DEPARTMENT OF BOTANY -2022-2023

Academic Planner with unitisation of the entire syllabus (on hourly basis)

DEPARTMENT OF BOTANY					
ACADEMIC PLANNER					
Unitisation of syllabus					
I SEMESTER – 2021 -2022					
MONTH	**WEEK**	**UNIT-I**	**UNIT-II**	**UNIT-III**	**UNIT-IV**
		RV	ZNB	ZNB/INDIRA	RV/INDIRA
12 OCT onwards	1	Introduction to microbial diversity ; methods of estimation ; Hierarchial organisations and positions of microbes in the living world . Whittakers's five kingdom system and carl Richard Woese's three domain system . Distribution of microbes in soil , air,food and water . Significance of microbial diversity in nature .	Culture media for microbes – Natural and synthetic media , Routine media – basal media , enriched media , selective media , indicator media , transport media and storage media	Microbial cultures and preservation – Microbial cultures . Pure culture and axenic cultures , subculturing , preservation methods overlaying cultures with mineral oils , lyophilisation . Microbial culture collections and their importance . A brief account on ITCC , MTCC and ATCC.	**BACTERIA –** general characteristics and classification . Archaebacteria and Eubactyeria . Ultrastructure of bacteria ; bacteria growth and nutrition . Reproduction in bacteria – asexual ad sexual methods . study of rhizobium and its aplications . A brief account of actinomycetes and cyanobacteria . Mycoplasms and phytoplasmas – General charcteristics and diseases . economic importance of bacteria
	2week	**HI** Whittakers's five kingdom system and carl Richard Woese's three domain	Sterilization methods : Principle of disinfection , antiseptic ,	VIRUSES – general structure and classification of viruses ; ICTV system of classification ,	**FUNGI -** genral charcteristics and classification . Thallus organisation and

		system . Distribution of microbes in soil , air,food and water . Significance of microbial diversity in nature **STORY AND DEVELOPMENT OF MICROBIOLOGY** : microbiologists and their contributions	tyndalisation and pasteurization , sterilization by dry heat , moist heat , UV light , Ionization radiation , filtration . Chemical methods of sterilization – phenolics compounds , anionic and cationic detergents	structure and multiplication of TMV , SARS-COV-2, and bacteriophage (T2) , Cultivation of viruses , vaccines and types.	nutrition in fungi . Reproduction in fungi , Heterothallism and parasexuality . Type study of phytophthora , rhizopus , Neurospora , Puccinia, Pencillium and Trichoderma
	3week	Microscopy working and applications of light , dark field , phase contrast and electron microscopes . Microbiological stains (acidic , basics and special) and principles of staining . Simple , Gram's and differential staining .	Microbial growth – Microbial growth and measurement , Nutritional types of microbes – autotrophs and heterotrophs , phototrophs and chemotrophs .lithotrophs and organotrophs	VIROIDS – general characteristics and structure of potato spindle tuber viroid (PSTVd) ; prions – general characters and prion diseases , Economic importance of viruses	**LICHENS** – structure and reproduction . VAM fungi and their significance . Fungal diseases – Late blight of potato , Black stem rust of wheat ; Downy mildew of bajra , Grain smut of sorghum , Sandal spike , citrus canker , Root Knot disease of mulberry , economic importance of fungi .
	4week	Contribution of Luis Pasteur	Reproduction in bacteria	economic importance of Cyanobacteria, SCP,	Hydrodictyon reproduction

Nov	**1week**	Robert Koch and Alexander Flemming	Reproduction in bacteria	Biofertilizers, role in water pollution and treatment.	Oedogonium – vegetative structure
	2week	Isolation of microbes from soil – Culture media	Economic importance of bacteria	Type study: Anabaena, Spirulina,	Oedogonium- Reproduction
	3week	Serial dilution and pore plate method – colony characterisitcs of bacteria	Bacterial disease	Type study: Spirulina,	Chara – Vegetativestructure Reproduction
	4week	Applied microbiology	General account of mycoplasma	Scytonema	Sargassum – structure and reproduction
Dec	**1week**	Bioconversions of waste products	General account of mycoplasma	Phycology-Part-I: Introduction, general characteristics outlines of classification (Fritsch – 1947	Sargassum – Reproduction
	2week	A brief history of virology (scientist)	Introduction to immunology	, thallus structure, pigmentation	Polysiphonia – Structure and male gametophyte
	3week	General composition and properties of viruses	Brief account of immune system	reproduction .	Polysiphonia- female gametophyte
	4 week	TMV and bacteriophage	Application of immune techniques	. Economic importance of algae in industry,	Polysiphonia – Carposporophyte and

				agriculture, medicine	tetrasporophyte
DEC	1week	Multiplication and transmission – a brief account of prions and viroids. Common plant diseases.	Monoclonal antibodies .	Toxic algae – Algal blooms, fish poisoning.	REVISION
	2 week	Multiplication and transmission – a brief account of prions	Revision	Revision	Revision
	3week	Viroids	Revision	Revision	Revision
	4week	revision	Revision	Revision	Revision

