



**Dharmabad Shikshan Sanstha's**  
**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**  
**Academic Year 2020-21**

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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr.D.R. More**

**Department: Botany**

**Program: B.SC /FY**

**Subject: Botany**

**Course Code: CCB-I SEC A**

**Paper Title: Viruses, Bacteria, Algae, Fungi, Lichens and Mycorrhiza**

**Paper Numer: I**

<b>Unit Number</b>	<b>Unit Name</b>	<b>Topics</b>	<b>Unit-wise Outcome</b>
<b>I</b>	<b>Microbes</b>	Viruses –Introduction, general characters of viruses, replication (general account), and RNA virus (TMV); Economic importance; study of yellow vein mosaic of Bhendi Bacteria – Introduction, General characters and cell structure; Reproduction – vegetative, asexual (Binary Fission) and recombination (conjugation,) Study of Citrus Canker and Economic importance of Bacteria.	Students will differentiate between various groups of Bacteria, viruses
<b>II</b>	<b>Algae</b>	Introduction, General characters, Ecology and distribution; Range of thallus organization and reproduction; Classification of algae (F. E. Fritch's 1935); Morphology and life-cycles of the following: <i>Nostoc</i> , <i>Oedogonium</i> and <i>Ectocarpus</i> . Economic importance of algae	Get knowledge about algae and cyanobacteria life cycle and its uses
<b>III</b>	<b>Fungi</b>	Introduction- General Characteristics, ecology and significance, cell wall composition, nutrition, reproduction and classification (Alexopolous & Mims 1979); General characteristics, ecology, significance and life cycle of, <i>Penicillium</i> , <i>Alternaria</i> (Deuteromycota), <i>Agaricus</i> (Basidiomycota).	Student will learn individual life cycles of fungi

<b>IV</b>	<b>Lichens and Mycorrhiza</b>	Lichens: General characters, types and economic importance. Mycorrhiza: General characters, ectomycorrhiza and endomycorrhiza and their	Life cycles of Mycorrhiza fungi and lichens could be understood
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**Specify Course Outcome:** getting knowledge about microbes, algae, cyanobacteria, bacteria, fungi, lichens and Mycorrhiza.

**Specify Program Outcome:** Students knowledge will motivate their seriousness about microbes around us

**Signature of Teacher**

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**Academic Year 2020-21**

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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr. Prasannarani Tanneru**

**Department: Botany**

**Program: B.SC /FY**

**Subject: Botany**

**Course Code: CCBI-SEC B**

**Paper Title: Plant Ecology, Phytogeography and Environmental Biology**

**Paper Number: II**

Unit Number	Unit Name	Topics	Unit-wise Outcome
<b>I</b>	<b>Ecological Factors</b>	Introduction, Scope of Ecology, Ecological Factors: Climatic factors- Light, Temperature, Wind, Humidity. Edaphic factors- Soil moisture, Temperature, Soil pH, Soil formation, Composition and Soil profile.	Will Learn scope of ecology and knowledge about ecological factors
<b>II</b>	<b>Ecological Adaptations</b>	Morphological and anatomical adaptations in Hydrophytes ( <i>Hydrilla</i> stem and <i>Nymphaea</i> petiole), Xerophytes ( <i>Nerium</i> leaf and <i>Casuarina</i> stem). General characters of Halophytes and	Will learn about hydrophytes and Xerophytes
<b>III</b>	<b>Ecosystem and Plant Communities</b>	Ecosystem: Introduction, Structure, types (Pond ecosystem and Forest ecosystem), Tropic levels, Energy flow in ecosystem, food chain, food web and ecological pyramids. Community ecology: Community characteristics, Frequency, Density, Life forms and ecological succession (Hydrosere), Analysis of Plant communities (quadrant	Awareness about community ecology and levels of tropic

IV	<b>Phytogeography and Environmental Biology</b>	Introduction, Bio-geographical regions of India, Bio-diversity hot spots of India Environmental pollution: Air, Water and soil pollution (Causes, effects and control measures), Soil erosion and soil conservation, afforestation , deforestation and Chipko movement, Environmental education and awareness.	They will learn about Biogeographical regions of India
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**Specify Course Outcome:** student will be able to understand scope of ecology and their ecological factors, adaptations and phytogeography and environmental biology

