

# BIOCHEMISTRY & BIOPHYSICS

**Placement:** First year

**Time Allotted:**

Section A (Biochemistry) - Theory 30 hrs.

Section B (Biophysics) - Theory 30 hrs.

## COURSE DESCRIPTION

This course introduces the basic principles of Biochemistry and Biophysics related to nursing.

## OBJECTIVES

At the end of the course, the student will:

1. Identify the basic principles of Biochemistry and Biophysics.
2. Synthesize the knowledge of these principles in various nursing situations.

## Section A : Biochemistry

**Theory** - 30 hrs.

## COURSE CONTENTS

### UNIT I

Introduction: Importance of Biochemistry in nursing.  
Study of cell and its various components.

### UNIT II

Water and Electrolytes: Water- Sources, property & functions in human body.  
Water and fluid balance.  
Electrolytes of human body, functions, sources.

### UNIT III

Enzymes  
Mechanism of action  
Factors affecting enzyme activity  
Diagnostic applications  
Precautions for handling specimens for enzyme estimation .  
Digestion and absorption of carbohydrates, proteins and fats  
Various factors influencing the digestion and absorption, mal-absorption syndrome.

## UNIT IV

Carbohydrates: Catabolism of carbohydrates for energy purposes .

Mitochondrial oxidation and oxidation phosphorylation.

Fats of glucose in the body. Storage of glucose in the body, glycogenesis, glycogenolysis and neoglucogenesis, blood glucose and its regulation.

Glucose tolerance test, hyperglycemia, hypoglycemia, glycemia.

## UNIT V

Protein: Amino acids, hormones.'

Essential amino acids. Biosynthesis of protein in the cells.

Role of nucleic acid in protein synthesis.

Nitrogenous constituents of Urine, Blood, their origin - urea cycle, uric acid formation, gout.

Plasma proteins and their functions.

## UNIT VI

Fat: Biosynthesis of fats and storage of fats in the body.

Role of liver in fat metabolism

Biological importance of important lipids and their functions.

Cholesterol and lipoprotein

sources, occurrence and distribution

blood level and metabolism

Ketone bodies and utilization.

Inter-relationships in metabolism and cellular control of metabolic processes.

## UNIT VII

Biomedical Waste Management

- Liquid waste generated from laboratory. Chemical waste.

(Please see Annexure -I)

## Section B : Biophysics

**Theory** - 30 hours

## COURSE CONTENTS

### UNIT I

Introduction: Concepts of unit and measurements.

Fundamental and derived units.

Units of length, weight, mass, time.

## **UNIT II**

Vector and scalar motion, speed, velocity and acceleration.

## **UNIT III**

Gravity: Specific gravity, centre of gravity, principles of gravity.

Effect of gravitational forces on human body.

Application of principles of gravity in nursing.

## **UNIT IV**

Force, Work, Energy: Their units of measurement.

Type and transformation of energy, forces of the body, static forces.

Principles of machines, friction and body mechanics.

Simple mechanics - lever and body mechanics, pulley and traction, including plane, screw.

Application of these principles in nursing.

## **UNIT V**

Heat: Nature, measurement, transfer of heat

Effects of heat on matter

Relative humidity, specific heat

Temperature scales

Regulation of body temperature.

Use of heat for sterilization

Application of these principles in nursing

## **UNIT VI**

Light: Laws of reflection

Focussing elements of the eye, defective vision and its correction, use of lenses

Relationship between energy, frequency and wavelength of light

Biological effects of light

Use of light in therapy

Application of these principles in nursing

## **UNIT VII**

Pressures: Atmospheric pressure, hydrostatic pressure, osmotic pressure

Measurements of pressures in the body

Arterial and venous blood pressures

ocular pressure

intracranial pressure

applications of these principles in nursing.

## **UNIT VIII**

Sound: Frequency, Velocity and Intensity  
Vocalisation and hearing. Noise pollution and its prevention.  
Use of ultrasound.  
Application of these principles in nursing.

## **UNIT IX**

Electricity and Electromagnetism: Nature of Electricity. Voltage, Current, Resistance and their Units  
Flow of electricity in solids, electrolytes, gases and vacuum.  
Electricity and human body.  
ECG, EEG, EMG, ECT  
Pace makers and defibrillation .  
Magnetism and electricity.  
M.R.I. Scanning, CAT Scan

## **UNIT X**

Atomic Energy: Structure of Atom, Isotopes and Isobars.  
Radioactivity: Use of radioactive isotopes.  
Radiation protection units and limits, Instruments used for detection of Ionising radiation. X-rays.

## **UNIT XI**

Principles of Electronics: Common electronic equipments used in patient care.

## **Practicum**

Experiments and Tests should be demonstrated wherever applicable.