STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TNCF 2017 - DRAFT SYLLABUS

Subject : Bio-Botany **Class :** XI

TOPIC	CONTENT
Unit 1 : Plant Diversity	Living world – Introduction; Attributes of living organisms- metabolism-Homeostasis-growth-Reproduction- Shape and size- Cellular structure-Consciousness Classification of Plants - Three domains; Five kingdom; Seven kingdom(Chromista); Diversity in the Plant World; Classification of plants; (cryptogams, phanerogams) Plant kingdom - Viruses- Discovery,classification, shape, size, structure(TMV, Bacteriophage)Reproduction, virion, virioids, virusoids Prions.Plant viral diseases (only names); Bacteria-Discovery, Archaebacterium, Eubacterium Gram + and Gram negative bacteria – with reference to cell wall composition,Glycocalyx flagellum ultra structure, Pilus and fimbriae Plasmid *and its types,* mesosome, Bacterial life processes,-Nutrition, Respiration,reproduction, , Mycoplasma, structure,Economic importance(Useful & harmful); *Cyanobacteria;* Fungi – Reproduction, classification, phycomycetes, zygomycetes,ascomycetes, Basidiomycetes, Deuteromycetes, symbionts – Lichen , Mycorhizae, Structure, Economic Importance; Algae –

	Thallus organisation, classification, Reproduction, Characteristics of Chlorophyceae, Phaeophyceae, Rhodophyceae,Structure of *Oedogonium and Chara*, Economic importance; Bryophytes – Salient features, classification Reproduction, Alternation of generation, Structure of *Marchantia and Funaria*, Economic importance; Pteridophytes – Salient features, classification, Different types of Stele, *structure of Selaginella* and Adiantum Economic importance; Gymnosperms- Salient features, comparision with angiosperm classification,Structure of *Cycas and Pinus.* Economic importance; Angiosperms- salient features, Dicots and monocots – Difference-traditional concept – Modern –Only Monocots; Life cycle of Plants – Haplontic, Diplontic, Haplo- Diplontic with examples.
Unit 2 : Morphology and Taxonomy of Angiosperms	Vegetative morphology - Introduction; Habit-Types; Life span; Habitat; Root system; Characteristics features, Regions of root; Types of roots, Functions, Modification of roots- Tap root (Storage, Nodulated,*Pneumatophore, assimilatory, Root buttress*); Adventitious (Storage, Mechanical- Prop roots, stilt roots (Balancing roots)- types and functions) Shoot system - Characteristic features, Buds- Terminal, Axillary and Adventitious buds- modifications; Stem modifications - aerial, sub-aerial, underground ; Comparison of underground stem and root, branching of stem; Leaf –Parts – Venation, Types

	-simple and compound; Phyllotaxy- *Symmetry of leaves*; Modification of leaf (Tendrils, spines, Hooks, Scales, tentacles, leaf bladders, foliar roots, storage, pitcher, Phyllode) Reproductive Morphology - Inflorescence - Types Racemose, Cymose, Mixed and special types; Flower- Monoecious, Dioecious, Polgamous, , floral symmetry; Calyx, corolla, Perianth; Aestivation; Androecium – Structure and types (Adelphy, epipetalous, syngenesious, gynostegium, pollinia, Didynamous, Tetradynamous; Gynoecium –Parts – syncarpous and apocapous,Gynobasic style; Gynandrophore, Placentation, Construction of floral diagram and floral formula- *Hibiscus, Brassica juncea, Crotolaria, Vinca, Phyllanthus, Musa;* Fruit –Definition and types. Taxonomy and Systematic Botany - Difference between Taxonomy and Systematic Botany; Concept of species- morphological, Biological, Phylogenetic; *Types of Specie;* Taxonomic hierarchy; *Organisms with their taxonomic categorie;* ICBN Principles (now ICN) ,Nomenclature, Codes of Nomenclature – Vernacular and Scientific names – Polynomial, Binomial and Trinomial nomenclature, Author citation; Type concept- Holotype, Isotype, Lectotype, Syntype, Paratype, Neotype, Epitype; Taxonomic Aids- Keys, Flora, revisions Monographs, catalogues, Botanical gardens, International and National, BSI, Herbarium- preparation and uses, National(MH, PCM, CAL, TBGRI) and International herbaria (Kew); Classification - need and types; Artificial- Linnaeus,