**Specify Program Outcome:** Knowledge about Environmental factors will motivate students to conserve environment.

**Signature of Teacher**

*Pro-forma for program and course outcomes (2.6.1)*

Name of Teacher: Dr. Prasannarani Tanneru

Department: Botany

Program: B.SC /FY

Subject: Botany

Course Code: CCBII -SEC A

Paper Title: Bryophytes, Pteridophytes, Gymnosperms and Paleobotany

Paper Number: III

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	Bryophytes	General characters, Classification (N.S.Parihar), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental study not expected), Economic importance of bryophytes.	Student will learn the life cycles of individual genera of bryophytes
II	Pteridophytes	General characters, classification ( N.S.Parihar), morphology, anatomy and reproduction of <i>Lycopodium</i> and <i>Marsilea</i> . (Developmental study not expected), Homospory, Heterospory and seed habit, stelar evolution, economical importance of Pteridophytes.	Student will learn life cycles of individual genera of Pteridophytes
III	Gymnosperms	General characters, classification (K.R.Sporne, 1964), morphology, anatomy and Reproduction of <i>Cycas</i> and <i>Pinus</i> . (Developmental study not expected), Ecological and Economic importance.	Student will learn life cycles of individual genera of Gymnosperms
IV	Paleobotany	Introduction to palaeobotany, process of plant fossilization, types of fossils, geological time scale, Study of fossil Gymnosperms- <i>Lyginopteris oldhamia</i> (stem), <i>Bennettites</i> (flower) and General characters of <i>Ginkgo</i> (A living fossil).	Student learn about process of fossil formation and fossil plants

**Specify Course Outcome:** learn the life cycles of individual Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany

**Specify Program Outcome:** students will understand classification, morphology, anatomy and reproduction and learn about process of fossil formation and fossil examples

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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr. D.R.More and Mr. Y.L. Khandhare**

**Department: Botany**

**Program: B.SC /SY**

**Subject: Botany**

**Course Code: CCB II- SEC B**

**Paper Title: Taxonomy of Angiosperms**

**Paper number: IV**

<b>Unit Number</b>	<b>Unit Name</b>	<b>Topics</b>	<b>Unit-wise Outcome</b>
<b>I</b>	<b>Introduction</b>	Aims of Taxonomy, Principles of Taxonomy, Identification, Nomenclature and Classification, Principles and rules of ICN (Rank of taxa, typification, author citation) Importance of Herbarium, important herbaria and botanical gardens of the India.	Understanding classification and nomenclature of plants
<b>II</b>	<b>Plant Classification</b>	Taxonomic hierarchy, Types of classification-artificial, natural and phylogenetic. Bentham and Hooker, Engler and Prantl (up to family level with reference to families mentioned in the syllabus).	Plant Classification types typically Bentham and Hooker's

<b>III</b>	<b>Morphology of Angiosperms</b>	<p>Root: Definition, characters, types (tap root and adventitious) and functions.</p> <p>Stem: Definition, characters and functions.</p> <p>Leaf: Definition, structure of typical leaf (Hibiscus), functions, types- Simple (Hibiscus), Compound (unipinnate, bipinnate, tripinnate, unifoliate, bifoliate, trifoliate, multifoliate), venation- definition, types (reticulate, parallel), Phyllotaxy. Inflorescence: Definition, types- Racemose (characters), Cymose (characters). Flower: Definition, symmetry, actinomorphic, zygomorphic, types (hypogynous, epigynous, perigynous), structure of typical flower (Hibiscus), calyx (polysepalous, gamosepalous), corolla (polypetalous, gamopetalous), Androecium (parts of a stamen), Gynoecium –structure of carpel, apocarpous, syncarpous, placentation (axile, parietal, free central, marginal, basal) Fruit: Definition, forms- simple (dry, legume, fleshy, berry), aggregate (Etario of berries), composite (Sorosis).</p>	Student will learn about morphological characters of different parts of plant in detail
<b>IV</b>	<b>Study of Plant Families</b>	Study of vegetative and floral characters of following families: Brassicaceae, Fabaceae, Solanaceae, Lamiaceae and Poaceae .	Student will get knowledge about different families

