ORGANIC CHEMISTRY UNIT-VIII

O. TYPES OF REACTIONS

i) Aliphatic nucleophilic substitution reactions –Aromatic electrophilic substitution reactions-Free radical reactions-Addition to C=C and C=O compounds – Elimination Reactions.

ii) Reduction and oxidation reactions – Oxidation with osmium tetroxide, ozone- reduction with $NaBH_4$, $LiAlH_4$

P. ELECTRON DISPLACEMENT METHODS

Inductive effects- Mesomeric effects, Hyper conjugation- Steric effects in substitution, addition and elimination reactions

Q) NOMENCLATURE OF ORGANIC COMPOUNDS

Classification of organic compounds-IUPAC nomenclature:alkanes, alkenes, alkynes, alcohols, aldehydes and ketones.

UNIT- IX

R. NATURE OF BONDING

1) Hybridization and geometry of simple organic compounds- Breaking of bonds- homolytic and heterolytic cleavage of C – C bonds-Reaction intermediates- free radicals : generation and stability- Carbocation and carbanion: formation and stability

S. STEREOCHEMISTRY

Stereoisomerism, definition and types- optical activity-asymmetric ccarbons, D and L notations, Enantiomerism, Diastereomerism- Racemization methods- Resolution methods-Walden inversion-Fisher, sawhorse and Newman projections-R and S notation of optical isomers: Cahn-Inhold and Prelog rules- Geometrical isomerism Z and E notations

UNIT X

T. MECHANISM IN AROMATIC SUBSTITUTION

i) Aromatic electrophilic substitution: Arenium ion mechanism: nitration, halogenation, sulphonation, Friedel Crafts reaction- Orientation and reactivity in monosubstituted benzene rings-Activating and deactivating groups-

ii) Aromatic nucleophilic substitution: S_NAr mechanism, Benzyne mechanism

U. CARBOHYDRATES

Classification of carbohydrates-Monosaccharides-D family sugars-L family sugars-Epimers-Mutarotation- Interconversion of glucose to fructose and vice versa, Reactions of monosaccharides-Disaccharides – Lactose, Maltose, Gentiobiose, Sucrose, Manufacture of sucrose, properties and uses.

V. MATERIAL CHEMISTRY

i) Polymers-Types of polymerization-Homopolymers- copolymers- Thermosetting and thermoplastic polymers-Vulcanization of rubber

ii) Dyes: Classification and Properties of dyes, Chromophores, auxochromes, Preparation of methyl orange, cangored, malachite green, fluorescein, indigo.

BOTANY

UNIT-1 VIRUS, BACTERIA, PHYCOLOGY, MYCOLOGY

VIRUS-

Discovery, Structure, Virus infection in plants, and symptoms, Transmission of plant Viruses, Genome Organisation, Replication of Bacteriophages, Economic Importance.

BACTERIA-

Discovery, General Characteristic Features, Cell Structure, nutrition, reproduction, Techniques in Sterilization and Bacterial Culture, Economic importance.

PHYCOLOGY –

General characters, Classification (F.E.Fritsch) Thallus Organisation, Life Cycle Patterns, pigmentation, Evolutionary Trends in The sexuality of Algae – Economic importance.

Structure and reproduction, life cycle of the following algae: Anabaena, Nostoc, Spirulina, Diatoms, Chlamydomonas, Oedogonium.

MYCOLOGY-

General Characteristics, Thallus Organisation, Classification (Alexopolus), Nutrition, Reproduction, Economic importance.

Structure, reproduction and Life cycle of the following: Rhizophus, Agaricus, Puccinia, Cercospora.

UNIT-2 LICHENOLOGY, BRYOLOGY, PTERIDOLOGY

Lichenology-

General characteristics, Thallus Organisation, Reproduction, occurrence, Classification, Ecological importance, Mycorrhiza (EctomyCorrhiza & Endomycorrhiza)

Bryology-

General characters, Classification, structure and reproduction, Economic importance, structure and Life history of Marchantia, Riccia and Polytrichum

Pteridology-

General characters – Classification, based on smith, Structure and life history of Psilotum, Lycopodium, Selaginella, stellar organisation, Heterospory and seed habit, Economic importance.

UNIT-3 GYMNOSPERMS, PALEOBOTANY, EVOLUTION.

