

# M.V.R. DEGREE COLLEGE

## (UG And PG Courses)

(Affiliated to Andhra University)  
An Institution of Priyadarshini Educational Academy)  
NAAC ACCREDITED COLLEGE



**Dr.V.Rama Rao, M.A.,Ph.D.,**  
Secretary & Correspondent

**Dr.A.Balakrishna,M.Sc.,Ph.D.,**  
Principal

**Department Of Botany**  
**Bachelor of Science (BSc-CBZ)**  
**Course Outcomes (COs) for Botany (CBZ)**  
**APSCH E w.e.f.2015-2016 (revised in April 2016)**

Code	Title of the paper	Outcomes
<b>DSC 1A (TH)</b>	<b>Microbial Diversity, Algae and Fungi</b>	<p><b>CO1:</b> Develop skills and knowledge in microbial diversity and microscopic methods.</p> <p><b>CO2:</b> Be able to understand the microbial world and identify microbial diversity.</p> <p><b>CO3:</b> Gain knowledge about classification of microorganisms and special groups of bacteria.</p> <p><b>CO4:</b> Study, discovery and structure of different viruses and different plant diseases caused by viruses.</p> <p><b>CO5:</b> Learn about the discovery, general characteristics, nutrition and economic importance of bacteria.</p> <p><b>CO6:</b> Study and import knowledge about the occurrence, distribution, structure and life history of lower plants such as Algae, Fungi and Lichens.</p> <p><b>CO7:</b> Study the structure, reproduction and life history and economic importance of different algae in the local ecosystems.</p> <p><b>CO8:</b> Familiarise with the general characteristics of fungi.</p> <p><b>CO9:</b> Gain knowledge about the structure, reproduction and life history of different types of fungi.</p> <p><b>CO10:</b> Know about lichens-structure, reproduction and ecological &amp; economic importance.</p>
<b>DSC 1A (Pr)</b>	<b>Microbial diversity, Algae and Fungi</b>	<p><b>CO1:</b> Gain knowledge about equipment used in microbiology and safe laboratory practices like safe chemical handling, hazardous waste management and proper use of lab equipment.</p>

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		<p><b>CO2:</b> Learn about the study of viruses and bacteria using electron photon micrographs.</p> <p><b>CO3:</b> Gain knowledge about the plant disease symptoms caused by bacteria under microscope and hands on experience.</p> <p><b>CO4:</b> Understand the vegetative and reproductive structures of bacteria, algae and fungi and familiarise with microscopic technique and cellular drawing.</p> <p><b>CO5:</b> Advanced study of plant material infected by fungi and learning of morphology and anatomy of different thalli.</p> <p><b>CO6:</b> Field visits to gain more hands-on experience.</p> <p><b>CO7:</b> Gain knowledge on bacterial identification using gram staining methods of analysis</p>
<b>DSC 1B (TH):</b>	<b>Diversity of Archaeogoniates and plant anatomy</b>	<p><b>CO1:</b> Understanding and comparison of various Bryophytes, Pteridophytes.</p> <p><b>CO2:</b> Study and importing knowledge about the occurrence, distribution, structure and life history of lower plants such as Bryophytes, Pteridophytes, Gymnosperms and wood yielding plants.</p> <p><b>CO3:</b> Gaining knowledge about the phylogeny and evolutionary concepts in lower group of plants like Bryophytes and Pteridophytes.</p> <p><b>CO4:</b> Understanding the classification, characteristics, ultra-structure of Bryophytes, Pteridophytes and Gymnosperms.</p> <p><b>CO5:</b> Know about fossilisation and types of fossils, Bennettitales general account.</p> <p><b>CO6:</b> Gain understanding about evolutionary significance of Bryophytes and Pteridophytes.</p> <p><b>CO7:</b> Gain insights on geological time scale process.</p> <p><b>CO8:</b> Understanding of various theories to gain knowledge of shoot and root apex organisation.</p>

