

The aim of this syllabus is to provide a broad and balanced view of the life processes and the interrelationships of the living organisms with their environment. The syllabus is designed to provide the background knowledge to the students with a view to enable them to appreciate the scope of life science and to understand the possibility of the application of this knowledge in the better service of the development of the national character and interest of human environment.

**The objectives of the Study of Life Science**

1. To awaken pupils' curiosity and interest in the plant, animal and human life as well as their environment.
2. To train in the pupils' habits of accurate observation and of testing knowledge by experiments.
3. To arouse awareness in the pupils of mutual interdependence of life organisms nature and their relationship with the environment as a whole.
4. To give pupils an intelligent and appreciative insight into the working of the life processes in nature's kingdom.

# **LIFE SCIENCE**

## **BIFURCATED SYLLABUS**

### **FOR CLASSES IX-X**

5. To develop areas of unity among pupils, respect for the different cultures, languages and religions.
6. To develop national integrity and to instill a sense of responsibility towards the country and the world perspective.
7. To provide the pupils with the knowledge of the natural world and their position in nature.

## SUBJECT : LIFE SCIENCE

### Classes IX –X

#### Aims and objectives

The aim of Life Science syllabus for secondary students is to pertain the basic concept of the origin, structure and maintenance of the life process in the living organisms. The teachers should introduce the fundamental knowledges to the student with a view to imbibe within them the interest of Life Science and to explore the possibility of the application of these knowledge in the human welfare. It will also help in the arousal of awareness and interest of human environment.

#### The objectives of the Study of Life Science

1. To awaken pupils' curiosity and interest in the plant, insect and animal life around him in his environment.
2. To form in the pupils' habits of accurate observation and of testing knowledge by experiment.
3. To arouse awareness in the pupils of mutual interdependence of life-forms in nature and their relationship with the environment as a whole.
4. To give pupils an intelligent and appreciative insight into the working of the life processes in nature's kingdom.
5. To kindle pupils' love for Animals (fauna) and plant (flora).
6. To develop in the pupils of upper forms a spirit of research with a view to enriching human life.
7. To develop knowledge, information and understanding about social problems which are essentially biological in nature.
8. To develop secular, liberal, scientific and reasoning mind among the students.
9. To develop physical, mental, intellectual and emotional aspects of the students in a balanced way.
10. To develop a sense of co-operation and understanding among the different people in different parts of the country and among different countries in relation to balanced distribution of natural wealth and resources.
11. To develop understanding and awareness of pollution, conservation and development of environmental resources. This is for sustainable development and to avoid wanton wastage of natural resources.
12. To develop ideas of unity among people, right to judicious exploitation of natural resources.
13. To develop national integration and international understanding in relation to Bio- diversity, natural resources and commonness about life processes and diversity in form and function thus promoting peace in the world perspective.
14. The overall knowledge about the living world, distribution of natural resources and man's position in nature would help to develop the sense of a good citizen of a democratic country.

## SYLLABUS FOR CLASS IX

### Topic I—Photosynthesis and Respiration:

#### A. Photosynthesis

Definition, explanation and overall reactions only. Components—CO<sub>2</sub>, chlorophyll, Sunlight, Water – their sources and role, Site of photosynthesis, significance of photosynthesis: Entrapping of solar energy and its conversion to potential energy in food. Detail mechanism of Dark and Light reactions are not required. Conversion of glucose to starch and its transport to storage organs. CO<sub>2</sub>–O<sub>2</sub> balance.

#### B. Respiration

Definition and explanation, Site of respiration, Difference between respiration & combustion. Simple idea about aerobic, anaerobic respiration and fermentation.

Difference between aerobic & anaerobic respiration.

Respiratory organs in animals – Body Surface, skin, gill, accessory respiratory organs, trachea, lung.

Significance of respiration – Release of energy, O<sub>2</sub> – CO<sub>2</sub> balance.

### Topic II – Nutrition: Metabolism and Digestion, Food, Vitamins, Enzymes, minerals and water.

Nutrition – Definition, its significance and importance.

Food—as source of energy. Types – Carbohydrates, Fats, and proteins – their sources and importance in nutrition, Micro and Macro elements in plants & animals & its importance (classification not required).