**Specify Course Outcome:** Development of knowledge about of different angiosperm families, taxonomic tools and the origin of angiosperm

**Specify Program Outcome:** awareness of plant biodiversity at local college level, universities and Educational institutes

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**Academic year 2020-2021**

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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr. D. R. More**

**Department: Botany**

**Program: B.SC /SY**

**Subject: Botany**

**Course Code: CCB-III SEC A**

**Paper Title: PLANT ANATOMY**

**Paper number: VI**

<b>Unit Number</b>	<b>Unit Name</b>	<b>Topics</b>	<b>Unit-wise Outcome</b>
<b>I</b>	<b>Meristematic tissues</b>	Introduction and Scope of Plant Anatomy. Meristematic Tissue: Definition, classification based on origin, function, position and development, organization of root apical meristem (RAM) and shoot apical meristem (SAM), apical cell theory, Histogen theory and Tunica corpus theory	Student will learn histology and various tissues
<b>II</b>	<b>Tissue systems in plants</b>	Simple tissues: parenchyma collenchyma, sclerenchyma Complex tissues: xylem and Phloem Secretory structures in plants: laticiferous tissues (latex cells vessels), glandular tissues (external glands-digestive glands, nectary glands and internal glands -oil glands, hydathodes)	Knowledge about description of Anatomy of Dicot and Monocots
<b>III</b>	<b>Anatomy-I</b>	Vascular bundles: definition and types Primary structures: Root anatomy of Monocotyledons (maize) and Dicotyledons (sunflower), Stem anatomy of monocotyledons (maize ) and dicotyledons (sunflower), leaf anatomy of monocotyledons (maize) and dicotyledons (sunflower), Primary growth in roots and stems of plants.	Student learn embryology and micro sporogenesis and megasporogenesis



IV	Anatomy-II	<p>Secondary growth: normal secondary growth in root and stem of dicotyledons (sunflower), anomalous secondary growth: Achyranthus stem, Mirabilis, Bignonia and Dracaena stem.</p> <p>Wood anatomy: Annual rings, wood elements, heartwood and sapwood, spring wood, summer wood, tension wood, economic importance of wood and wood elements, dendrochronology. Periderm: development and composition of periderm, rhytidome and lentils</p>	<p>Student learn embryology and micro sporogenesis and megasporogenesis, fruit formation and seed formation</p>
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**Specify Course Outcome:** knowledge about histology, Anatomy embryology and various tissues

**Specify Program Outcome:** Students will get motivated about Histology, Anatomy and Embryology of angiosperms

**Signature of Teacher**

*Pro-forma for program and course outcomes (2.6.1)*

**Name of Teacher: Dr. Prasannarani Tanneru**

**Department: Botany**

**Program: B.SC /SY**

**Subject: Botany**

**Course Code: CCB-III SEC B**

**Paper Title: PLANT PHYSIOLOGY AND BIOCHEMISTRY**

**Paper Number: VII**

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	<b>Plant water relations</b>	Physical aspects of water absorption-Diffusion , DP, DPD Imbibition osmosis-OP, Exosmosis, Endosmosis, Plasmolysis, Water Potential, mechanism of water absorption by root active and Passive absorption Ascent of sap: Introduction and mechanism (transpiration pull theory)	Students will understand importance of water in plant life
II	<b>Mineral Nutrition</b>	Major and Minor elements: Introduction, source, deficiency symptoms and their role. Foliar nutrition, hydroponic technique. Mineral salt absorption: introduction mechanism of passive absorption (ion exchange theory) and active absorption (carrier concept theory). Translocation of organic solutes: Intro, mechanism of translocation (munch-mass flow hypothesis)	Various types of minerals can be understood necessary for plants
III	<b>Growth and development</b>	Growth and Plant growth regulators: Introduction, phases of growth, measurement of growth (arc indicator and Pfeitter's auxanometer), factors affecting growth. Chemical nature and practical applications of Auxins, Gibberellins, cytokines, abscisic Acid and Ethylene. Circadian Rhythms in plants Seed dormancy: Intro, causes of seed dormancy and methods of breaking seed dormancy. Seed germination: intro, types and mechanism of seed germination. Pysiology of flowering: intro, photoperiodism (LDP, SDP and DNP), phytochrome, red and far red light responses on photomorphogenesis. Photo-morphogenesis: photoreceptors, photo-chrome, crypto chrome. Vernalization and devernalization: Intro, mechanism and significance	Knowledge about growth, development, plant growth hormones Knowledge about flower production

