CURRICULUM CONTENT

1. Characteristics of living organisms
   - List and describe the characteristics of living organisms
   - Define the terms:
     - Nutrition as taking in of nutrients which are organic substances and mineral ions, containing raw materials or energy for growth and tissue repair, absorbing and assimilating them
     - Excretion as removal from organisms of toxic materials, the waste products of metabolism (chemical reactions in cells including respiration) and substances in excess of requirements
     - Respiration as the chemical reactions that break down nutrient molecules in living cells to release energy
     - Sensitivity as the ability to detect or sense changes in the environment (stimuli) and to make responses
     - Reproduction as the processes that make more of the same kind of organism
     - Growth as a permanent increase in size and dry mass by an increase in cell number or cell size or both
     - Movement as an action by an organism or part of an organism causing a change of position or place

2. Classification and diversity of living organisms
   - Define and describe the binomial system of naming species as a system in which the scientific name of an organism is made up of two parts showing the genus and species
   - List the main features of the following vertebrates: bony fish, amphibians, reptiles, birds and mammals

3. Cell structure and organization
   - State that living organisms are made of cells
   - Identify and describe the structure of a plant cell (palisade cell) and an animal cell (liver cell), as seen under a light microscope
   - Describe the differences in structure between typical animal and plant cells
   - Relate the structure of the following to their functions:
• Ciliated cells – in respiratory tract
• root hair cells – absorption
• Xylem vessels – conduction and support
• Muscle cells – contraction
• Red blood cells – transport

• Define:
  • *Tissue* as a group of cells with similar structures, working together to perform a shared function
  • *Organ* as a structure made up of a group of Tissues, working together to perform specific functions
  • *organ system* as a group of organs with related functions, working together to perform body functions using examples covered in Sections II and III

4. **Movement in and out of cells**
   **a. Diffusion**
   • Define *diffusion* as the net movement of molecules from a region of their higher concentration to a region of their lower concentration down a concentration gradient, as a result of their random movement
   • Describe the importance of diffusion of gases and solutes and of water as a solvent
   **b. Active Transport**
   • Define *active transport* as movement of ions in or out of a cell through the cell membrane, from a region of their lower concentration to a region of their higher concentration against a concentration gradient, using energy released during respiration
   • Discuss the importance of active transport as an energy-consuming process by which substances are transported against a concentration gradient, e.g., ion uptake by root hairs and uptake of glucose by epithelial cells of villi
   **c. Osmosis**
   • Define *osmosis* as the diffusion of water molecules from a region of their higher concentration (dilute solution) to a region of their lower concentration (concentrated solution), through a partially permeable membrane
   • Describe the importance of osmosis in the uptake of water by plants, and its effects on plant and animal tissues
d. Enzymes

- Define the term *catalyst* as a substance that speeds up a chemical reaction and is not changed by the reaction
- Define *enzymes* as proteins that function as biological catalysts
- Investigate and describe the effect of changes in temperature and pH on enzyme activity

5. Photosynthesis and plant Nutrition

- Define *nutrition* as taking in of nutrients which are organic substances and mineral ions, containing raw materials or energy for growth and tissue repair, absorbing and assimilating them
- List the chemical elements that make up: carbohydrates, fats, proteins
- Describe the synthesis of large molecules from smaller basic units, i.e. Simple sugars to starch and glycogen amino acids to proteins, fatty acids and glycerol to fats and oils
- Describe tests for: starch (iodine solution) reducing sugars (Benedict’s solution) protein (biuret test)
- fats (ethanol)
- List the principal sources of, and describe the importance of:
  - carbohydrates
  - fats
  - proteins
  - vitamins (C and D only)
  - mineral salts (calcium and iron only)
  - fiber (roughage)
  - water
- Describe the deficiency symptoms for: vitamins (C and D only) mineral salts (calcium and iron only)
- Define *photosynthesis* as the fundamental process by which plants manufacture carbohydrates from raw materials using energy from light
- State the word equation for the production of simple sugars and oxygen
- Investigate the necessity for chlorophyll, light and carbon dioxide for photosynthesis, using appropriate controls
- Describe the intake of carbon dioxide and water by plants
- Explain that chlorophyll traps light energy and converts it into chemical energy for the formation of carbohydrates and their subsequent storage

6. **Excretion in humans**
   - Define *excretion* as the removal from organisms of toxic materials, the waste products of metabolism (chemical reactions in cells including respiration) and substances in excess of requirements.
   - Substances should include carbon dioxide, urea and salts
   - Describe the function of the kidney in terms of the removal of urea and excess water and the reabsorption of glucose and some salts (details of kidney structure and nephron are not required)
   - State the relative positions of ureters, bladder and urethra in the body
   - State that urea is formed in the liver from excess amino acids
   - State that alcohol, drugs and hormones are broken down in the liver

7. **Hormones**
   - Define a *hormone* as a chemical substance, produced by a gland, carried by the blood, which alters the activity of one or more specific target organs and is then destroyed by the liver
   - State the role of the hormone adrenaline in chemical control of metabolic activity, including increasing the blood glucose concentration and pulse rate
   - Give examples of situations in which adrenaline secretion increases
   - Compare nervous and hormonal control systems