DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Levels of organisation

STANDARD X

1.1. Viruses

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the dual nature of viruses 2. Realises that viruses are active only in living cells. 3. Understands that diseases such as common cold are caused by viruses	**1.1. Viruses** **1.1.1. Definition** **1.1.2. T.M.V. (Tobacco Mosaic Viruses)** **1.1.3. Differences between plant and Animal viruses.** **1.1.4. Common viral diseases in plants and animals including human beings.**	1. Herbarium specimen of T.M.V. infected Tobacco plant (Leaf)	1. Diagram showing the structure of T.M.V. 2. Photographs showing T.M.V. infected plant.	1. Define a virus 2. What are the differences between plant and animal viruses?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Levels of organisation

STANDARD X

1.2. Bacteria

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands that Bacteria occur all around us. (soil, water, air) 2. Compares the Virus with Bacteria 3. Understands the role of bacteria in day to day life 4. Understands that bacteria cause some diseases in human 5. Appreciates that bacteria are Nature's scavengers.	**1.2. Bacteria** **1.2.1. Introduction - prokaryotic nature** **1.2.2. Types based on shape** **1.2.3. Cell structure** **1.2.4. Reproduction** **- Binary fission** **1.2.5. Beneficial and harmful role of bacteria with three examples each.**	1. Root - nodules of commonly available leguminous plants such as ground-nut may be shown 2. Bacterium infected citrus fruit may be shown (citrus canker)	1. Charts showing different types of bacteria. 2. Charts showing the structure of a bacterial cell.	1. Is nucleus present in a bacterial cell? 2. How do bacteria differ from viruses? 3. How does souring of milk occur? 4. What is the role of bacteria in decomposition of organic materials?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Levels of organisation

STANDARD X

1.3. Penicillium

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands that some plants are heterotrophic 2. Compares the heterotrophic nutrition with autotorphic nutrition 3. Appreciates the importance of Penicillium for the production of Penicillin (Antibiotics) and flavoured cheese.	**1.3. Penicillium** **1.3.1. Introduction - to fungi.** **1.3.2. Occurrence in nature** **1.3.3. Structure** **1.3.4. Reproduction (Asexual only)** **1.3.5. Economic importance** **(Antibiotics industry, cheese industry)** **1.3.6. Discovery of Penicillin - Alexander Flemmings's work**	1. Slide showing Penicillium to be shown under the microscope 2. Photograph of Alexander Fleming	1. Charts showing the life-history of Penicillium	1. What is a fungus? 2. Are all the plants autotrophic? 3. What is Penicillin? 4. Who discovered Penicillin?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Levels of organisation

STANDARD X

1.4. Medical Entomology

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Defines vectors 2. Knows the host parasitic adaptation 3. Knows the stages of transmission of parasites 4. Narrates the control measures 5. Differentiates male and female mosquito	**1.4.1. Insect vectors** **1.4.2. Anopheles Culex, Aides, Pheleobotomus, bedbug, headlouse** **1.4.1. Vector borne diseases - Malaria (Parasite *Plasmodium*)** **Life cycle** **Life History of Filarial worm** **Dengue fever** **Brain fever** **Cholera** **Vector Control** **Research centre - (VCRC) NMEP**	1. Chart showing life cycle of plasmodium and Filarial worm 2. Observing stages of development in mosquito 3. Observing the uses of repellents	1. Pictures of Anophelus and Culex mosquito 2. Life cycle of Plasmodium	1. Noting down control measures taken by Government 2. Mention the reason for taking blood samples during evening for elephantaiasis 3. What is brain Malaria? - 4. Can you suggest precautionary methods in your area for vector borne disease?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

1. Levels of organisation

STANDARD X

1.5. Multicellular level organisation - Frog

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Defines amphibious mode of life 2. Realises that amphibians are an intermediate form between Fishes and Reptiles 3. Understands that frog can respire both in water and on land. 4. Understands metamorphosis.	**1.5.1. Frog - Systematic position** **1.5.2. External morphology and sexual dimorphism** **Digestive system** **Buccal cavity and Alimentary canal and physiology of digestive system** **Respiratory system** **Circulatory system** **Nervous system** **Sense organs** **Urinogenetal system.**	1. Demonstration of all organ systems through dissections	1. Diagram of Frog 2. External morphology and organ systems 3. Diagram showing stages in the life history	1. What is metam-orphosis? 2. Define Amphibia. 3. Why is the skin slimy in Frog? 4. What is cloaca? 5. What do you understand by the term sexual dimorphism? 6. What are secondary sexual characters?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