	Natural – Bentham and Hooker, Phylogenetic- Engler& Prantl; Cronquist, APG system-APG III and IV- Cladistic methodology; Modern trends in taxonomy, Chemotaxonomy, Biosystematics, Karyotaxonomy, Serotaxonomy, Molecular methods (RFLP, AFLP and RAPD); Difference between classical and modern taxonomy; Diagnostic features and economic importance of following families, Fabaceae – *Pisum sativum*, *Clitoria ternatea,* Solanaceae - Solanum nigram, *Datura metel,* Liliaceae -*Allium cepa*
Unit 3 : *Cell Biology and Bio Molecules*	Cell: The Unit of Life Discovery; Microscopy– Compound microscope, Electron microscope (TEM,SEM); Dark field, Phase contrast Microscope; Comparison of microscopes; Cell Theory ,*Cell doctrine, Exceptions to cell theory, Protoplasmic theory, Granular theory, colloidal Theory, Sol-Gel Theory.* Properties, Cell size &shape; Prokaryotes-Mesokaryotes- Eukaryotes; Plant cell and Animal cell differences; *Protoplasm*- Cell Wall- Cell Membrane-E.R, Golgi Apparatus- Mitochondria- Plastids- Ribosomes- lysosomes -Peroxisomes- Glyoxysomes –*Centrioles*-*Vacuole*-Cell inclusions- endocytosis- *Phago cytosis* –pinocytosis- exocytosis, microbodies- xenobiotics; Flagella- Prokarytes & Eukaryotes Mechanism of Flagellar Movement, ultra structure of flagellum; Nucleus, Chromosome- Structure and Types, Cytological techniques Cell Cycle - *History of Cell division, scientist contribution;* Cell cycle – stages, duration; Cell Division – Amitosis, Mitosis & Meiosis; Mitosis stages and

	significance; Meiosis stages and Significance; Difference between Mitosis and Meiosis; Mitogens, mitotic poisons, endomitosis- Anastral, Amphiastral Biomolecules - Primary metabolites; *Water;* Carbohydrates – Classification & Structure; Proteins & Amino Acids– Classification & Structure; Lipids – Classification & Structure; Nucleic Acids general Structure & composition – Forms Of DNA & Types Of RNA; Enzymes – Classification, Nomenclature, Structure and Concepts, Mechanism of Enzyme Action, Activation energy, factors affecting enzyme action; Secondary Metabolites
UNIT 4 : Plant Anatomy(Structural Organisation of Plants)	Tissues - Introduction to anatomy & milestones; Brief outline of theories of meristem – (*Apical Cell theory, Tunica Corpus theory,* Quiescent Centreconcept); Tissues – introduction & types; Meristematic tissue – characteristics & types; Permanent tissue – Simple (Parenchyma, Collenchyma & Sclerenchyma) Complex (Xylem & phloem); Types – special types – aerenchyma, chlorenchyma. Tissue System - Dermal tissue – root, stem and leaf; Ground tissue – cortex &pith; Vascular tissue – types of bundles(collateral, bi-collateral, conjoint, concentric, radial, amphivasal, amphicribral)– comparison of primary structure – monocot and dicot root, stem and leaf Secondary Growth - Secondary growth in dicots; Cork cambium, vascular cambium; Wood anatomy, Sap wood and heart wood; Autumn wood and spring wood; *Anomalous secondary growth in dicots and*

