

## **B.Sc. PART II**

### **PAPER I: Principles of Human Physiology and Nutrition**

#### **Section A: Physiology**

**Functional organization of the human body and homeostasis:** Intracellular and extracellular division of body fluids, the concept of homeostasis and feedback control systems.

**General organization of the Nervous system:** Sensory and motor nerves, major levels of nervous system function, Central and autonomic nervous systems, transmission of nerve impulse, synapse, neurotransmitters.

**Digestion and absorption in the gastrointestinal tract:** Digestion and absorption of carbohydrates, fats and proteins

**Blood:** Composition of blood, functions of blood constituents in immunity, hemostasis, blood transfusion and tissue transplant

**Regulation of acid-base balance:** buffers in blood, respiratory control, renal control.

**Transport and exchange of respiratory gases:** Carbon Dioxide dissociation curve. Bohr's effect. Haldane effect.

**Body fluids and principles of urine formation:**

**Principles of endocrinology:** Endocrine glands and hormones produced by them.

#### **Section B: Nutrition**

##### **Scope of Nutrition**

**The fuels used by the body:** Carbohydrates, proteins and fat. Composition of the human body. Composition of common foods. Units of energy.

**Energy requirements:** Components of energy requirements. Basal metabolic requirements. Energy requirements of BMR, activity, specific dynamic action of food, growth, pregnancy, lactation. Direct, indirect calorimetry. Reference Indian man and woman.

**Concept of Recommended dietary allowances.** Recommended allowances of energy requirement.

**Carbohydrates:** Types. Functions, dietary requirements, food sources. Fibre. Oligosaccharides.

**Proteins**: Nutritional functions, concept of protein quality, dietary requirements, food sources, deficiency symptoms, cure and prevention.

**Fats**: Functions, Fat quality. Dietary considerations. Essential fatty acids. Food sources, effects of excess and deficiency.

Interactions among the three fuels

**The water soluble vitamins**: Thiamine. Riboflavin. Niacin. Pyridoxine. Folic acid. Ascorbic acid. Functions. Requirements. Food sources. Fortifications. Deficiencies.

**The fat soluble vitamins**: Vitamins A, D, E, K. Functions. Requirements. Food sources. Fortifications. Deficiency and excess.

**Minerals**: Macrominerals. Microminerals. Calcium, Iron. Iodine. Fluorine. Absorption. Functions. Requirements. Food sources. Fortification.

**Balanced diet**: Foods for energy. Protective foods. Nutritional adequacy. Locally available foods.

#

## **PAPER II: Genetics, origin of life and chemical evolution**

**Mendelian genetics**: Mendel's laws of inheritance, Linkage and crossing over, Chromosome mapping.

**Mutation**: Molecular basis of mutation, Radiation induced and chemically induced mutations, Mutagens, Carcinogens, Practical applications of mutations.

**Theories of origin of life**: Archaeobacteria, Significance of extremozymes. Evolution of Cell from Prokaryotes to Eukaryotes, Viruses

**Theories of evolution**: Evolution at the molecular level, Evolution of proteins and nucleotide sequences, Structure functional relationship of Proteins, Proteomics

**Introns versus Exons**: Role of non-coding RNA in Evolution.

#

## **PAPER III: Intermediary Metabolism**

**Introduction to metabolism**, catabolism and anabolism: Integration of biochemical pathways.

**Concepts in thermodynamics**: Free energy, enthalpy and entropy in biochemical reactions  
Coupled Reactions ATP as energy currency of cell.

**Carbohydrate metabolism**: An overview of aerobic and anaerobic carbohydrate metabolism:  
Reactions and energetics of glycolysis. Alcoholic and lactic acid fermentation. Reactions and energetics of TCA cycle, gluconeogenesis, glycogenesis and glycogenolysis; Reactions and physiological significance of pentose phosphate pathway. Regulation of glycolysis and TCA cycle.

**Electron transport chain and oxidative phosphorylation**: Organisation of ETC, concept of redox potential, sites of ATP production, inhibitors of electron transport chain. Hypothesis of mitochondrial oxidative phosphorylation (basic concepts). Inhibitors and uncouplers of oxidative phosphorylation.

**Lipid metabolism**: Introduction to Lipids as energy sources,  $\beta$  oxidation of saturated fatty acids, ATP yield from fatty acid oxidation, biosynthesis of saturated and unsaturated fatty acids. Metabolism of ketone bodies, oxidation of unsaturated and odd chain fatty acids.

**Photosynthesis**: Light and dark reactions.

**General reactions of amino acid metabolism**: Transamination, oxidative deamination and decarboxylation. Urea cycle, glycolytic and ketogenic amino acids.

**Nucleotide metabolism**: Biosynthesis of purines and pyrimidines.