1. Levels of organisation

STANDARD X

1.6. Plant physiology

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the capacity / ability of plants to carry out many physiological activities. 2. Understands that plants convert Light energy into available chemical energy by the unique process of photosynthesis. 3. Appreciates the role of plants as the primary producers in the living world by performing photosynthesis. 4. Understands the role of hormones in the growth of plants. 5. Appreciates the importance of synthetic hormones in agriculture.	**1.6. Plant physiology** **1.6.1. Introduction** **1.6.2. Different areas of plant physiology (Absorption, Transpiration, Mineral Nutrition, Photosynthesis, Respiration, Nitrogen Metabolism, Flowering, Growth - List and brief explanation)** **1.6.2. Absorption of water - osmosis - Thistle funnel experiment - Entry of water through root - hair - Root pressure** **1.6.3. Photosynthesis - Definition - Light reaction and dark reaction - a brief account** **1.6.4. Respiration - aerobic and anaerobic - mechanism of aerobic respiration - a brief account. Fermentation of milk** **1.6.5. Growth - Definition - Growth hormones including synthetic hormones**	1. Experiment to demonstrate osmosis, Root pressure, Evolution of Oxygen, importance of light in photosynthesis, necessasity of CO_2 in photosynthesis 2. Respiration - Evolution CO_2during respiration (Ganonges respiroscope)	1. Charts showing light and dark reactions, Glycolysis, Krebs cycle, fermentation	1. What is physiology? 2. What are the different physiological activities of plants? 3. What is absorption? 4. How does water enter the plant? 5. What is the importance of water? 6. What is photosynthesis? 7. How is photosynthesis important for living organisms? 8. What do you mean by primary producer? 9. How will you show the importance of O_2, $CO_2$for phytosynthesis? 10.What is light reaction? 11.What is respiration? 12.How does aerobic respiration differ from anaerobic respiration? 13. What is growth? 14.Wat is a hormone? 15.What is the use of hormones?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

1. Level of organisation

STANDARD X

1.7. Human Physiology

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Defines physiology. 2. Explains the different systems. 3. Knows the composition of blood. 4. Understands various functions of systems. 5. Knows the biochemical nature of muscle contraction. 6. Knows physiology related illnesses.	**1.7.1. Physiology of following :** **1.7.2. Digestion, Respiration, circulation, Nervous, Excretion and sense organs (Eye and ear)** **- related diseases - brief account**	1. Human Tarsus can be used 2. Muscular working model can be used.	1. Diagram showing organ systems	1. List out Digestive enzymes 2. What is ulcer? 3. What is the life span of RBC? 4. What is the volume of blood in man? 5. What is a blood bank? 6. What is blood cell count? 7. What is short sightedness? 8. Why should we avoid severe exercises in mountains? 9. What is night blindness? 10. What is a Reflex? 11. Urine output varies in different climates Why?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

2. Cell Biology

STANDARD IX

2.1. Chromosomes and Genes

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows the nuclear content 2. Understands the ultra structure of a typical chromosome. 3. Realises specificity in the number of Chromosomes. 4. Realises the Geneic composition of Chromosome	**2.1.1. Introduction to chromosomes and genes** **2.1.2. A Typical chromosome - Structure** **2.1.3. Types of chromosomes** **2.1.4. Number of chromosomes - Karyotypes** **2.1.5. Genes - Sites - Structure and Role** **- Genomes**	1. Explanation of chromosomes using charts	1. Diagram of a typical chromosome 2. Table providing specific number of chromosomes in different organisms.	1. What are sex chromosomes? 2. Differentiate autosomes and allosomes 3. Discuss how chromosome number is kept constant in all generations.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