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		<b>CO9:</b> Acquire knowledge on plant histology, anatomy and anomalous secondary growth. <b>CO10:</b> Familiarize with some common wood yielding plants of India.
<b>DSC 1B (Pr):</b>	<b>Diversity of Archaeogoniates and anatomy</b>	<b>CO1:</b> Learn about the principles of basic and advanced microscopy. <b>CO2:</b> Advanced learning of Bryophytes, Pteridophytes and anatomy slides and specimens under microscope and gain hands-on experience. <b>CO3:</b> Familiarize with the external and internal structure of Bryophytes, Pteridophytes and Wood yielding plants. <b>CO4:</b> Gain knowledge on the double staining technique. <b>CO5:</b> Understand how to survey techniques and to identify and evaluate the values of different timbers available locally.
	<b>Plant Taxonomy and Embryology</b>	<b>CO1:</b> Understanding of principles of taxonomy and the modern trends in plant taxonomy. <b>CO2:</b> Gain knowledge about identification and naming of plants as per ICBN regulations. <b>CO3:</b> Acquiring knowledge about the classification of Phanerogams according to the standard system of classification. <b>CO4:</b> Understanding different types of systems of classification based on natural and evolutionary tendencies. <b>CO5:</b> Gain knowledge on the diversity of families of angiosperms. <b>CO6:</b> Understand the various aspects of embryology of plants. <b>CO7:</b> Acquire basic and detailed understanding for identification of the members of different families. <b>CO8:</b> Understand and identify the different stages in reproduction leading to seed formation in angiosperms.

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		<p><b>CO9:</b> Enable to understand the process of pollination and fertilisation leading to the formation of fruit, seed and embryo.</p> <p><b>CO10:</b> Gaining knowledge about the diversity in embryogeny of dicots and monocots and also about polyembryony as an abnormal characteristic.</p>
<b>DSC 2A(Pr)</b>	<b>Plant taxonomy and embryology</b>	<p><b>CO1:</b> Understand the angiospermic plant diversity and identify the members of the representative families through taxonomic observations.</p> <p><b>CO2:</b> Acquiring the skill of Herbarium technique.</p> <p><b>CO3:</b> Gaining knowledge about identification of different stages in reproduction leading to seed formation in angiosperms.</p> <p><b>CO4:</b> Isolating the embryos and testing the viability of pollen grains.</p>
<b>DSC 2B (TH)</b>	<b>Plant physiology and metabolism</b>	<p><b>CO1:</b> Understanding the requirement of mineral nutrition for plant growth.</p> <p><b>CO2:</b> Acquiring knowledge about sensory photobiology.</p> <p><b>CO3:</b> Understanding the process of photosynthesis, respiration and nitrogen metabolism.</p> <p><b>CO4:</b> Knowing about the plant growth nutrients and understanding the biosynthesis of nitrogenous compounds and their role in plants.</p> <p><b>CO5:</b> Understanding physiology of flowering – photoperiodism; role of phytochrome in flowering and vernalization.</p> <p><b>CO6:</b> A pervasive understanding on the kingdoms of biomolecules, metabolites and pathways that are the prerequisites and consequences of physiological phenomenon for further manipulations.</p> <p><b>CO7:</b> Acquaintance with mechanistic view on</p>



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		the plant environment interactions. <b>CO8:</b> Development of an integrative approach for visions in biological problems. <b>CO9:</b> Understanding the stress tolerance mechanism adopted by plants. <b>CO10:</b> Knowing about the plant growth hormones (Auxins, Gibberellins, Cytokinens, Ethylene, Brassinosteroids) and assessing their role in plants.
<b>DSC 2B (Pr)</b>	<b>Plant physiology and metabolism</b>	<b>CO1:</b> Upon completion of this course, students will be able to understand the major functions and physiological processes occurring in plants. These processes have both theoretical and practical value. <b>CO2:</b> Become acquainted with plant metabolism (photosynthesis, respiration and mineral nutrition), water relations, gas exchange and physiology of growth and development and plant responses to environmental stress. Be able to describe and use the basic techniques for studying. <b>CO3:</b> Students will be able to discuss some practical applications of plant physiological research.
<b>DSC 3A (TH)</b>	<b>Cell biology, genetics and plant breeding</b>	<b>CO1:</b> Gain basic knowledge to understand the ultrastructure of envelopes of plant cell, nucleus, chromosomes and cell division. <b>CO2:</b> Gain detailed knowledge about genetic material DNA, its structure, replication and types of RNA <b>CO3:</b> Gain detailed knowledge about the various stages of cell division and chromosomal analysis or karyotyping. <b>CO4:</b> Acquire an insight of molecular biology. <b>CO5:</b> Enable the student to understand and comprehend the basic principles of heredity. <b>CO6:</b> Gain basic and better knowledge about the