Gymnosperms-

General characters, classification (Sporne, 1954), Structure & reproduction, Economic importance, Life history of cycas, pinus and Gnetum.

Paleobotany-

Geological time scale – era, period, epoch, fossilization methods – fossil types – Radio carbon dating, contributions of Birbal sahni.

Evolution-

Origin of Life, Theories of Evolution – Darwin, Lamarck and De vries.

UNIT-4 ANGIOSPERM - MORPHOLOGY, TAXONOMY AND ECONOMIC BOTANY

Angiosperm morphology-

Root system – Modifications, shoot system – Modifications, Leaf – simple, Compound- phyllotaxy, Modifications of leaf.

Inflorescence – types, Flowers – parts, Aestivation, Placentation, fruits – types and classification.

Taxonomy –

Classification of Angiosperms – Artificial, natural, phylogenetic, Herbarium – techniques, Botanical Nomenclature, Botanical Survey of India.

Study of the following families based on the natural sytem poaceae, cucurbitaceae, asteraceae, solanaceae Arecaceae, Euphorbiaceae Leguminosae lamiaceae & Economic importance of the above familes.

Economic Botany-

Source, Cultivation methods and economically important products of rice, sugarcane, cotton, groundnut.

UNIT-5 ANATOMY AND EMBRYOLOGY

ANATOMY-

Meristems and types, simple permanent tissues, complex permanent tissues (xylem, phloem), Tissue systems & types, Secondary growth, Anomalous Secondary Growth, primary structure of root, stem and leaf of dicots & monocots, krantz anatomy.

EMBRYOLOGY-

Microsporangium, microsporogenesis and development of male gametophyte, Megasporangium, types, Megasporogenesis, development of female gametophyte - Monospory, Bispory, tetraspory, Double fertilization, triple fusion, types of endosperm, Embryo development in dicot & monocots, Apomixis, polyembryony, anther and embryo culture technique.

UNIT -6 MICROBIOLOGY, PLANT PATHOLOGY

Microbiology-

History and scopes of microbiology, Introduction to microbial world – protozoa, bacteria, viruses, mycoplasma, economic importance of bacteria, culture methods and techniques, Fermentation and antibiotic production.

PLANT PATHOLOGY-

History of plant pathology, symptomology of Fungal, viral, bacterial pathogens host defence.

Name the causative organisms, etiology and control measure of the following diseases Blast of rice, wilt of cotton, canker of citrus, powdery mildew disease, Redrot of sugarcane, Tikka of groundnut, Little leaf of brinigal, Bunchy top of banana.

UNIT -7 PLANT PHYSIOLOGY, BIOCHEMISTRY, BIOPHYSICS

PLANT PHYSIOLOGY: -

Water relations of plants – Imbibition, Diffusion, Osmosis, plasmolysis, Mechanism of Water absorption – Ascent of sap, Transpiration – Types, Significance, Mechanism, Factors affecting it, Guttation.

Photosynthesis- C3, C4 CAM pathways.

Respiration – Aerobic, Anaerobic, Glycolysis, kreb's cycle, Electron transport chain, photorespiration Nitrogen Metabolism – Source of nitrogen, Methods of nitrogen Fixation – Metabolism - Symbiontic, non-symbiontic, Nitrogen Cycle.

Physiology of flowering - photoperiodism – plant growth substances, chemical nature and physiological functions of auxins, Gibberellins cytokinins, ethylene, ABA and Brassinosteriods.

BIOCHEMISTRY: -

Biopolymers, carbohydrates, Lipids, proteins, nucleic acids and their monomers.

Enzymes- properties, classification, mode of action-factors affecting enzymes.

BIOPHYSICS: -

Laws of thermodynamics – Concept of free energy, ATP as high energy compound- photo physiology – Light emission – fluorescence, phosphorescence, Bioluminescence, light absorption

UNIT-8 CYTOLOGY, GENETICS, PLANTBREEDING, HORTICUTURE

CYTOLOGY: -

Cell organisation – prokaryotic & Eukaryotic cells, Cell membrane, Cell cycle, mitosis, Meiosis, Amitosis, Cell Organelles – Occurrence, Structure, Function and Origin of ER, Golgibody, Lysosomes, Ribosomes, Mitochondria and chloroplast,

Chromosome- Structure, types, polytene & lampbrush.