IV	<b>Biomolecules and secondary metabolites</b>	Carbohydrates: Introduction, structure and classification, monosaccharides, disaccharides and polysaccharides (starch and cellulose) biological functions of carbohydrates. Protein: introduction, classification and biological functions of primary, secondary (alpha-helix and beta sheets), tertiary and quaternary structure of proteins Lipids: introduction, structure classification and biological functions of lipids Secondary metabolites: biological functions of tannins, terpenoids, flavonoids, alkaloids, essential oils and organic acids	Learning biomolecules and secondary metabolites
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**Specify Course Outcome:** Understand importance of water, mineral nutrition, biomolecules secondary metabolites

**Specify Program Outcome:** Knowledge about biomolecules and secondary metabolites and awareness about plant physiological processes

**Signature of Teacher**

*Pro-forma for program and course outcomes (2.6.1)*

Name of Teacher: Dr. D.R. More and Mr. Y. L. Khandhare

Department: Botany

Program: B.SC /SY

Subject: Botany

Course Code: CCB-IV SEC A

Paper Title: Plant Embryology

Paper number: VIII

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	Embryology	Introduction-Definiton and Scope, Contribution of embryologists: W. Hofmeister, E. Strasburger, S.G. Nawaschin, P. Maheshwari, B.G.L Swamy and B.M Johri Microsporangium-Strucute of typical anther, T.S of Anther, Microsporogenesis, structure of Pollengrain, Development of Male gametophyte, male sterility, Pollen germination, Pollentube growth and guidance, pollen storage, pollen allergy, pollenembyo. Brief Accountant of palynology	Knowledge about scientists, microsporogenesis, and palynology
II	Pollination biology	Pollination, Introduction, definition, Agents of pollination, mechanism of pollination in Salviaplant, types of pollination, self-pollination, cross pollination, adaptations (contrivances) in pollination	Students will learn about pollination, its metods, adaptations
III	Megasporangium and fertilisation	Megasporangium-structute of typical ovule, L.S . Ovule, types of Ovule (Orthotropous, Anatropous, Hemianatropous, Amphitropous, camphylotropous and Circinotropous)Megasporogenesis, Structure of the embryo sac, Development of Mnosporic (Polygonum type), Bisporic (Allium type) and Tetrasporic (Adoxa type) female gametophytes, Fertilization- Double fertilisation and Triple fusion,	Student will learn about megasporangium, types of embryos, fertilisation process

IV	<b>Embryo and Endosperm</b>	Endosperm-Definition and types of endosperms (Nuclear, Cellular and Helobial endosperm), Embryo-Definition, development of Dicot (Crucifer type) embryo and Monocot (sagittaria type), Development of seed and Fruit (Post fertilisation changes), seed dispersal and seed germination, seed appendages, endosperm and non-endospermic seeds. A brief account of Polyembryony, Apomixis and Parthenocarpy	Student will learn about Endosperm, Embryo and its development
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**Specify Course Outcome:** Overall knowledge about embryology, pollen grains, process of fertilisation, Embryo and endosperm

**Specify Program Outcome:** Awareness about the reproductive process and fertilisation process , embryo development in angiosperms

**Signature of Teacher**

*Pro-forma for program and course outcomes (2.6.1)*

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Name of Teacher: Dr. Prasannarani Tanneru