2. Cell Biology

STANDARD X

2.2 Genes and Nucleic acis

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows the role of genes and differentiates the nucelic acids 2. Explains the structure of DNA 3. Lists out the different types of RNA	**2.2.1. Gene - DNA Nucleotide nucleoside bases** **2.2.2. DNA Model with strips and beads.** **2.2.3. Double helix Watson and Crick's model** **2.2.4. DNA Replication** **2.2.5 Structure of RNA and Functions** **2.2.6. Genetic code and its significance.**	DNA model with strips and beads Collection of colourful pictures for an album	1. Diagram showing double helical structure	1. What is a gene? 2. Draw the structure of helix model 3. Write a note on triplet code. 4. Give an account of Hargobind Khorona.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

2. Cell Biology

STANDARD X

2.3. Gene Expression - Protein synthesis

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that characters are expressed through synthesis of proteins. 2. Interrelates the functioning of DNA and types of RNA 3. Knows transciption and Translation	**2.3.1. Genic expression through genetic code - DNA, RNA** **2.3.2. Genetic code and protein synthesis.** **2.3.3. Expression of genetic characters**	Genic expression through charts. Model of DNA	1. Diagrammatic representation of DNA, 2. Process of protein sysnthesis	1. What is meant by one gene one enzyme hypothesis? 2. What is the role of Ribosomes? 3. What are tRNA / mRNA 4. How do you relate protein synthesis with expression of character.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

2. Cell Biology

STANDARD X

2.4. Mutation

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
Chromsomal aberrations Knows the chemical transformation in mutation. Evolutionary changes are due to mutations. Knows the importance of mutation in agriculture.	**2.4.1. Mutation - gene, chromosome definition** **2.4.2. Gene reaction - Hugo devries Dobzhansky and works of TH Morgan** **2.4.3. Molecular Basis of gene mutation.** **1.4. Induced Mutation** **1.1.5 Chromosomal aberrations** **1.1.6. Evolutionary significance of Mutation** **2.4.7.7. Applied mutation**	Showing pictures of mutant varieties Culturing Drosophila and observing mutants.	1. Diagram of Drosophila 2. Corn varietes.	1. Define mutation? 2. What is the role of Drosophila in genetical studies? 3. What are the types of Mutations? 4. Define Gene Mutation? 5. Define evolutionary significance of mutation?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

2. Cell Biology

STANDARD X

2.5. Genetic Engineering

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that genes can be altered. 2. Realises change of characters through genetic engineering 3. Knows the basic techniques. 4. Understands the importance of Genetic engineering in productivity	**2.5. Genetic engineering - Manipulation of genes.** **2.5.1. Tools used in genetic engineering** **Host-vector DNA Enzymes.** **2.5.2. Mechanism of genetic engineering** **2.5.3. Isolation** **Integration and cloning of Nif gene** **2.5.4. Application of Genetic engineering.**	Explanation through models and charts	Appropriate diagrams	1. Can you define genetic engineering? 2. What are the tools used in genetic engineering? 3. Define Mechanism of genetic engineering?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

2. Cell Biology

STANDARD X

2.6. Bio-Technology

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that biotechnology involves utilization of micro - organisms 2. Realises the use of micro organisms in nitrogen fixation.	**2.6. Bio- technology** **2.6.1. Scientific art of using micro organisms** **2.6.2 Application of Biotechnology in production industries.** **2.6.3. Products of Biotechnolgoy** **2.6.4. Future of Bio-technology**	Field trip to a nearby form. Pictures of apparatus / Photos involved in Biotechnology. Collection of paper clippings related to Bio-Technology	1. Illustraton related to content	1. What is bio-technology? 2. Importance of Bio-Technology in industries? 3. How antibodies produced?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

3. Reproductive Biology

STANDARD X

3.1 Pollination and fertilisation

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the process of sexual reproduction in Angiosperm 2. Appreciates the role of different agents in pollination 3. Recognises various floral adaptations fovouring cross pollination 4. Understands the formation of fruit and seed.	**3.1 Pollination and fertilisation** **3.1.1. Definition - pollination** **3.1.2. Types of pollinations** **3.1.3. Contrivances for cross - pollination** **3.1.4. Definition of fertilisation** **3.1.5 Process of fertilisation** **3.1.6. Double fertilisation** **3.1.7 Post - Fertilisation changes in a flower.**	1. Sunflowers - (Inflorescence) adapted both for cross & self pollination can be demonstrated. 2. Crotalaria flower adpated for insect pollination can be demonstruted paddy flower - adapted for wind pollination can be demonstrated	1. Chart showing contrivances for cross pollination 2. Charts showing the proces of fertilisation	1. What is pollination? 2. What is fertilisation? 3. What are the adpatations seen in insect and wind pollinated flowers? 4. What happens to the floral parts after fertilisation?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