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III SEMESTER – 2023 -2024					
MONTH	**WEEK**	**UNIT-I and UNIT-II**		**UNIT-III and UNIT-IV**	
OCTO	1	**Unit 1: ANGIOSPERM ANATOMY, PLANT CELL STRUCTURE AND TISSUES** Introduction,objectiveand scope of Plant Anatomy	, Plant cell structure	**Unit III: Morphogenesis and Differentiation**	Differentiation and cell polarity in acellular (*Dictyostelium*),
	2	nature of plant cell wall.	***Tissue and tissue systems***	Unicellular (*Acetabularia*)	multicellular system (root hair and stomata formation)
	3	meristematic tissue	permanent tissue and secretary cells.	Shoot Apical meristem (SAM): Origin, structure and function	Cytohistological zonation and Ultrastructure of meristems
	4	Classification of meristem: (apical, intercalary and lateral),	primary and secondary meristem.	Organogenesis: Differentiation of root, stem,	stem, leaf and axillary buds, bud dormancy
	5	***Apical meristem:*** Theories on organization of meristem	(apical cell theory, Tunica-Corpus theory, histogen theory and Korper-Kappe theory),	Mechanism of leaf primordium initiation,	development and Phyllotaxis (Diversity in size and shape of leaves)

	6	quiescent centre, Root cap.	Evolution and concept of organization of shoot apex	Structure and function of root apical meristem (RAM)	Root cap, quiescent centre and origin of lateral roots.
	7	Apical cell theory, Histogen theory	Tunica Corpus theory	Transition from vegetative apex into reproductive apex	Developmental patterns at flowering apex:
	8	continuing meristematic residue	cytohistological zonation	ABC model specification of floral organs.	Modification of gene action by growth hormones and.
	9	**Unit II: MORPHOGENESIS AND DIFFERENTIATION** Morphogenesis in plants	- Differentiation of root, stems and leaf.	cellular differences between floral organs. Senescence – a general account	**Unit IV: Reproductive Biology**
	10	Types of vascular bundles	Vascular cambium, Origin, development	Introduction, Scope and contributions of Indian embryologists: P. Maheswari,	, B G L Swamy, P.Maheshwari, M.S. Swaminathan and K.C. Mehta.
NOV	11	Arrangement and diversity in size and shape of leaves.	Structure of Dicot root	**Microsporangium**: Development and structure of mature anther,	Anther wall layers, Tapetum - types, structure and functions and sprogenous tissue.
	12	primary and secondary structures (Tridax/Sunflower),	Structure of monocot root (Maize).,	**Microsporogenesis** - Microspore mother cells, microspore tetrads, Pollinia.	**Microgametogenesis** – Formation of vegetative and generative cells structure of male gametophyte. Pollen embryosac

					(Nemec phenomenon).
	13	Structure of Dicot stem	Primary and secondary structures (Tridax/Sunflower),	**Megasporangium –** Structure of typical Angiosperm ovule	Types of ovule- Anatropous, Orthotropous, Amphitropous, Circinotropous.
	14	Structure of Monocot stem (Maize), Nodal anatomy.	Structure of Dicot leaf: primary structure (Tridax/Sunflower),	**Megagametogenesis –** Types of development of Female gametophyte/embryo sac- monosporic- *Polygonum* type	bisporic – *Allium* type, tetrasporic - *Fritillaria* type. Structure of mature embryosac.
DEC	15	primary structure of Monocot leaf (Maize),, Stomatal types.	Anomalous secondary growth: Aristolochia, , Boerhaavia (dicot stem)	**Pollination and fertilization:** Structural and functional aspects of pollen, stigma and style. Post	pollination events; Current aspects of fertilization and Significance of double fertilization, Post fertilization changes.
	16	Dracaena (monocot stem)	Applications in systematics, forensics and Pharmacognosy.	**Endosperm** – Types and its biological importance. Free nuclear (*Cocos nucifera*) cellular (*Cucumis),* helobial types. Ruminate endosperm.	**Embryogenesis –** Structure and composition of zygote ,Dicot (*Capsella bursa-pastoris)*and Monocot (*Najas)* embryo development. A general account of seed development.