	monocots
Unit 5 : Plant Physiology (Functional Organisation of Plants)	Transport in Plants - Movement of water, gases and nutrients; Cell to cell transport-diffusion, facilitated diffusion – active transport – uniport, antiport and symport , role of membrane permeability in transport, comparison of different transport processes – aquaporins; Plant water relations-Water potential, Osmosis, Osmotic pressure, Plasmolysis, Deplasmolysis, DPD, Imbibition, movement of substances; Absorption of water, -apoplast, symplast; Conduction of water - root pressure, Exudation, Guttation, Hydathodes; Transpiration, types of transpiration, factors affection transpiration; Plant antitranspirants; Transpiration pull and guttation; Ascent of sap; Mechanism of stomatal movement – role of potassium , Calcium & ABA; Uptake and translocation of minerals ; Transport of food- phloem transport-phloem loading and unloading; Mechanism of translocation Mineral Nutrition - Essential minerals, Criteria for essentiality; Classification on the basis of function; Mechanism of absorption of elements; Macro and micronutrients and their role; Deficiency symptoms& toxicity of mineral elements, Hydroponics, Aeroponics, Special modes of nutrition; Nitrogen metabolism-Nitrogen cycle, biological nitrogen fixation (Symbiotic and non symbiotic eg. *Rhizobium, Frankia, Azospirillum)* Photosynthesis in higher plants - Introduction,

	Historical,; Significance, site of photosynthesis; Pigments involved in photosynthesis; Chlorophyll structure; Photosynthetic units; Photochemical and biosynthetic phases; Photoluminescence; Cyclic and noncyclic photophosphorylation, Chemiosmotic hypothesis; C3, C4 and CAM cycle; Bacterial photosynthesis; Photorespiration, CO_2 compensation point; Respiration – Introduction; Mechanism of Respiration, , anaerobic (fermentation); Factors affecting respiration; Aerobic, Glycolysis, Pyruvate oxidation,TCAcycle(amphibolic pathway); Electron transport chain , oxidative phosphorylation, energy relations – ATP molecules generated; Respiratory quotient (RQ); Growth and Development - Introduction-Characterеristic- Phases of plant growth – growth types- kinetics of growth and growth rate- Growth curve types- Conditions of growth- measurement of growth; Conditions of growth,Sequence of developmental process in a plant cell; Differentiation, dedifferentiation,and redifferentiation; Plant growth regulators – classification; Auxin, Avena curvature test, Went's experiment. Types of auxins, Precursors, structure, Bioassay and physiological effects; Synergistic effects, antagonistic effects; Gibberellin – discovery, chemical structure of GA3, Precursors, Bioassay and Physiological effects; Cytokinin – discovery, Precursors, structure, Bioassay and physiological effects; Ethylene – discovery, Precursors, structure, Bioassay and physiological effects; ABA – discovery,

	Precursors, structure, Bioassay and physiological effects; Photoperiodism- Vernalization

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TNCF 2017 - DRAFT SYLLABUS

Subject : Bio-Botany **Class :** XII

TOPIC	CONTENT
Unit 1 : Reproduction in Plants	Asexual Reproduction – Introduction; Asexual reproduction – Modes; Vegetative propagation; Sexual Reproduction - Stages of Sexual Reproduction; Pre-fertilization Fertilization - Events of fertilization; Formation of pollen tube; Types of pollen tube entry – histology of style – transmission tissue; Syngamy; Triple fusion & Double Fertilization Post-Fertilization Changes - Zygote formation & Development of fruit; Endosperm and types; Embryogenesis – development of dicot embryo; Seed (monocot vs dicot); Transformation of parts of flower Special modes of Reproduction - Apomixis,Types of apomixes; Polyembryony ,Types (Simple and Adventive & True and False) Causes; Parthenocarpy , Types and Applications &significance
Unit 2 : Genetics and	Heredity and Variation - Heredity And Variation and Recent finding in genetics; Mendelian Inheritance –Laws;