3. Reproductive - Biology

STANDARD X

3.2. Dispersal of Fruits and Seeds

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the necessity for dispersal 2. Appreciates the role of various agents in dispersal 3. Compares the adaptations in fruits and seeds for dispersal.	**3.2. Dispersal of fruits and seeds.** **3.2.1. Agents of dispersal.** **3.2.2. Adapatations of fruits and seeds for dispersal - Advantages of dispersal.**	1. Fruits of Xanthium Tridax & Achyranthes & Cocos (Waterdispersal) seeds of Calotropis, (dispersal by animals) 2. Moringa (winds dispersed) can be demonstrated.	1. Charts showing fruits and seeds with adaption for dispersal by wind, water, and animals	1. What are the different agents of dispersal? 2. How are seeds and fruits adapted for dispersal by various agents? 3. What are the advantages of dispersal?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Reproductive - Biology

STANDARD X

3.2.A Germination

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the seed structure 2. Recognises the types of Germination	**3.2A. Parts of a seed** **3.2A.1. Germination types**	Seed germination (Dicot (Bean- eipgeal), castor (Hypogeal) Paddy (for monocat seed) can be demonstrated.	1. Charts showing different types of germination	1. What is germination? 2. How does germination of a bean seed differ from that of castor? 3. Which part of the bean seed comes out first during germination?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

3. Reproductive - Biology

STANDARD X

3.3. Gametogenesis

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Defines Gametogenesis 2. Understands production of sex cells 3. Compares spermatogenesis and oogenesis 4. Knows phases in menstrual cycle	**3.3. Gametogenesis Introduction** **3.3.1 Testis - Spermatogenesis** **3.3.2 Phases - Multiplication** **- Growth** **_maturation** **-Spermiogenesis** **-Structure of Sperm** **3.3.3 Ovary - Oogenesis menstrual cycle**	Charts can be shown to explain spermatogenesis and Oogeneis Labelled diagram of sperm and egg.	Diagrammatic representation of spermato genesis and Oogenesis Labelled diagram of sperm and Egg	1. What is meant by primordial germ cells. 2. Growth Phase is insignificant in Spermato - genesis Explain. 3. Tabulate the differences between spermato - grnesis and oogenesis.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Reproductive - Biology

STANDARD X

3.4. Fertilization

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Realises that fertilization restores diploid chromosome number. 2. Knows that fertilization involves chemoattraction 3. Relaises that Fertilization initiates further development	**3.4.1 Introduction** **External fertilization** **Internal fertilization** **3.4.2 Mechanism of fertilization** **3.4.3. The meeting of gametes penetration of the sperm into the egg, activation of the egg, fusion of male and female pronuclei.** **3.4.4. Significance of fertilization**	Charts showing fertilization process	1. Diagram showing entry of sperm into a ovum	1. What is fertilization ? 2. Differatiate external and Internal fertilization 3. What is amphimixis?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

3. Reproductive - Biology

STANDARD X

3.5. Types of vertebrate eggs

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands that the eggs of different animals are having different shapes and sizes. 2. Realises the importance of yolk in the egg.	**3.5.1 Egg cell - definition** **3.5.2. Sizes and shapes** **3.5.3 Types of animal eggs.** **3.5.4 Egg membranes** **3.5.5 Amphioxus egg.** **3.5.6. Hen's egg - typical structure**	1. Chart showing Diagram of Amphioxus egg and Hen's egg. 2. Observation of real egg.	1. Labelled diagram of amphioxus egg and hen's egg.	1. What is cleidoic egg? 2. Will the amount of yolk affect further development? 3. What is an alecithal egg?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

3. Reproductive - Biology

STANDARD X

3.6. Cleavage

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that cleavages are mitotic cell divisions. 2. Understands that a single celled egg results in a multicellular animal through cleavage 3. Knows that amount of yolk decides the nature of cleavage	**3.6. Cleavage - Microlecithal egg.** **3.6.1. Planes of cleavage** **3.6.2. Cleavage upto 64 cell stage** **- Blastula** **- Beginning of multi cellular organisation.**	1. A model of showing cleavage furrows 2. Demonstration by using Apple and knife.	Diagrams to show different stages	1. Define meridional and lattitudinal cleavages. 2. Why do you consider Amphioxus egg as microlecithal?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