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		<p>mutations and polyploidy.</p> <p><b>CO7:</b> Solve problems in genetics on the basis of Mendel's laws of inheritance.</p> <p><b>CO8:</b> Enable the students to know the different concepts, methods and recent trends of plant breeding.</p> <p><b>CO9:</b> Acquire practical knowledge to understand the principles and techniques of plant breeding.</p> <p><b>CO10:</b> Learn basic concepts on Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).</p>
<b>DSC 3A (Pr)</b>	<b>Cell Biology, Genetics and Plant Breeding</b>	<p><b>CO1:</b> Study the structure of plant cell through temporary mounts and cell organelles through microphotographs.</p> <p><b>CO2:</b> Acquire practical knowledge in cytochemical methods of fixation and nuclear staining.</p> <p><b>CO3:</b> Gain good skills for cytological preparation for study of mitosis using onion root tips.</p> <p><b>CO4:</b> Be able to identify different stages of mitosis by squash preparations of onion roots.</p> <p><b>CO5:</b> Able to do calorimetric estimation of DNA by diphenylamine method.</p> <p><b>CO6:</b> Develop analytical skills to solve numerical problems in genetics and field skills to perform emasculation and hybridization methods in plant breeding.</p>
<b>DSC 3B (TH)</b>	<b>Plant Ecology and Phytogeography</b>	<p><b>CO1:</b> Acquire knowledge about the basic concepts of ecology and environment.</p> <p><b>CO2:</b> Understand the morphological, anatomical and physiological response of plants to the environmental factors.</p> <p><b>CO3:</b> Learn the role and impact of climatic factors on plant communities and general vegetation.</p>

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		<p><b>CO4:</b> Understand population characteristics.</p> <p><b>CO5:</b> Learn methods to study plant communities.</p> <p><b>CO6:</b> Gain knowledge about the importance of community ecology and ecological succession.</p> <p><b>CO7:</b> Know the significance of phytogeography and understand the phytogeographical regions of India and the world.</p> <p><b>CO8:</b> Acquire knowledge to identify causes of biodiversity loss and learn ex-situ and in-situ conservation methods of biodiversity.</p> <p><b>CO9:</b> Be able to locate biodiversity hotspots on a map.</p> <p><b>CO10:</b> Understand the role of seed banks and international organisations in the conservation of biodiversity.</p>
<b>DSC 3B (Pr):</b>	<b>Plant Ecology and Phytogeography</b>	<p><b>CO1:</b> Learn handling of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, psychrometer, rain gauge and lux meter.</p> <p><b>CO2:</b> Learn the quantitative aspects of a plant community by quadrat method.</p> <p><b>CO3:</b> Estimation of primary productivity of an ecosystem.</p> <p><b>CO4:</b> Gain understanding of the phytogeography of India and the world.</p> <p><b>CO5:</b> Locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.</p>
<b>Paper VII(B)-(TH)</b>	<b>Nursery, Gardening and Floriculture</b>	<p><b>CO1:</b> Learn nursery infra structure and its management.</p> <p><b>CO2:</b> Know methods of direct planting of seedlings and transplants.</p> <p><b>CO3:</b> Enable the students to learn different types of gardening and regular garden operations soil as soil laying, manuring and watering.</p>