Molecular Biology	Monohybrid, Dihybrid, Test cross, Trihybrid cross, Back cross & Test cross; Incomplete Dominance –Lethal Genes, Interaction Of Genes- Intragenic & Intergenic; Polygenic Inheritance In Wheat(Kernel Colour) Pleiotropy-Pisum Sativum Chromosomal basis of Inheritance - Chromosomal Theory Of Inheritance; Comparison between gene and chromosomal behaviour; Linkage And Crossing Over Eye colour in Drosophila, Maize multiple allelism; Recombination; Sex Determination In Plants Sphaerocarpos, Papaya, Maize; Mutation, types and Mutagenic agents, Significance of mutation; Gene Mapping Molecular Biology - Introduction to Molecular Biology; Central Dogma; Transcription; Regulation of Gene expression
Unit 3 : PLANT BIOTECHNOLOGY	Principles Of Biotechnology - Introduction to biotechnology; Historical perspective; Milestones – including fermentation, SCP, PTC, protoplast fusion, genome sequencing, evolutionary pattern (relationship between various plant species), plant genome projects, RNA i- Genome editing – CRISPR CAS -9; *Principles* : Genetic Engineering (rDNA technology); *Tools* : Restriction endonuclease; DNA ligase and alkaline phosphatise; Vectors :Properties of vectors, Plasmid – pBR 322, Cosmid, Bacteriophage vector, Phagemid, BAC, YAC, Transposon as vector, Shuttle vector Recombinant DNA Technology - Introduction to recombination; Steps involved in RDT; Methods of gene transfer; Direct – electroporation, gene gun, liposome –

	mediated; Indirect – Agrobacterium mediated gene transfer – Ti plasmid; Screening for recombinants - Insertional inactivation-blue – white colony selection; Antibiotic resistant markers; Replica plating technique; Molecular techniques – isolation of genetic material and gel electrophoresis; Southern blotting; northern blotting; PCR, western blotting, ELISA; Bioassay for target gene effect Transgenic plants (GM crops) - Herbicide tolerant-Glyphorate,Basta; Insect resistance – Bt crops(cotton)Bt cotton, Bt Brinjal, DMH; Virus resistance; FlavrSavr tomato; Golden rice – bio fortification ; PHB – PLA; Green Florescent Protein(GFP), Yellow Florescent Protein (YFP) in Transgenic Arabidiopis Other applications - Biopharming – plant as bioreactors; Bioprospecting, biopiracy (neem/turmeric); Bioremediation; Biofuel, algal biofuel; Inter disciplinary fields of biotechnology; IPR & patent Biosafety and Bioethics – ethical legal social issues (ELSI) –genetic engineering appraisal committee (GEAC) Plant Tissue Culture - Introduction about plant tissue culture and explaining terminologies like totipotency, differentiation, redifferentiation and dedifferentiation; Basic technique involved in PTC; Media preparation; MS medium; Types of culture – callus, embryo, protoplast culture (hybrid and cybrid), cell suspension culture – production of secondary metabolites; Plant regeneration pathway; Somatic embryogenesis and organogenesis; Applications; Micro-propagation (banana) - Artificial seed,

	Virus free plants; Germplasm conservation - Cryopreservation (-196°C)
Unit 4 : Plant Ecology	Principles of Ecology - Introduction – Autecology, Synecology, Habitat and Ecological niche, Ecological equivalents, Biotic and Abiotic factors – responses of plants to temperature, water, light and soil, Topography, definition of stenothermal, stenohaline, eurythermal, euryhaline plants with one example in each; Ecological adaptations – hydrophytes, mesophytes, xerophytes and halophytes and epiphytes in term of morphological, physiological and behavioural response; Population interactions – mutualism, competition, predation, parasitism, commensalism and amensalism with plant examples, Plant Animal Interaction-Herbivory, Pollination, seed dispersal –Co-evolution Ecosystem - Definition, types, structure (Pond ecosystem), brief outline about biotic and abiotic components of ecosystem, Major Ecosystem of India and World, ecosystem functions – Productivity (GPP & NPP), secondary productivity; Decomposition – fragmentation, leaching, catabolism, humification, mineralization, factors affecting rate of decomposition; Types of food chain & Food web (grazing, detritus food, trophic level ecological pyramids - energy numbers, biomass); Definition of PAR (Photosynthetically Active Radiation) – Energy flow - Laws of Thermodynamics, 10% law for transfer of energy from one trophic level to next- standing crop, standing state of ecosystem; Nutrient cycle – definition, biogeochemical cycle (carbon and phosphorous cycles only) – graphical representation of the above