Vitamins – its importance. A, B – Complex, C, D, E, K—sources of these vitamins and their deficiency symptoms in man (Chemical nature not required).

Water – Importance in nutrition.

Plant nutrition—Autotrophs & heterotrophs (Definition & example), Essential micro & macro—elements in nutrition & their sources.

Animal nutrition – Phases of nutrition (Ingestion, Digestion\*, Absorption, Assimilation and Egestion along with the names of the structures concerned with reference to man).

\*Enzymes—Definition, Characteristic features. Digestive enzymes with example and their role in digestion.

Diet – Definition. Metabolism – Anabolism and catabolism (definition only). B.M.R – definition only. Total calorie requirements of human being; concept of Balance diet.

### Topic III –Circulation

#### A. Plants

Definition and medium of transport, Osmosis & diffusion – definition and its role in circulation. Ascent of sap through xylem, absorption through root, (root pressure, adhesion- cohesion force & transpiration pull to explain ascent of sap). Transportation of food through phloem (detail process not required).

Transpiration: Definition, factors affecting transpiration and importance. Experiment to demonstrate the rate of transpiration in plants.

#### B. Animals

Definition and medium of transport circulating fluid, Blood: Components of blood, Plasma, Thrombocytes, R.B.C, W.B.C.(detail types not required), respiratory pigments – mention haemoglobin & haemocyanin. Lymph and its importance; Blood groups in elementary way (mention A, B, O, groups RH factor and importance). Functions of blood –

(i) Transportation (food, vitamins, minerals, oxygen, carbon dioxide, hormones, metabolic waste).

(ii) Coagulation.

(iii) Immunity

(iv) Protective function and

(v) Regulation of temperature circulatory system, Components of circulatory system (heart, artery, vein, capillary – No description of individual system). Basic idea of open and closed circulation with example (Cockroach & Human). Blood circulation through human heart (with diagrammatic representation).

### Topic IV – Movement and locomotion

Difference between movement and locomotion.

Purpose of locomotion.

Mention locomotory organs in amoeba, earthworm, cockroach and fish.

Mention the role of myotomes and fins in fish locomotion, Bipedal locomotion in Man – details of structure and mechanism not needed.

Absence of locomotory organs in majority of plants. Types of movements in plants: (i)Tactic (ii)Tropic (phototropic, Geotropic and Hydrotropic) (iii) Nastic.

### Topic V – Environment, Ecosystem & Conservation

(A) Environment : Definition (mention: Lithosphere, Atmospheres, Biosphere, Hydrosphere) Biosphere – Definition. Biogeochemical cycles – Oxygen, Carbon and Nitrogen cycle.

(B) Ecosystem : Definition, Components of ecosystem (biotic & abiotic), definitions of Food chain, Food web, Ecological Pyramids and Energy flow in ecosystem.

(C) Conservation : Definition and importance :

Necessity & ways of water, soil & forest conservation. Wild life – Definition, Causes of wildlife depletion, necessity & ways for wildlife conservation. Definition of Sanctuary, National park, Reserve forest with examples.

## SYLLABUS FOR CLASS X

### Topic I – Excretion

Definition and explanation.

Plants : Means of removal of excretory products. Mention shedding of leaves, bark and fruits. Types of excretory products and its economic importance (gums, resins, alkaloid and latex).

Animal: Human nephron as structural and functional unit of kidney. Excretion of nitrogenous wastes through kidney after reabsorption of essential substances. Mention in brief the role of Skin, Lungs, Liver in animal excretion.

### Topic II-- Nervous System and Sense organs with reference to human being

Nervous system: Outline classification and components of

Nervous System; Neurone- Structural and functional unit.

Nerves – afferent and efferent types, synapse, ganglion, reflex action with common examples. Central nervous system (Brain and Spinal cord – components & functions).

Sense organs:

- (i) Eye: structure and function.
- (ii) Ear structure and function (details not required).
- (iii) Sensory functions of Tongue, Skin and Nose.

### Topic III-- Hormones

Plant hormones:

General idea, definition, characteristics, site of formation, functions and common examples of natural and synthetic hormones of: Auxin, Gibberellin and Cytokinin.