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		<p><b>CO4:</b> Develop an approach towards landscaping highways, educational institutes and other public places like parks.</p> <p><b>CO5:</b> Acquire knowledge on seed propagation methods like sowing and raising of seeds and seedlings, transplanting of seedlings.</p> <p><b>CO6:</b> Learn techniques involved in layering and cutting, rooting and cultivation of plants in pots, Indoor gardening; Bonsai</p> <p><b>CO7:</b> Understand and learn techniques in floriculture - propagation of ornamental plants by rhizomes, corms tubers, bulbs and bulbils.</p> <p><b>CO8:</b> Familiarize with Green house - mist chamber, shed root, shade house and glass house for propagation.</p> <p><b>CO9:</b> Gain knowledge on factors affecting flower production and management of pests, diseases and methods of harvesting.</p> <p><b>CO10:</b> Learn methods in production and packaging of cut flowers, flower arrangements and to prolong vase life of flowers.</p>
<b>Paper VII(B)-(Pr.)</b>	<b>Nursery, Gardening and Floriculture</b>	<p><b>CO1:</b> Develop skills on propagation and nursery techniques.</p> <p><b>CO2:</b> Get acquaintance with tools, implements and containers used in nursery and gardening and floriculture.</p> <p><b>CO3:</b> Acquire basic and detailed understanding for identification of commercially important flower crops and their varieties.</p> <p><b>CO4:</b> Acquire skill in grading, packing and marketing of cut flowers.</p> <p><b>CO5:</b> Gain more hands-on experience through field visits and the project study help the students to improve their presentation skills.</p>
<b>VIII-A-1-(TH)</b>	<b>Plant diversity and human welfare.</b>	<p><b>CO1:</b> Learn different types of diversity at ecosystem level and management of plant biodiversity</p>

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		<p><b>CO2:</b> Understand the ethical and aesthetic values of plant diversity.</p> <p><b>CO3:</b> Know the use of biodiversity and different methodologies for its valuation and uses of plants.</p> <p><b>CO4:</b> Acquire knowledge on loss of genetic diversity, loss of species diversity, loss of agro biodiversity</p> <p><b>CO5:</b> Learn about -IUCN, UNEP, UNESCO, WWF, NBPGR.</p> <p><b>CO6:</b> Understand biodiversity legislation and conservations.</p> <p><b>CO7:</b> Enable to understand contemporary practices in resource management including EIA, GIS and solid and liquid waste management.</p> <p><b>CO8:</b> Learn the social approaches to conservation and its importance.</p> <p><b>CO9:</b> Know the role of plants in relation to Human Welfare particularly importance of forestry and commercial utilization of plants and their products</p> <p><b>CO10:</b> Enable the student to aware biodiversity programmes and sustainable development.</p>
<b>VIII-A-1 -(Pr.)</b>	<b>Plant diversity and human welfare.</b>	<p><b>CO1:</b> Helps in study and identification of plant diversity (flowering plants) and exotic species</p> <p><b>CO2:</b> Able to identify forest trees by looking at its bark, wood, flowers, leaves and fruits.</p> <p><b>CO3:</b> Gets hands on experience on the technique involved in maceration of wood to study and identify of the elements of wood.</p> <p><b>CO4:</b> Learn the methods of preservation and canning of fruits.</p> <p><b>CO5:</b> Gain more hands-on experience through field visits and have better understanding on ecological diversity.</p>
<b>VIII-A-2-</b>	<b>Ethnobotany and</b>	<b>CO1:</b> Gain knowledge on relevance of