Department: Botany

Program: B.SC /SY

Subject: Botany

Course Code: CCB-IV SEC B

Paper Title: Plant Metabolism and Biotechnology

Paper number: IX

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	Photosynthesis & Respiration	<p><b>Photosynthesis:</b> Introduction, ultra structure of chloroplast, photosynthetic pigments, concepts of two Photosystems, Mechanism of photosynthesis, Light reaction, Hill's reaction, Cyclic and Non-cyclic photophosphorylation, Calvin cycle (C3) and Hatch and Slack (C4) pathway, CAM pathway, Significance of photosynthesis, photorespiration.</p> <p><b>Respiration:</b> Introduction, ultra structure of mitochondria, structure and functions of ATP, significance of respiration. Respiratory quotient (RQ)</p> <p><b>Types of respiration:</b> Aerobic respiration- Glycolysis, Krebs's cycle, Electron Transport System. Anaerobic respiration- Fermentation (Alcoholic and Lactic acid)</p>	Proficiency in basic terminologies of photosynthesis and respiration
II	Enzymes and Nitrogen Metabolism	<p><b>Enzymes:</b> Introduction, nomenclature and classification (IUB), mechanism of enzyme action (Lock and key model, induced fit model), Concept of holoenzyme, mechanism of regulation of Enzyme activity-Feedback and allosteric regulation.</p>	Students will learn about enzymes, mechanism of enzyme action with regulations Basic knowledge about Nitrogen metabolism

III	<b>Biotechnology- Plant tissue culture</b>	<p>Introduction to Biotechnology, current uses of biotechnology, Plant Tissue Culture: Introduction to plant tissue culture, totipotency of plant cells, basic aspects</p> <p>of tissue culture laboratory, nutrient media, composition and its preparation , Technique of plant</p> <p>tissue culture: selection and surface sterilization of explants, inoculation, incubation (temperature and light regime) ,Initiation of callus cultures and cell suspension cultures, Regeneration of plants (Organogenesis and embryogenesis).</p> <p><b>Applications of tissue culture:</b> Micropropagation, Production of disease free plants, production of secondary metabolites, Anther culture and production of haploids, protoplast culture and somatic hybridization, synthetic seeds</p>	Student will learn about tissue culture and different application
IV	<b>Biotechnology- Genetic Engineering</b>	<p>Introduction to genetic engineering ,tools and techniques and applications of recombinant DNA technology, Cloning vectors (Plasmid-PBR 322, Bacteriophage, Cosmid, Phagemid ), Gene cloning, Genomic library and cDNA library, <i>Agrobacterium</i> mediated gene transfer, transgenic plants, Polymerase Chain Reaction and its applications.</p> <p><b>Bioinformatics:</b> Introduction, Biological database, NCBI, BLAST.</p>	Knowledge about Genetic Engineering and Bioinformatics

**Specify Course Outcome:** Students will learn about different types of enzymes, Biotechnology metabolism and Genetic engineering

**Specify Program Outcome:** Understanding this course will led students to study further recent techniques and tissue culture concepts along with statistics used in Botany

**Signature of Teacher**



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*Pro-forma for program and course outcomes (2.6.1)*

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Name of Teacher: Dr. Prasannarani Tanneru

Department: Botany

Program: B.SC /TY

Subject: Botany

Course Code: **DSEB-I SEC A**

Paper Title: PLANT PHYSIOLOGY

Paper number: XII

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	Plant water relations	<b>Importance of water in plant life</b> <b>Different bio-physico-chemical phenomenon:</b> Permeability, Diffusion, Osmosis, Plasmolysis and Imbibition. <b>Ascent of sap:</b> Introduction and mechanism (transpiration pull theory), <b>Transpiration:</b> Definition, types, structure of stomata, mechanism of opening and closing of stomata (starch-sugar theory and K <sup>+</sup> pump theory). <b>Plant movements:</b> Introduction, classification, paratonic and nastic movements.	Students will understand importance of water in plant life
II	Mineral Nutrition	<b>Major and Minor elements:</b> Introduction, source, deficiency symptoms and their role. <b>Mineral salt absorption:</b> Introduction, mechanism of passive absorption (ion exchange theory) and active absorption (carrier concept theory) <b>Translocation of organic solutes:</b> Introduction, mechanism of translocation (Munch-Mass flow hypothesis)	Various types of minerals can be understood necessary for plants