3. Reproductive - Biology

STANDARD X

3.7. Applied Embryology

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Defines applied embryology 2. Understands that knowledge of embryology helps in understanding organ formation 3. Knows that through tissues culture new variety of useful plants canbe produced. 4. Knows that stem cell research has medical importance.	**3.7. Introduction to applied embryology** **3.7.1. Tissue culture - Technique - Application** **3.7.2. Cloning Technique - cloned animals** **3.7.3. Stem cells - Maintenance of cell lineages** **- application** **- Organ repair.**	1. Explanation through paper clippings and charts	1. Photos of cloned animals 2. Dioagram showing tissue culture prac-tises and stem cell studeis.	1. "Knowledge of applied embyology is important" - Discuss 2. List out organisms in which embryological researches have been done. 3. Would you like to be cloned?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Diseases and Immunology

STANDARD X

4.1 Medicinal Plants 4.2. Medical Practices

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the role of plants in medicine. 2. Appreciates the importance of Indian medicine in the present context	**4.1.1. Importance of plants as a source of drug for various kinds of ailments** **4.2. Types of Indian Medicine (Siddha, Naturopathy, Homeopathy, Unani and Ayurvedic)** **4.2.3. Study of a few common medicinal plants and their uses. (Azadizhata indica (Neem), Catharanthus roseus (Vinca rosea)** **4.2.3. Zingiber officinale (Euinger)** **4.2.4. Ocinum sanction (Thulsi)**	1. Fresh specimens of plants mentioned may be shown	1. Charts showing the the medicinal plants mentioned in the syllabus	1. How are plants useful in the cure of human diseases? 2. Which part of Cartharanthus is useful for Leukemia 3. For what disease is the plant Ocimum sanctium used?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Diseases and Immunology

STANDARD X

4.3. Non-Communicable diseases

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that certain diseases are individualistic diseases. 2. Understands that life style deviations can cause diseases. 3. Realises the importance of balanced food and exercises 4. Knows that renal failure can be due to hypertension, selfmedication and diabetics.	**4.3.1. Definition** **4.3.2. Non - communicable diseases.** **4.3.3. A study of followng diseases.** **Diabetics CHD, RHD, Anorexia nervosa, Renal failure, obesity protein defeciency diseases**	1. A Chart showing diseases and causes	1. Relevant pictures	1. What are the causes for coronary heart diseases? 2. What is angiogram and angioplasty? 3. What is ICCU? 4. What are the symptoms of Diabetes mellitus? 5. What are the earlier symptoms of RHD? 6. What are marasmus and kwashiorkor?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Diseases and Immunology

STANDARD X

4.4. Addictions

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that addictions are due to experimentations 2. Understands that addiction leads to social rejection 3. Realises that addiction retards mental ability 4. Knows that addictions lead to mental depression and serious ailments. 5. Realises his social responsibility	**4.4. Definition** **4.4.1. Alchoholism and ill effects** **4.4.2. Abuse of Tobacco - various forms of usage - Cancer** **4.4.3. Drugs - Narcotic - Drugs - Types - Severe addictions - Dependance** **4.4.4. Deaddiction methods - Govt. and Non-Govt. organisations** **4.4.5. Social aspects.**	1. Specialists can be invited for guest lecture 2. Conduct a seminar on evil effects of drug abuse	1. Diagrams of symbols for 'no alchohol' 'Tabacco' and 'drugs'.	1. Why do people consume alchohol? 2. What is the medical importance of narcotic drugs? 3. What is drug abuse? 4. Who is a passive smoker? 5. Can we ban tobacco? 6. Make a survey of deaddiction facilities available by reading news papers	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Diseases and Immunology

STANDARD X

4.5. Health - Artificial Immunisation

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Realises the concept of Immunity 2. Knows - antigen antibody reactions. 3. Understands the need for booster doses	**4.5. Artificial immunity - Types** **4.5.1. Development of vaccines - history - vaccines available** **4.5.2. Immunisation schedule**	1. Through Charts	1. Diagrams showing antibody production Rabbits / Horses	1. What is the need for vaccination 2. Differentiates natural and artificial immunity 3. What are the Government projects of immunisation	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Our Environment