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(TH)	medicinal botany	<p>ethnobotany and the life styles of major ethnic groups or tribals in India.</p> <p><b>CO2:</b> Learn different plants used as food, intoxicants and beverages, resins and oils by the tribal populations in India.</p> <p><b>CO3:</b> Understand role of ethnobotany in modern medicine with special reference to plants such as <i>Rauvolfia epentina</i>, <i>Trichopus zeylanicus</i>, <i>Artemisia annua</i>, <i>Withania somnifera</i>.</p> <p><b>CO4:</b> Acquire knowledge on significance of plants such as <i>Azadirachta indica</i>, <i>Ocimum sanctum</i>, <i>Gloriosa superb</i>, <i>Phyllanthus niruri</i>, <i>Indigofera tinctoria</i>, <i>Senna auriculata</i>, <i>Curcuma longa</i> in ethno botanical practices.</p> <p><b>CO5:</b> Study the role of ethnic groups in the conservation of plant genetic resources</p> <p><b>CO6:</b> Develop an approach to protect the interests of ethnic groups.</p> <p><b>CO7:</b> Enable the student to study history, scope and importance of medicinal plants.</p> <p><b>CO8:</b> Learn the scope, origin, history and concept of indigenous medicinal sciences such as Ayurveda, Siddha and Unani systems and their efficacy</p> <p><b>CO9:</b> Gain knowledge on conservation - <i>In situ</i> conservation and <i>Ex situ</i> conservation of endangered and endemic medicinal plants.</p> <p><b>CO10:</b> Learn biopiracy, Intellectual Property rights and traditional knowledge of plant medicines.</p>
VIII-A-2-(Pr.)	Ethnobotany and medicinal botany	<p><b>CO1:</b> Develop skills in identification of various plant parts used as medicines by ethnic groups.</p> <p><b>CO2:</b> Understand the difference between ancient wisdom and modern system of medicine.</p> <p><b>CO3:</b> Learn the use of traditional medicine at the rescue of curing drug resistant maladies like</p>

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		<p>malaria and viral diseases.</p> <p><b>CO4:</b> Know the importance of spices in Indian kitchens and their therapeutic role.</p> <p><b>CO5:</b> Gain more hands-on experience through field visits. Interaction with local tribes during field visits help the student for better understanding on identification of ethno medicinal plants used by them.</p>
VIII-A-3-(TH)	Pharmacognosy and Phytochemistry	<p><b>CO1:</b> Learn about pharmacognosy (knowledge concerned with medicinal drugs) and various types of drugs obtained from plants and their utilization for the welfare of human beings.</p> <p><b>CO2:</b> Understand the importance and methods evaluation of different types of drugs isolated from plants.</p> <p><b>CO3:</b> Acquire knowledge about the nature of active principles and common adulterants of certain plants such as : <i>Alstonia scholaris</i> (bark), <i>Adhatoda vasica</i>(leaf), <i>Strychnos nuxvomica</i> (seed), <i>Rauwolfia serpentina</i>(root) and <i>Zinziber officinalis Catharanthus roseus</i>.</p> <p><b>CO4:</b> Learn methods on extraction of primary and secondary metabolites from plants and their utility for human.</p> <p><b>CO5:</b> Enable the students to learn about biosynthesis and sources of plant drugs mainly phenols and phenolic glycosides, tannins, anthraquinones, coumarins and furanocoumarins, flavones and related flavonoid glycosides, anthocyanins, betacyanins, stilbenes, lignins and lignans.</p> <p><b>CO6:</b> Understand the chemistry of steroids, sterols, saponins, withanolides, ecdysones, cucurbitacins and alkaloids extracted from plants.</p> <p><b>CO7:</b> Gain knowledge on volatile oils and aromatherapy using natural plant metabolites.</p>

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		<p><b>CO8:</b> Know about plant enzymes, proteins and amino acids and their utility as drugs.</p> <p><b>CO9:</b> Enable to understand the chemical nature and mode of action of vaccines, toxins and toxoids, antitoxins, immune globulins, antiserums, vitamins and antibiotics obtained from plants.</p> <p><b>CO10:</b> Gain knowledge on pharmacological action of plant drugs such as tumor inhibitors, PAF (Platelet Activating Factor) antagonists, antioxidants, phytoestrogens and role of enzyme inhibitors in human beings.</p>
<b>VIII-A-3- (Pr.)</b>	<b>Pharmacognosy and Phytochemistry</b>	<p><b>CO1:</b> Develop skills on identification of various plant parts used as medicines.</p> <p><b>CO2:</b> Learn techniques on extraction of active principles from plant parts which are identified to have medicinal value and their isolation by chromatographic method.</p> <p><b>CO3:</b> Perform physical and chemical tests for evaluation of unorganized drugs such as Asaphoetida, Honey, Castor oil and Acacia.</p> <p><b>CO4:</b> Identification of crude drugs from bark, root, rhizome, fruit, flower and whole plants.</p> <p><b>CO5:</b> Develop skills on the preparation of herbarium.</p>



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