	cycles; Succession – definition, kinds of succession, hydrosere, *lithosere*, xerosere, primary & secondary with example; Definition of pioneer community and climax community; Significance of ecological succession Environmental issues - Alien Invasive species – Impacts – (example -*Kappaphycus*, *Eichhornia*, *Lantana, Parthenium, Prosopis* etc.,); agrochemicals and their effects; greenhouse effect and global warming, climate change, ozone depletion, Impact on food crops ,CCS - carbon – accumulation, trading, sequestration, Carbon foot print/Ecological foot print – deforestation –causes and effects , Afforestation , any one case study as success story addressing environmental issues; Drone technology to study vegetation and pest attacks; Forestry - Agro forestry – Social forestry – Community forestry – Conservation movements (CHIPKO & APIKO); Rain water harvesting – swach Bharath, Important Lakes in TN (Madurantakam, Chembarabakkam, Sholavaram)- Philosophy, construction- Ecological importance; Sewage disposal – Solid and liquid waste management
Unit 5 : Economic Botany	Traditional Knowledge of plants - Relationship between Humans and plants; Traditional system of medicines- Siddha and Ayurveda andFolk. Plant breeding - Strategies for enhancement of food production; Conventional methods -Plant breeding, Selection, Hybridization, Heterosis, Mutation, polyploidy, Green revolution; Modern methods - GM crops –definition and example, Improved varieties of commonly used plants (Rice, Wheat, Pulses,etc.…)

	Economically useful plants - Food – Cereals –Rice, wheat, Millets – Pearl millet, Minor millets (Samai, thinai, varagu), Pulses –Black gram, Red gram, Green gram, Vegetables- Potato, Radish, Fruits and nuts-Mango, Banana, Jackfruit, Guava, Papaya,Cashew nut, almonds ; Sugar- Cane sugar , beet sugar, sweetener *(Stevia*) Palm sugar, Oil seeds- groundnut, sesame, Beverages- Tea, Coffee and Cocoa; Fodder –Napier grass, Guinea grass ,Elephant grass, Alfalfa (Legume fodder); Spices and condiments - Cardamom, Cloves, pepper, Turmeric; Fibre – Cotton, jute, , hemp; Timber -Teak, Sal, Rose wood; Rubber – Hevea rubber, Manicoba rubber; Industry - Paper – bamboo, Casuarina, Eucalyptus; Dyes –Indigofera; Cosmetics – Papaya, Aloe; Perfume – Rosemary, Jasmine, Rose, Sandal, Lavender; Agriculture - Green Manure, Biofertilizer Rhizobium, Azolla, VAM Medicinal plants- Active Principles, Castor, Phyllanthus, *Ocimum sanctum, Aegle marmelos , Acalypha indica ,Cissus quadrangularis, Andrographis paniculata , Turmeric longa, Catharanthus roseus, Withania somnifera, Gloriosa superba, Emblica officinalis, Rauwolfia serpentina, Artemesia maritime,* Psychoactive Drugs- *Papaver somniferum* -Opium, morphine. *Cannabis sativa* Entrepreneurial botany - Mushroom Cultivation; SCP production; Sea weed liquid fertilizers; Organic farming- biofertilisers- bio pest repellants; Terrarium, Terrace Gardening; Cultivation of Medicinal Plants Plant diseases – Introduction; Red rot of sugar cane; Citrus canker; Bunchy top of banana; Blast and Blight of