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V SEMESTER – 2023 –2024 PAPER 5					
MONTH	**WEEK**	**UNIT-1**		**UNIT-2**	
		ZNB			
OCT	1	**UNIT-1** Mendelian genetics – Introduction ,	Mendelian genetics – Introduction [revision]	**UNIT-2** Linkage, crossing over and chromosome mapping	Linkage and crossing over - Cytological basis of crossing over; Recombination frequency,
	2	Mendelian genetics – History	Mendelian genetics –Laws and concepts	two factor and three factor crosses; Interference and coincidence	Sex Determination in plants - Melandrium
	3	Non-Mendelian genetics - Allelic [introduction]	Non-Mendelian genetics - Allelic (Incomplete Dominance)	Variation in chromosome number and structure	Gene mutations – Types, Molecular basis of Mutations; Mutagens
	4	Non-Mendelian genetics - Allelic [Co-dominance]	Non-Mendelian genetics- non-allelic gene interactions	physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of	Fine structure of gene

				mutations	
NOV	5	complement ary, supplement ary factors,	dominant and recessive epistasis)	Population Genetics - Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection and mutation	role of natural selection and mutation
	6	Multiple alleles	Extra chromosomal inheritance Chloroplast mutation	Evolutionary Genetics – Genetic drift.	. Genetic variation and Speciation
	7	variegation in Four o'clock plant	Mitochondrial mutations in yeast	**UNIT-4** Quantitative inheritance	Concept, mechanism
	8	**UNIT-3** Plant Breeding: Introduction and objectives.	Breeding systems: modes of reproduction in crop plants.	Examples of inheritance of Kernel colour in Wheat	Monogenic vs Polygenic inheritance.
	9	Important achievemen ts and undesirable consequenc es of plant breeding	Methods of crop improvement	inbreeding depression	heterosis History
	10	Plant introduction	primary and secondary Plant genetic resources - Acclimatization	genetic basis of inbreeding depression	genetic basis of heterosis;
	11	primary and secondary	Selection methods: For self-pollinating	genetic basis of inbreeding	Crop improvement and breeding

		Plant genetic resources - Acclimatization		depression and heterosis; **Applications**	
DEC	12	Selection methods: For cross-pollinating crops	Types of vegetative propagation in plants	Role of mutations	Polyploidy
	13	Hybridization – Types, Procedure.	Hybridization – advantages and limitations.	Distant hybridization	role of biotechnology in crop improvement.

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V SEMESTER – 2023 –2024 PAPER 6					
MONTH	**WEEK**	**UNIT-1**		**UNIT-2**	
		ZNB		**RV/INDIRA**	
OCT	1	**UNIT-1** Morphology of Root, Stem and Leaf.	Their modifications for various functions.	**UNIT-2** Plant identification: Taxonomic dichotomous keys;	intended (yolked) and bracketed keys. (Brief account only). frequency,
	2	Inflorescence – types.	Fruits–types.	Plant descriptions: Common Terminologies used for description of vegetative	reproductive parts of the following families
	3	Structure of Flower - Floral diagram and floral formula.	Introduction to Taxonomy: History,	Study of the diagnostic features of Angiosperm families: Annonaceae,	Study of the diagnostic features of Angiosperm families: Brassicaceae

	4	objectives, scope and relevance of Taxonomy	Systems of classification: Artificial, Natural and Phylogenetic;	Rutaceae, Fabaceae (Papilionoideae, Ceasalpinoideae and Mimosaideae)	Cucurbitaceae, Apiaceae,
NOV	5	brief account of Linnaeus', Bentham & Hooker's, Engler and Prantl's system and APG IV System (2016) - Merits and demerits of classifications	Taxonomic literature: Floras, Monographs and Journals.	Rubiaceae, Asteraceae,	Lamiaceae, Euphorbiaceae,
	6	Herbaria and Botanical gardens: Important herbaria and botanical gardens of the world	Important herbaria and botanical gardens of the world. (Royal Botanical Garden, Kew, England) and India (National Botanical Garden, Calcutta).	Orchidaceae, Commelinaceae, and Poaceae.	Plant Taxonomic Evidences: from palynology,
	7	Role of botanical gardens. Technique of Herbarium Preparation	Virtual herbarium: E-flora; Documentation.	Plant Taxonomic Evidences: from , embryology,	Plant Taxonomic Evidences: from cytology, phytochemistry and molecular data.
	8	**UNIT-3** Taxonomic Hierarchy:	Concept of taxa (family, genus, species);	**UNIT-4** Biometrics, Numerical Taxonomy; Phenetics and	Characters; Variations;

				Cladistics:	
DEC	9	taxonomic hierarchy;	Species concepts (biological, morphological and evolutionary)	OTUs, character weighting and coding;	Cluster analysis;
	10	Rank less system of phylogenetic systematics	Botanical Nomenclature:	Phenograms,	cladograms (definitions and differences)
	11	Botanical Nomenclature: Principles and rules (ICN);	Latest code –brief account, Brief account of Ranks of taxa	Phylogenetic Systematics: Terms and concepts (primitive and advanced, homology and analogy, parallelism and convergence....	monophyly, Paraphyly, polyphyly, clades, synapomorphy, symplesiomorphy, apomorphy, lineage sorting, serial homology etc.)
	12	Type concept (Typification), Rule of priority,	effective and valid publication	Origin and evolution of angiosperms;	Co-evolution of angiosperms and animals;
	13	Author citation., rejection of names,	Nomenclature of hybrids/cultivated species	Methods of illustrating evolutionary relationship (phylogenetic tree, cladogram)	Molecular taxonomy: DNA sequences of chloroplast gene (rbcL)