III	<b>Growth and Development</b>	<p><b>Growth and Plant growth regulators:</b> Introduction, phases of growth, measurement of growth (arc indicator and Pfeiffer's auxanometer), factors affecting growth, Chemical nature and practical applications of Auxins, gibberellins, cytokinins, abscisic acid and ethylene.</p> <p><b>Seed dormancy:</b> Introduction, causes of seed dormancy and methods of breaking seed dormancy</p> <p><b>Seed germination:</b> Introduction, types and mechanism of seed germination, <b>Physiology of flowering:</b> Introduction, Photoperiodism (LDP, SDP and DNP), <b>Vernalization and devernialization:</b> Introduction, mechanism and significance,</p>	<p>Knowledge about growth, development, plant growth hormones</p> <p>Knowledge about flower production</p>
IV	<b>Biomolecules and Secondary metabolites</b>	<p><b>Biomolecules:</b></p> <p><b>Carbohydrates:</b> introduction, structure and classification, Monosaccharides, disaccharides and polysaccharides (starch and cellulose)</p> <p><b>Protein-</b> Introduction, classification and biological functions of Primary, secondary (<math>\alpha</math> helix and <math>\beta</math> sheets), tertiary and quaternary structure</p> <p><b>Lipids:</b> Introduction, structure classification and biological functions of lipids</p> <p><b>Secondary metabolites:</b> Biological functions of tannins, terpenoids, flavonoids, alkaloids, essential oils and organic acids</p>	<p>Learning biomolecules and secondary metabolites</p>

**Specify Course Outcome:** Understand importance of water, mineral nutrition, biomolecules secondary metabolites

**Specify Program Outcome:** Knowledge about biomolecules and secondary metabolites and awareness about plant physiological processes

**Signature of Teacher**

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**Dharmabad Shikshan Sanstha's**  
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**Academic Year 2020-21**

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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr. D.R. More**

**Department: Botany**

**Program: B.SC /TY**

**Subject: Botany**

**Course Code: DSEB-I SEC B**

**Paper title: SYSTEMATIC BOTANY-I**

**Paper number: XIII**

<b>Unit Number</b>	<b>Unit Name</b>	<b>Topics</b>	<b>Unit-wise Outcome</b>
<b>I</b>	<b>Classification</b>	Introduction- Definition, aims, scope and application of angiosperms taxonomy, Types of classification- Artificial, Natural and Phylogenetic, Outline of Bentham and Hooker, Engler and Prantl and Hutchinson's systems of classification of angiosperms with merits and demerits	Learn about different types of classification of plants
<b>II</b>	<b>Principles of Taxonomy</b>	ICN (International Code of Nomenclature)-Brief history, principle of priority, effective and valid publication, typification and author citation, Species concept- Morphological and biological, Role of phytochemistry, cytology, anatomy and palynology in relation to taxonomy. Pollen morphology with reference to pollen grains of Hibiscus, Ipomoea and Grasses	Proficiency with the basic terminologies, principles of plant taxonomy

<b>III</b>	<b>Study of Dicot families-I (Polypetalae)</b>	Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance Papaveraceae, Mimosaceae, Combretaceae, Myrtaceae, Rutaceae, , Cucurbitaceae Nyctaginaceae (Monochlamydeae)	Students will identify the major families of plants and their economic importance
<b>IV</b>	<b>Study of Dicot families-II (Gamopetalae)</b>	Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance Rubiaceae, Apocynaceae, Convolvulaceae, Bignoniaceae, Acanthaceae, Verbenaceae,	Able to identify the major families of plant and their economic importance

**Specify Course Outcome:** Develop knowledge regarding classification, principles of taxonomy and different dicot and monocot families

**Specify Program Outcome:** Create the awareness of systematic botany and its identification , description and classification of plants among the students.