	Paddy; Tikka disease of Groundnut

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TNCF 2017 - DRAFT SYLLABUS

Subject : Bio - Zoology **Class :** XI

TOPIC	CONTENT
UNIT – 1 : Animal Diversity	LIVING WORLD - Diversity in the living world - Need for classification-Three domains of life; Taxonomy and Systematics- Concept of species and taxonomical hierarchy -Binomial and trinomial nomenclature - Tools for study of Taxonomy– Key,Museums, Zoo. KINGDOM ANIMALIA - Basis of classification - Levels of organisation, asymmetry - symmetry, Radial symmetry, and Bilateral symmetry - Diploblastic and triploblastic organisation (Brief account giving one example for each type from the representative phyla) - Acoelomates, Pseudocoelomates and Eucoelomates: Schizo and Entero coelomates - Segmentation and notochord - Salient features and classification of animals Non-Chordates (Invertebrates) up to phyla level and

	Chordates up to class level (five salient features and at least two examples of each category).
UNIT – 2 : Structural Organisation in Animals	ANIMAL TISSUES - Animal tissues - Epithelial tissues- simple and compound epithelium - Connective tissue - Loose and dense connective tissue - Muscle tissue- skeletal muscle, smooth muscle, cardiac muscle, Neural tissue ORGAN AND ORGAN SYSTEM IN ANIMALS - Morphology – Anatomy and functions of different systems (digestive, respiratory, circulatory, nervous and reproductive) of Earthworm, Cockroach and Frog.
UNIT – 3 : Human Anatomy and Physiology (I)	DIGESTION AND ABSORPTION - Digestive system: Alimentary canal –histology of human gut and digestive glands; salivary glands, gastric glands, liver and pancreas - Digestion of food - Role of digestive enzymes and gastrointestinal hormones - absorption and assimilation of proteins, carbohydrates and fats – Egestion - Caloric value of carbohydrates, proteins and fats- Nutritional and digestive disorders – Protein Energy Malnutrition, indigestion, constipation, vomiting, jaundice, diarrohea, peptic ulcer, Appendicitis, Gallstone, Hiatus, Hernia RESPIRATION - Respiratory organs in animals- Human respiratory system - Mechanism of breathing - Respiratory volumes and capacities - Exchange of gases,- respiratory pigments- haemoglobin. methaemoglobin, transport of gases - O_2 and CO_2- Regulation of respiration - Disorders related to

	respiration-Asthma, Emphysema, TB, pneumonia, bronchitis; Occupational respiratory disorders - Problems with O_2 transport BODY FLUIDS AND CIRCULATION - Composition of blood, coagulation of blood - Composition of lymph and its function - Structure of human heart and blood vessels- arteries and veins; coronary blood vessels; Cardiac cycle, cardiac output, Double circulation - Regulation of cardiac activity - Disorders of circulatory system- Hypertension, Coronary artery disease, Angina pectoris, Heart failure, Rheumatoid heart disease - Diagnosis and treatment – Electrocardiograph (ECG), Angiogram, bypass surgery, heart transplantation, CPR EXCRETION - Modes of excretion- Ammonotelism, ureotelism, uricotelism - Human excretory system, structure and functions of Kidney; Urine formation - Osmoregulation : Regulation of kidney function-Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus- Urinary tract infection - causes - Role of other organs in excretion; Disorders related to excretory system; Uraemia, Renal failure, Renal calculi, Nephritis - Dialysis – types, Artificial kidney. Kidney transplantation.
UNIT – 4 : Human Anatomy and Physiology (II)	LOCOMOTION AND MOVEMENT - Types of movement- amoeboid, ciliary, flagellar, muscular - Muscle – types, structure, distribution - Skeletal muscle- ultrastructure ; structure of contractile proteins and mechanism of muscle contraction; types of muscle contractions – isotonic , isometric - Skeletal system and its functions -

