A.S.D GOVT DEGREE COLLEGE FOR WOMEN (A)

(Re-Accredited by NAAC with'B')

KAKINADA 533002, EASTGODAVARI, ANDHRA PRADESH

BOTANY SYLLABUS

2021 – 2022

DEPARTMENT OF BOTANY & HORTICULTURE

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (A)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

COURSE OUTCOMES

SEMESTER – 1

- Explain origin of life on the earth.
- Illustrate diversity among the viruses and prokaryotic organisms and can categorize them.
- Classify fungi, lichens, algae and bryophytes based on their structure, reproduction and lifecycles.
- Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi.
- Recall and explain the evolutionary trends among amphibians of plant kingdom for their shift to land habitat.
- Evaluate the ecological and economic value of microbes, thallophytes and bryophytes.

Microbial diversity

SEMESTER – 2

- Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and lifecycles.
- Justify evolutionary trends in tracheophytes to adapt for land habitat.
- Explain the process of fossilization and compare the characteristics of extinct and extant plants.
- Critically understand various taxonomical aids for identification of Angiosperms.
- Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families.
- Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welfare.
- Locate different phytogeographical regions of the world and India and can analyze their floristic wealth

SEMESTER-3

Understand on the organization of tissues and tissue systems in plants.

- Illustrate and interpret various aspects of embryology.
- Discuss the basic concepts of plant ecology, and evaluate the effectsof environmental and biotic factors on plant communities.
- Appraise various qualitative and quantitative parameters to study the population and community ecology.
- Correlate the importance of biodiversity and consequences due to its loss.
- Enlist the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation.

SEMESTER – 4

- Distinguish prokaryotic and eukaryotic cells and design the model of a cell.
- Explain the organization of a eukaryotic chromosome and the structure of genetic material.
- Demonstrate techniques to observe the cell and its components under a microscope
- Discuss the basics of Mendelian genetics, its variations and interpret inheritanceof traits in living beings.
- Elucidate the role of extra-chromosomal genetic material for inheritance of characters.
- Evaluate the structure, function and regulation of genetic material.
- Understand the application of principles and modern techniques in plant breeding.
- Explain the procedures of selection and hybridization for improvement of crops.

SEMESTER -5

- Distinguish prokaryotic and eukaryotic cells and design the model of a cell.
- Explain the organization of a eukaryotic chromosome and the structure of genetic material.
- Demonstrate techniques to observe the cell and its components under a Microscope.
- Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings.
- Elucidate the role of extra-chromosomal genetic material for inheritance of characters.
- Evaluate the structure, function and regulation of genetic material.
- Understand the application of principles and modern techniques in plant breeding.
- Explain the procedures of selection and hybridization for improvement of crops.

SEMESTER – 6

- Study about tissue culture methods and applications are extensively studied with application point of view
- Plant biotechnology reveals new trends in plant sciences this was extensively studied
- Diversified plants are studied extensively
- Ornamental plants study is possible
- Secondary metabolites are studied from phytochemistry
- Medicinal plants are extensively studied from different species of plants

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DEPARTMENT OF BOTANY 2021-2022
COURSE STRUCTURE AND SYLLABUS

S.No.	Semester	Title of the Course (Paper)	Hours /week	Max. Marks (SEE)	Marks in CIA	Credits
1.	Sem.-I Course-1	Fundamentals of Microbes and Non-vascular Plants	04	75	25	03
	Course-1 Practical	Fundamentals of Microbes and Non-vascular Plants	03	Max. Marks-50 Internal assessment at Semester end		02
2.	Sem.-II Course-2	Basics of Vascular plants and Phytogeography	04	75	25	03
	Course-2 Practical	Basics of Vascular plants and Phytogeography	03	Max. Marks-50 External assessment at Semester end		02
3.	Sem.-III Course-3	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	04	75	25	03
	Course-3 Practical	Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity	03	Max. Marks-50 Internal assessment at Semester end		02
4.	Sem.-IV Course-4	Plant Physiology and Metabolism	04	75	25	03
	Course- 4 Practical	Plant Physiology and Metabolism	03	Max. Marks-50 External assessment at Semester end		02
4.	Sem.- IV Course- 5	Cell Biology, Genetics and Plant Breeding	04	75	25	03
	Course- 5 Practical	Cell Biology, Genetics and Plant Breeding	03	Max. Marks-50External assessment atSemester end		02
5.	Sem.- V Course- 5	Cell Biology, Genetics and Plant Breeding	04	75	25	03
	Course- 5 Practical	Cell Biology, Genetics and Plant Breeding	03	Max. Marks-50 Internal assessment at Semester end		02
	Sem. V Course – 6	Plant Ecology and Phytogeography	04	75	25	03
	Sem. V Course – 6 Practical	Plant Ecology and Phytogeography	03	Max. Marks-50 Internal assessment at Semester end		02