STANDARD X

5.1. Social Forestry

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the importance of social forestry 2. Appreciates the benefits of social forestry. 3. Understands the dangers of deforestation	**5.1.0. Definition** **5.1.1. Deforestation and afforestation** **5.1.2. Advantages of social forestry** **5.1.3. Plants employed in social forestry.**	1. Visit to deforested and afforested areas. 2. Collection of specimens from a social forest.	1. Photographs showing the deforested and afforested areas	1. What is social forestry? 2. What are the advantages of afforestation? 3. List out the plants used in social forestry.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Our Environment

STANDARD X

5.2. Environment - Global issues

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that the environmental issues are Global issues. 2. Understands the concept of global warming. 3. Realises the side effects of global warming 4. Relates ozone hole with cancer	**5.2.0. Global environmental issues - Introduction** **5.2.1. Global warming** **- A crisis** **- Gases** **Effect of global warming** **5.2.2. Ozone layer depletion - causes - effects - control** **5.2.3. Earth summits**	1. Charts and paper clippings	1. Diagrams to show ozone layer depletion 2. Graphical representation of Global warming over the years.	1. "Think globally and act locally" comment. 2. What is the future for oceanic islands 3. What is the reason for melting ice in Arctic and Antarctic regions.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Our Environment

STANDARD X

5.3. Freshwater crisis and Management

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Realises that water is a major component in all living systems. 2. Knows the % of fresh water available to human 3. Understands the need for RWH	**5.3.0. Role of water in animal system** **5.3.1. Availability of fresh water** **- Depletion** **- Conservation** **- Rain water harvesting (RWH)**	1. Visiting a site having RWH facility	RWH Pit	1. How much water do you use every day? 2. What are the uses of water? 3. What are monsoon rains?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Our Environment

STANDARD X

5.4. Effluent treatment

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows the composition of effluents 2. Understands effluent treatment	**5.4.1. Industrial effluents** **5.4.2. Heavy metals and their effects on organisms** **5.4.3. Common effluent Treatment plants and their importance**	1. Charts and Photo showing effluent treatment	1. Photos of CETP	1. Can we recycle industrial water? 2. How are organisms affected?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Our Environment

STANDARD X

5.5. Air pollution

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that air pollution is a crisis in cities 2. Realises that air pollution can causes disease.	**5.5.0. Air pollution - Pollutants** **5.5.1. Carbon - Monoxide, Sulphur dioxide, Nitrous Oxide - effects** **5.5.2. Control of Air Pollution** **5.5.3. Noise pollution** **- Decibel levels**	1. Charts	1. Table to provide air pollutants and effects	1. What are the common air pollutants? 2. Describe the control measures for air pollution. 3. What is dB?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Our Environment

STANDARD X

5.6. Wild Life Protection

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows all forms of wild life. 2. Understands the need for sanctuaries 3. Wonders at variety in life.	**5.6.0. Wild life** **5.6.1. Need for protection - conservation** **5.6.2. Indian wild life fauna and flora** **5.6.3. Sanctuaries - Other protection methods.** **5.6.4. Extinct and endangered species** **5.6.5. Governmental and NGO agencies**	1. Charts and pictures	1. Table for sanctuaries of Tamilnadu - India	1. How do you declare an organism as extinct? 2. What is a marine Reserve? 3. Provide salient features of wildlife protection act. 4. Collection of pictures of wild animals.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Applied Biolody

STANDARD X

6.1. Sustainable Agriculture

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the importance of sustainable agriculture 2. Appreciates the benefits of green - revolution and crop rotation 3. Understands the benefit of biofertilisers and biopesticides	**6.1.0. Definition** **6.1.1. Mixed cropping** **6.1.2. Crop rotation** **6.1.3. Green revolution** **6.1.4 Plant breeding** **6.1.5. Eco-friendly agriculture (use of biofertilisers and biopesticides)** **(avoiding chemical fertilizers and pesticides)**	1. Visit to an agricultural research institute 2. Collection of crops used for mixed cropping	1. Charts showing mixed cropping	1. What is mixed cropping? 2. What are the advantages of mixed cropping? 3. What is green revolution? 4. How is a hybrid plant superior to old varieties.	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Applied Biolody