	Axial skeleton, appendicular skeleton - Joints- types - Disorders of muscular and skeletal system-Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis – types , Osteoporosis, Gout, fatigue, pull, tetany, atrophy, rigor mortis - Bone fracture-mechanism and healing - dislocation of joints and treatment - Knee Replacement, physiotherapy NEURAL CONTROL AND COORDINATION - Neural System, Human neural system-Neuron as structural and functional unit of neural system - Generation and conduction of nerve impulse; synaptic transmission of impulse - Central neural system- human brain - Reflex action and reflex arc - Sensory reception and processing – Eye, Ear, Olfactory and gustatory receptors CHEMICAL COORDINATION AND INTEGRATION - Introduction – Endocrine glands and hormones - Human endocrine system-Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads - - Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exopthalmic goiter, diabetes, Addison's disease etc.,) - Mechanism of hormone action; Role of hormones as messengers and regulators - Hormones of heart, kidney and Gastro intestinal tract
UNIT – 5 : Animal Resources	TRENDS IN ECONOMIC ZOOLOGY - Scope of Zoology – Vermiculture - Sericulture- apiculture – Lac culture – Aquaponics - Aquaculture - Fishes- Prawn- Pearl Culture- Animal Husbandry and management - Dairy

	farm - Poultry (chicken, duck) - Animal Breeding.

STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TNCF 2017 - DRAFT SYLLABUS

Subject : Bio-Zoology **Class :** XII

TOPIC	CONTENT
UNIT – 1 : REPRODUCTION	REPRODUCTION IN ORGANISMS - Reproduction - characteristic features of all organisms, continuation of species - Modes of reproduction: Asexual and sexual - Modes of asexual reproduction: Binary and multiple fission – Sporulation - Budding – Gemmule – Fragmentation – Regeneration - Modes of sexual reproduction: External and internal fertilization - Oviparous, Ovoviviparous and Viviparous – examples HUMAN REPRODUCTION - Human reproductive system -

	Male and Female reproductive system - Gametogenesis - Spermatogenesis and oogenesis - Structure of Spermatozoan and ovem Fertilization and Implantation – Menstrual Cycle-Menstrual Hygiene - Napkins, Tampons - Cervical Cancer - Maintenance of Pregnancy - Pregnancy and Embryonic Develpment - Parturition and lactation - Hormones in parturition - lactation – Colostrum REPRODUCTIVE HEALTH - The strategies to be implemented to attain total reproductive health - Statutory ban on gender Detection in Pregnancy - Amniocentesis, Ultra sound Scan,- Population explosion and birth control - Control Measures- Statutory rising of marriageable age - small families and family planning programme - Contraceptive methods - Natural barriers - Social Impact of Sex Ratio, Feticide and Infanticide - IUDs -Copper IUDs- Cu-7, CuT 380A, Multiload 375 and Hormonal releasing IUDs- Progestasert, LNG 20) - Oral Pills -Female contraceptive injections - Depot Medroxyprogesterone Acetate (DMPA), norethisterone enanthate (NET-EN), combined progestin and estrogen monthly injections - Implants and surgical methods - Medical Termination of Pregnancy - The medical necessity and social consequences of MTP - Sexually Transmitted Diseases (STD) - The major STDs and its symptoms- AIDS - Hepatitis, Gonorrhoea, Syphilis, Genital Herpes, Genital warts, Trichomoniasis, Chlamydiasis. - Mode of Transmission - Preventive measures – Infertility - Methods used to assist infertile couple to have children-- IVF-ET, ZIFT, GIFT, IUT, AI,

	ICSI - Surrogacy
Unit – 2 : Genetics and Evolution	PRINCIPLES OF INHERITANCE AND VARIATION - Multiple alleles - Human Blood Groups - ABO Blood groups inheritance - Genetic control of Rh factor - Erythroblastosis foetalis - Sex determination - Autosome, Allosome - Sex determination in Humans - Sex Linked Inheritance - Barr bodies{x-inactivation} - X-linked inheritance – Haemophilia - Colour blindness - Y-linked- Hypertrichosis – Karyotyping - Pedigree analysis - Mendelian Disorders - Chromosomal abnormalities - Down's syndrome - Klinefelter's Syndrome - Turner's Syndrome MOLECULAR GENETICS - Nucleic Acids - DNA - Structure of Polynucleotide chain - Packing of DNA Helix - The search for genetic material - DNA is a genetic material - Hershey and Chase Experiment - Properties of Genetic materials - RNA world - Types of RNA - Role of RNA – Replication - Enzymes for DNA replication - Mechanism of Replication – experimental proof of DNA replication(Meselson and Stahl'sexperiment) – Transcription - Transcription unit - Transcription unit and gene - Process of Transcription - Genetic code - Salient features of Genetic code -Mutation and Genetic code - Translation - tRNA-The adapter molecule - Mechanism of Translation - Regulation of Gene expression - -Lac operon - Human Genome project - - Goal of HGP - Salient feature of HGP - Applications and future challenges - Blotting techniques - Southern blotting - Northern Blotting - Western Blotting -