6.	Sem.- VI Elective	Nursery, Gardening and Floriculture	04	75	25	03
	Elective Practical	Nursery, Gardening and Floriculture	03	Max. Marks-50 External assessment at Semester end		02
	Sem. VI Cluster – A1	Plant Diversity and Human Welfare	04	75	25	03
	Sem. VI Practical – A1	Plant Diversity and Human Welfare	03	Max. Marks-50 External assessment at Semester end		02
	Sem. VI Cluster – A2	Ethno Botany and Medicinal Botany	04	75	25	03
	Sem. VI Practical – A2	Ethno Botany and Medicinal Botany	03	Max. Marks-50 External assessment at Semester end		02
	Sem. VI Cluster – A3	Pharmacognosy and Phytochemistry	04	75	25	03
	Sem. VI Practical – A3	Pharmacognosy and Phytochem istry	03	Max. Marks-50 External assessment at Semester end		02

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (A)

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I B.Sc BOTANY SYLLABUS Semester - I

For the Academic Year 2021-2022

Paper – I Fundamentals of Microbes and Non-Vascular Plants

(Viruses, Bactria Fungi, Lichens, Algae and Bryophytes)

THEORY:

Unit – 1: Origin of life and Viruses **12Hrs.**

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment. Five kingdom classification of R.H. Whittaker
2. Discovery of microorganisms, Pasteur experiments, germ theory of diseases.
3. Shape and symmetry of viruses; structure of TMV and Gemini virus; multiplication of TMV; A brief account of Prions and Viroids.
4. A general account on symptoms of plant diseases caused by Viruses. Transmission of plant viruses and their control.
5. Significance of viruses in vaccine production, bio-pesticides and as cloning vectors.

Unit – 2: Special groups of Bacteria and Eubacteria **12Hrs.**

1. Brief account of Archaebacteria, Actinomycetes and Cyanobacteria.
2. Cell structure and nutrition of Eubacteria.
3. Reproduction- Asexual (Binary fission and endospores) and bacterial recombination (Conjugation,Transformation,Transduction).
4. Economic importance of Bacteria with reference to their role in Agriculture and industry (fermentation andmedicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

Unit – 3: Fungi & Lichens **12 Hrs.**

1. General characteristics of fungi and Ainsworth classification (upto classes).
2. Structure, reproduction and life history of(a)*Rhizopus* (Zygomycota)and (b)*Puccinia*(Basidiomycota).
3. Economic uses of fungi in food industry, pharmacy and agriculture.
4. A general account on symptoms of plant diseases caused by Fungi; Blast of Rice.
5. Lichens- structure and reproduction; ecological and economic importance.

Unit –4:Algae **12 Hrs.**

1. General characteristics of Algae (pigments, flagella and reserve food material);Fritsch classification (upto classes).
2. Thallus organization and life cycles in Algae.
3. Occurrence, structure, reproduction and life cycle of (a)*Spirogyra* (Chlorophyceae) and (b) *Polysiphonia* (Rhodophyceae).
4. Economic importance of Algae.