Animal Hormones:

Endocrine, exocrine glands & mixed glands—definition & example. Site of secretion & function of the following hormones in man: Anterior pituitary, (ACTH, GH, TSH, GTH), insulin (Pancreas), Thyroxin(Thyroid), Adrenalin(Adrenal), Oestrogen, Progesteron, Testosteron (Gonads).

### Topic IV – Cell & Cell Division

Definition, Prokaryotic and Eukaryotic cells. Difference between Prokaryotic and Eukaryotic cells. Morphology of eukaryotic chromosome (mention chromatid and centromere). Composition of eukaryotic chromosome (mention—DNA, RNA & Protein). Definition of autosome, sex chromosome and gene. Cell division—Types: Amitosis & Mitosis & Meiosis (definition occurrence and significance with example). Cell cycle: definition and phases only.

Mitosis – in Plants & Animals – Stages of mitosis, important features with diagrams. Cytokinesis – definition and differences between plants and animals.

### Topic V – Reproduction and Heredity

Definition & importance of vegetative, asexual, sexual reproduction & parthenogenesis. Examples from plants and animals. Alternation of generation : Definition and example. Heredity –Definition & explanation : Experiments on Mendel's monohybrid dihybrid cross (experiments). Mention Laws of Mendel, Mention the reasons for choosing pea plants for mendel's experiments. Mention 7 pairs of contrasting characters in pea plants. Mendelian inheritance in Guineapig/Drosophila. Outline concept of sex determination in Man.

### Topic VI -- Evolution

Definition and Explanation. Evidence: morphological (basic similarity in certain organs like limbs, heart & vestigial organs) and palaentological (Horse). Theories of evolution – Lamarckism & Darwinism (as put forwarded by Lamarck & Darwin).

### Topic VII – Adaptation

Definition and explanation. Adaptive features of the following plants & animals – Plants : Lotus, Cactus, Sundri.

Animals: Rohu fish, pigeon.

### Topic VIII – Virus, Microbes, Diseases & Hygiene

(A) Virus : Definition and characteristics (detail structure not required).

Bacteriophage (definition, example & significance).

Pathogenic viruses – Influenza, HIV and Polio virus (mode of transmission).

(B) Microbes – Definition and types (Bacteria, Fungi & Protozoa only).

Bacteria – Definition and significance-

(a) beneficial – Lactobacillus and Rhizobium,

(b) harmful – *Vibrio cholerae*, *Mycobacterium leprae*, *Mycobacterium tuberculosis* and *Salmonella typhosa*.

Fungus – Definition and significance –

(a) beneficial – *Penicillium* and *Saccharomyces cerevisiae*.

(b) Harmful – *Aspergillus* and *Puccinia graministritici*.

Protozoa – Definition and significance.

Pathogenic protozoa – *Plasmodium* and *Entamoeba*.

(C) Disease and hygiene –

Diseases caused by carriers – House- fly, Mosquito.

Diseases caused by blood transfusion mainly AIDS, Hepatitis and Malaria.

Use of Common disinfectants, Vaccination and Immunisation (outline ideas only).

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# UNITISATION

CLASS IX

Unit Test	Topic	Unit
1st	1 <sup>st</sup> Topic	• Photosynthesis and Respiration
2 <sup>nd</sup>	2 <sup>nd</sup> Topic	• Nutrition, Metabolism, Digestion, Food Vitamins, Enzymes, Minerals and Water
1 <sup>st</sup> Remedial	1 <sup>st</sup> Topic and 2 <sup>nd</sup> Topic	Mentioned earlier
3 <sup>rd</sup>	3 <sup>rd</sup> Topic (b)	• Animal Circulation
4 <sup>th</sup>	3 <sup>rd</sup> Topic (a) and 4 <sup>th</sup> Topic	• Plant Circulation • Movement and Locomotion
2 <sup>nd</sup> Remedial	3 <sup>rd</sup> , 4 <sup>th</sup> Topic	Mentioned Earlier
5 <sup>th</sup> (Oral)	5 <sup>th</sup> Topic	• Environment , Ecosystem and Conservation