STANDARD X

6.2. Natural resources

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Understands the uses of various natural resources for mankind 2. Understands the need to conserve our natural resources	**6.2. Types of natural resources** **6.2.1. Air** **6.2.2. Water** **6.2.3. Soil** **6.2.4. Minerals** **6.2.5. Energy** **6.2.6. Flora & Fauna** **6.2.7. Management of Natural resources**	1. Collect and show different soil samples (sand, clay, loam, garden soil) and water samples (pond, lake, sea, well, river)	1. Chart showing biosphere reserves can be shown 2. Charts showing the different sources of energy may be shown 3. Charts showing wild life can be shown	1. What are the different types of natural resources? 2. What are the different types of soils found in your locality?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Applied Biolody

STANDARD X

6.3. Crop Production

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Appreciates the importance of crop plants in human welfare 2. Understands the cultivation practices of one common food crop 3. Identifies different types of crops and their pests.	**6.2. Importance of crops for man** **6.2.3. Cultivation of crops (cash and food crops)** **6.2.4. Nutrients required for the crops** **(Organic and Inorganic)** **6.2.5. Water requirements** **6.2.6. Crop protection**	1. Collection of some common cultivated crops. 2. Visit to an agricultural farm (or) an agriculture field. 3. Domonstration of Wormicomposting 4. Different types of fertilizers can be shown with details of nutrients they contain	1. Chart showing different crop plants 2. Charts showing wormi composting	1. List out the common food crops grown in our villages 2. What are the fertilizers used for different types of food crops?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Applied Biolody

STANDARD X

6.4. Aquaculture and Vermiculture

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows the basic methods in aquaculture. 2. Understands that there are different methods of aquaculture 3. Realises the importance of earthworms in the production of bio-fertilisers	**6.4.1. Aquaculture** **- Cultivable organisms** **- Fish varieties** **- Fish culture** **- Prawns** **- Crabs** **- Algae** **- Pearl oyster** **- Mussels** **6.4.2. Vermiculture** **- Need** **- Species of Earthworms** **- Vermitech products and uses**	1. Charts paper clipping and pictures 2. Visit to an aquaculture farm.	1. Pictures of cultivable organisms 2. Pictures to show vermiculture technique	1. What is our protein requirement? 2. What are the uses of algae? 3. Name the fresh water culture fishes. 4. What is biodegradable garbage?	

DIRECTORATE OF SCHOOL EDUCATION, GOVERNMENT OF TAMILNADU, CHENNAI - 600 006.
SCIENCE SYLLABUS - BIOLOGY

Applied Biolody

STANDARD X

6.5. Bio-Medical - Instrumentation

Expected Specific Outcomes of Learning	Content in terms of Concepts	Curriculum Transactional Strategies	Illustrations	Evaluation	Suggested No. of Periods
1	2	3	4	5	6
1. Knows that modern medical practice depends on instrumentation 2. Understands the significance of ECG in heart care 3. Realises the importance of monitoring Blood pressure. 4. Understand the application of CT Scan 5. Knows the reason for doing Angiogram 6. Realises the importance of endoscopy 7. Wonders at the eye lens implantation technique 8. Realises the significance of organ transplantation 9. Understands Blood transfusion	**6.5. Introduction to Instrumentation techniques** **6.5.1. ECG - equipment usage and operation - Sphygmomono meter** **6.5.2. CT scan - application** **6.5.3. Angiogram - application** **6.5.4. Dialysis - various techniques - need** **6.5.5. Laproscopy and Endoscopy - applications** **6.5.6. Eye lens implantation** **6.5.7. Organ transplantations - precaution and care** **6.5.8. Blood transfusion -Blood groups -Blood Banks -Techniques** **6.5.9. Scope for further studies - Institutes**	1. Visit to a medical laboratory	1. Pictures of various equipments	1. What is 'PQRST' wave? 2. What is normal Blood Pressure? 3. Why should a person have dialysis? 4. What are the applications of Endo and Laproscopies? 5. What are the organs transplanted? 6. What is the normal volume of Blood in man?	