	Polymerase chain reaction(PCR) - DNA finger printing technique EVOLUTION - Origin of life - Evolution of life form- A Theory - Theory of Spontaneous generation - Big bang theory - Theory of Biogenesis - Evidences for evolution - (Paleontology, comparative anatomy, embryology, molecular evidences) - Evolution by anthropogenic action by natural/Artificial Selection: Examples. Adaptive radiation - Darwins finches - Australian marsupials – Theories of Evolution: Lamarck's theory, Darwins theory - Mechanism of evolution - Hardy Weinberg principle - Geological time scale - Origin and evolution of man
UNIT – 3 : Biology and Human Welfare	HUMAN HEALTH AND DISEASES - Common diseases in man: Infectious and non infectious diseases - Common diseases in Man-typhoid, Pneumonia, common cold, ringworm infection - Diseases caused by protozoans-malaria, amoebiasis - Diseases caused by helminthes-Ascariasis, filariasis. - Maintenance of personal and public hygiene. Immunity - Basic concepts of immunology- Innate immunity. Acquired immunity, - primary and secondary immune response; cells of the immune system - Structure of antibody - Active and passive immunity– vaccination and Immunisation – Allergies -; Lymphoid organs in the body – Autoimmunity-Autoimmune disease Cancer and AIDS; Adolescence and Drug / Alcohol abuse –Addiction and Dependence-Effects of drug-Drug / Alcohol abuse-Prevention and Control- Alcohol abuse- Depression – Mental Health
Unit – 4 :	PRINCIPLES AND APPLICATIONS OF BIOTECHNOLOGY -

Animal Biotechnology and Its Applications	Principles of Biotechnology - applications in Medicine - Human insulin - Human growth hormones - Human blood clotting factors in treating haemophilia – Interferons –Vaccines - Gene therapy - Molecular diagnosis - ELISA (Enzyme Linked Immune-Sorbent Assay) - PCR (Polymerase Chain Reaction) - Stem Cell therapy – Bone Marrow Therapy Stem Cell Banks - Animal cloning: Dolly - Transgenic Animals & Biological products (Rosie- cow) and their uses - Ethical Issues
Unit- 5 : Ecology, Environment and Conservation	ORGANISM AND POPULATION - Concept of Ecology – Environment - habitat & Niche - Concept of Biome & distribution - Major abiotic factors, water, light, temperature & soil - Responses to abiotic factors - Population and ecological Adaptations - Interactions – Commensalism mutualism, competition, predation & parasitism - Population attributes – growth, birth rate & death rate, age distribution - Population growth curve population regulations BIODIVERSITY AND ITS CONSERVATION - Biodiversity – concepts of biodiversity - levels of Biodiversity - Patterns of Biodiversity - Biogeographical regions of India - Biotic provinces of Tamil Nadu - Importance of biodiversity – global /India - Loss of biodiversity - Threats to biodiversity - Biodiversity conservation(Insitu, Exsitu conservation) – IUCN - Hotspots / Endangered organisms - extinction, red data book - Causes of biodiversity losses ENVIRONMENTAL ISSUES - Air pollution and its control - Water pollution and its control - Noise pollution -

	Agrochemicals and their effects – biomagnifications – Eutrophication - Organic farming & its implementation - Solid waste management / radioactive waste management - green house effect & global warming - ozone depletion – deforestation - E- waste - Remedy of plastic waste - Eco- San toilets - Peoples participation in conservation of forest.