GENETICS: -

Mendelism, Monohybrid, Dihybrid crosses, Laws of Mendel, Incomplete dominance, Interaction of factors and genes, Linkage & crossing over, Multiple alleles, Mutations, sex determination in Plants.

PLANTBREEDING: -

Principles involved in plant breeding Methods of crop improvement – Selection, hybridisation Introduction, acclimatization, Heterosis – cause and effects, polyploidy in breeding, Hybridisation technique employed in Cotton, paddy & sugarcane

HORTICUTURE: -

Scope of Horticulture – Classification of Horticulture plants – fruits, Vegetables, ornamentals, Garden design & types – Rockery. Bonsai, Kitchen Garden, Lawn making, Floriculture, Cultivation of commercial plants – Jasmine, Propagation methods, cutting, grafting, Layering, Budding.

UNIT-9 PLANT ECOLOGY, ENVIRONMENT, CONSERVATION BIOLOGY, PHYTOGEOGRAPHY

PLANT ECOLOGY: -

Biotic and Abiotic Factors, plant Succession, Ecological adaptations, Xerophytes, hydrophytes, Epiphytes.

Food chain, Food web, Energy flow- Types of eco system, Ecological pyramids, Nutrient cycles,

ENVIRONMENT: -

Pollution – Air, Water, Soil, Causes and Consequence, Green house effect, Global warming, ozone depletion, acid rain and their impacts, remedial measures – Green building.

CONSERVATION BIOLOGY: -

Natural resource and its conservation (Insitu, Exsitu), Brief account of National and International agencies of conservation – Afforestation.

PHYTOGEOGRAPHY: -

Principles – Vegetation types of India, Tropical evergreen forests, Deciduous forest, Mangrove vegetation and scrub jungle with reference to Tamil Nadu – Raunkiaer's life form, Remote sensing of vegetation photo interpretation.

UNIT-10 PLANT BIOTECHNOLOGY, BIOINFORMATICS, MOLECULAR BIOLOGY

PLANT BIOTECHNOLOGY: -

History & Scope, Applications of plant biotechnology, Bio fertilizers, Biopesticides, antibiotics, Recombinant Vaccines, Insulin and Interferons – Bio remediation.

Plant tissue culture – Applications of plant tissue Culture, Vectors – Plasmid, Bacteriophages, viral vectors, cosmids, Restriction enzymes, rDNA technology, Development of transgenic plants with reference to insect resistance, edible Vaccines, pros and cons of genetically Modified food (GM food).

BIOINFORMATICS: -

Databases and tools – Biological database 'NCBI' model primary & Secondary databases – BLAST - proteomics and tools, Homology modelling.

MOLECULAR BIOLOGY: -

Nature and function of genetic materials – Nucleic acid – DNA, RNA, Replication of DNA, RNA types, Transcription, protein synthesis, codons, anticodons, gene regulation in prokaryotes – Lac Operon.

Zoology

DEGREE STANDARD

Unit I – INVERTEBRATA

Principles of taxonomy - Bionomical nomenclature - Rules of nomenclature - Classification of Animal Kingdom - General Characters and classification up to orders from protozoa to Echinodermata - Protozontype study - *Paramecium* and *Plasmodium* - Parasite protozoans (*Entamoeba*, *Trypanosoma* and *Leishmania* - Porifera - Type study *Leucosolenia* - General Topic - History, Skeleton and canal system in sponges - Coelenterata - Type study - *Obelia* and *Aurelia* - General topic - Coral and coral reefs - Polymorphism, Economic importance - Platyhelminthes - Type Study - *Fasciola* and *Taenia* - General Topic: Parasitic adaptation - Aschelminthes - Type Study - *Ascaris* - General Topic - Nematode parasites and diseases (*Enterobius vermicularis*, *Ancylostoma duodenale* and *Wuchereria bancrofti*) - Annelida -Type study - Earthworm and Hirudinaria General Topic - Metamerism - Trochophore larva and its significance - vermiculture - Nephridia - Econonic importance - Arthropoda - Type study - *Penaeus* - General topic - Affinities of *Peripatus* - Crustacean larvae and their significance - Mouth parts of insects - Economic importance of insects - social life of insects - Mollusca - Type study - *Pila* and *Lamellidens* - General Topics - Foot in Mollusca - Economic importance - Torsion in Gastropods - Echinodermata - Type study - *Asterias* - General Topic - Echinoderm larvae and their significance - water vascular system in Echinoderms.