**Signature of Teacher**

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*Pro-forma for program and course outcomes (2.6.1)*

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Name of Teacher: Dr. Prasannarani Tanneru

Department: Botany

Program: B.SC /TY

Subject: Botany

Course Code: DSEB-II SEC A

Paper Title: Plant Metabolism, Biochemistry and Biotechnology

Paper number: XIV

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	<b>Photosynthesis and Respiration</b>	<b>Photosynthesis:</b> Introduction, significance, ultra structure of chloroplast, photosynthetic pigments, concepts of two Photo systems, Mechanism of photosynthesis, Light reaction, Hill reaction, Cyclic and Non cyclic photophosphorylation, Dark phase, Calvin cycle (C3) and Hatch and Slack (C4) pathway, CAM pathway  <b>Respiration:</b> Introduction, significance, ultra structure of mitochondria, structure and functions of ATP, <b>Types of respiration:</b> Aerobic respiration- Glycolysis, Krebs' cycle, Electron Transport System. Anaerobic respiration- Fermentation (alcoholic and lactic acid)	Proficiency in basic terminologies of photosynthesis and respiration

II	<b>Enzymes and Nitrogen Metabolism</b>	<b>Enzymes:</b> Introduction, nomenclature and classification (IUB), mechanism of enzyme action (lock and key model, induced fit model), Concept of holoenzyme, mechanism of regulation of enzyme activity-Feedback and allosteric regulation. <b>Nitrogen metabolism:</b> Introduction, sources and forms of nitrogen, types of nitrogen fixation- physical and biological (symbiotic and asymbiotic), Ammonification, nitrification and denitrification	Students will learn about enzymes, mechanism of enzyme action with regulations Basic knowledge about Nitrogen metabolism
III	<b>Biotechnology</b>	<b>Tissue culture:</b> Introduction and basic aspects of tissue culture, media, culture techniques, cellular totipotency. <b>Applications of tissue culture:</b> Micropropagation, Production of disease free plants, production of secondary metabolites, Anther culture and production of haploids, protoplast culture and somatic hybridization, synthetic seeds	Student will learn about tissue culture and different application
IV	<b>Genetic Engineering</b>	Introduction, tools and techniques of recombinant DNA technology, Cloning vectors, Gene cloning, Genomic library and cDNA library, <i>Agrobacterium</i> mediated gene transfer, transgenic plants. <b>Bioinformatics:</b> Introduction, Biological database, NCBI, BLAST.	Knowledge about Genetic Engineering and Bioinformatics

**Specify Course Outcome:** Students will learn about different types of enzymes, Biotechnology metabolism and Genetic engineering

**Specify Program Outcome:** Understanding this course will led students to study further recent techniques and tissue culture concepts along with statistics used in Botany

**Signature of Teacher**

*Pro-forma for program and course outcomes (2.6.1)*

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Name of Teacher: Dr. D.R. MORE and Mr. Y. L. Khandhare

Department: Botany

Program: B.SC /TY

Subject: Botany

Course Code: DSEB-II SEC B

Paper Title: SYSTEMATIC BOTANY-II

Paper number: XV

Unit Number	Unit Name	Topics	Unit-wise Outcome
I	Study of Monocot Families-I	Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance Musaceae, Zingiberaceae, Cannaceae Amaryllidaceae	Able to identify the major families of plants and their economic importance
II	Study of Monocot Families-II	Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance Orchidaceae, Commelinaceae, Cyperaceae, palmaceae	Able to identify the major families of plants and their economic importance
III	Taxonomic tools	Herbarium- Techniques of plant preservation, Importance of herbarium, Botanical gardens- Role in plant taxonomy, Important Botanical gardens, Plant identification key-Types and use	Understand the methods of collecting and preserving plants

IV	<b>Origin of Angiosperms</b>	Place and Time of origin of angiosperms, Probable ancestors of Angiosperms: Benettitalean theory, Gnetalean theory, Pteridosperm theory	Learn the characters of taxa belonging to angiosperms and their comparative account of families
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**Specify Course Outcome:** Develop knowledge about different angiosperms, their families , taxonomic tools and origin of Angiosperms

**Specify Program Outcome:** Plant Biodiversity awareness for students of universities and educational institutes.

**Signature of Teacher**