlebotomy - Sampling errors - Collection and preservation of biological fluids - Anticoagulants - Preservation of samples - Chemical preservatives - Process of analysing the specimens - The laboratory report.

Unit 4: Characteristics of laboratory Substances and sterile techniques 5 hrs

The chemical composition, structure, and properties of substances. The chemical processes and transformations that they undergo including the use of chemicals and their interactions, danger signs, production techniques, and disposal methods.

Sterilization-definition, classification and general principle of sterilization. Antiseptics & Disinfectants -Definition -Types - Mode of Action – Uses

Unit 5: Introduction to immunology 10 hrs

Non specific resistance to infection- Specific immunity. Antigens. Antibodies- Structure and function. Complement and antigen-antibody reaction. Hybridoma and Monoclonal antibodies. Applied immunology -Hypersensitivity. -Autoimmunity. - Transplantation and Tumourimmunity Routine staining techniques - Special Stains (differential staining).

Unit 6: Histological techniques 10 hrs

Introduction - Tissue Preparation – Fixation - Classification of fixatives – Dehydration.

Embedding Techniques of impregnation - Embedding or Blocking - Type of mould. Use of ion exchange resins - Treatment of hard tissues - Section Cutting: Microtomes, Techniques of section cutting - Mounting of Sections.

Fixation and Cutting of Small Biopsies, Renal biopsies, Intestinal biopsies, Skin biopsies, Muscle biopsies.

Overview of freezing microtomy use of freezing microtome, fixation, fixing sections on slides, advantages and disadvantages – frozen sections using cryostst – uses staining of frozen sections for rapid diagnosis.