UNIT II - CHORDATA

Origin of chordates - General characters and outline classification of Phylum chordata with examples - General characters and classification upto mammalia. **Prochordates** - Type study - Hemichordata - *Balanoglossus* - Urochordata - *Ascidian* - Cephalochordata - *Branchiostoma* (*Amphioxus*). **Agnatha** - Type study - *Petromyzon* - General topic - Affinities of cyclostomata. **Pisces** - Type study - *Scoliodon sorrokowah* and *Mugil cephalus* - General Affinities of Dipnoi - Types of scales and fins - Accessory respiratory organs - Air bladder - Migration- Parental care - Economic Importance. **Amphibia** - Type study *Rana hexadactyla* - General - Origin of Amphibia - Adaptive features of Anura; Urodela and Apoda - Neoteny in urodela - Parental care in Amphibia. **Reptilia -** Type Study - *Calotes versicolor* - General - Origin of reptiles - snakes of India - poison apparatus and biting mechanism of snakes. **Aves** - Type study - *Columba livia* - General topics: Origin of birds - Ratitae - Flight adaptation - Migration in birds - Palate in birds - Birds are glorified reptiles. **Mammalia** - Type study - Rabbit - General topics - Adaptive radiation in mammals. Egg laying mammals - Marsupials - Aquatic mammals - flying mammals - Dentition in mammals.

Unit III - CELL AND MOLECULAR BIOLOGY

Compound microscope - Phase contrast microscope – Electron microscope - Light and Dark field microscopes - Cytological techniques - fixation - staining - centrifugation- sedimentation co-efficient - **History of cell biology** - Cell theory - cell as the basic unit of living organism - Prokaryotic and Eukaryotic cell - ultrastructure of an animal cell - plasma membrane - Lipid bilayer, unit membrane, fluid mosaic and functions of plasma membrane - Cell organelles - ERC - Ribosomes - Golgi complex - Lysosomes - Centrioles and mitochondria - Nucleus - Nucleolus - structure and functions of chromosomes - heterochromatin and euchromatin - Giant chromosome - Polytene and Lambrush chromosome - cell cycle - mitosis and meiosis. Cancer - types - causes - diagnosis - characteristics and treatment - Gene responsible for aging - stem cells.

Nucleic acids - Molecular structure of DNA and RNA - Types of RNA - DNA replication - Role of RNA and ribosome in protein synthesis - Regulation of Protein synthesis.

UNIT IV - GENETICS

Mendelian principles - Gene interactions - Multiple alleles - ABO blood group and Rh factor - Multiple factors - skin colour - Sex determination - Linkage and crossing over - chromosomal aberrations. Extra chromosomes - Allosomal and Autosomal aberrations - Mendelian traits - Pedigree studies - Eugenics - Genetics and society. Nucleic acids - DNA and RNA - Chemical basis of hereditary - Gene mutation - Genetics of bacteria - Genetic code - Gene action - Regulation of gene expression - Insertion elements and transposons - Genetic cloning.

UNIT V - ANIMAL PHYSIOLOGY

Nutrition - Types of nutrition - food - feeding mechanism. Digestive enzymes and their role in digestion - Respiration - Respiratory organs - Mechanism of respiration - Transport of gases - chloride shifting - Haldane and Bohr's effect. Circulation - Structure of human heart - cardiac cycle - origin of heart beat - pace maker regulation of heart beat - ECG - Blood pressure. Blood - excretion - kidney - nephron - mechanism of urine formation in mammals - hormonal control of excretion. Osmoregulation and thermoregulation. Muscular system - Types of muscles - structure and chemical composition of skeletal muscle - mechanism of muscle contraction. Nervous system - Structure of neuron - Types of neuron - nerve impulse in myelinated and non- myelinated neuron - action potential – synapse - neuromuscular junction and reflex action - reflex arc. Photoreceptor - phonoreceptor - physiology - equilibrium - chemoreceptors. Endocrine