Unit–5:Bryophytes **12 Hrs.**

1. General characteristics of Bryophytes; classification upto classes.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life cycle of (a) *Marchantia* (Hepaticopsida) and (b) *Funaria*(Bryopsida).
3. General account on evolution of sporophytes in Bryophyta.

Text books:

- Botany – I (Vrukshasastram-I) : Telugu Akademi,Hyderabad
- Pandey, B.P. (2013) *College Botany, Volume-I,* S. Chand Publishing, NewDelhi
- Hait,G., K.Bhattacharya&A.K.Ghosh (2011) *A Text Book of Botany,Volume-I,* New Central Book Agency Pvt. Ltd., Kolkata
- Bhattacharjee, R.N., (2017) *Introduction to Microbiology and Microbial Diversity,* Kalyani Publishers, NewDelhi.

Books for Reference:

- Dubey, R.C. &D.K.Maheswari (2013) *A Text Book of Microbiology,* S.Chand & Company Ltd., NewDelhi
- Pelczar Jr., M.J., E.C.N. Chan &N.R.Krieg (2001)*Microbiology,* Tata McGraw- Hill Co, NewDelhi
- Presscott, L. Harley, J. and Klein, D. (2005)*Microbiology, 6th edition,* Tata McGraw –Hill Co. NewDelhi.
- Alexopoulos, C.J., C.W.Mims&M.Blackwell (2007) *Introductory Mycology,* Wiley& Sons, Inc., NewYork
- Mehrotra, R.S. & K. R. Aneja (1990)*An Introduction to Mycology*. New Age International Publishers, New Delhi
- Kevin Kavanagh (2005) *Fungi ; Biology and Applications* John Wiley & Sons, Ltd.,West Sussex,England
- John Webster & R. W. S. Weber (2007) *Introduction to Fungi,*Cambridge University Press, NewYork
- Fritsch, F.E. (1945)*The Structure & Reproduction of Algae (Vol. I &Vol. II)*Cambridge University Press Cambridge, U.K..
- Bold, H.C. & M. J. Wynne (1984)*Introduction to the Algae,* Prentice-Hall Inc., New Jersey
- Robert Edward Lee (2008) *Phycology.* Cambridge University Press, NewYork
- Van Den Hoek, C., D.G.Mann&H.M.Jahns (1996)*Algae : An Introduction to Phycology*. Cambridge University Press, NewYork
- Shaw, A.J.&B.Goffinet (2000)*Bryophyte Biology.*Cambridge University Press, NewYork.

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I B.Sc., BOTANY PRACTICAL SYLLABUS

Semester – I For the Academic year 2021-2022

PAPER – I FUNDAMENTALS OF MICROBES AND NON- VASCULAR PLANTS

(Viruses, Bacteriam, Fungi, Lichens, Algae and Bryophytes)

Total hours for the laboratory Exercises 30 Hrs @ 2 per week

Course Outcomes: On successful completion of this practical course, student shall be able to;

1. Demonstrate the techniques of use of lab equipment, preparing slides and identify the material and draw diagrams exactly as it appears.
2. Observe and identify microbes and lower groups of plants on theirown.
3. Demonstrate the techniques of inoculation, preparation of mediaetc.
4. Identify the material in the permanent slidesetc.

Practical Syllabus:

1. Knowledge of Microbiology laboratory practices and safetyrules.
2. Knowledge of different equipment for Microbiology laboratory (Spirit lamp, Inoculation loop, Hot-air oven, Autoclave/Pressure cooker, Laminar air flow chamber and Incubator) and their working principles. (In case of the non- availability of the laboratory equipment the students can be taken to the local college/clinical lab. with required infrastructural facilities or they can enter a linkage with the college/lab for future developments and it will fetch creditsduring the accreditation byNAAC).
3. Demonstration of Gram's staining technique for Bacteria.
4. Study of Viruses (Corona, Gemini and TMV) using electron micrographs/models.
5. Study of Archaebacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.
6. Study of *Anabaena* and *Oscillatoria*using permanent/temporaryslides.
7. Study of different bacteria (Cocci, Bacillus, Vibrio and Spirillum) using permanent or temporary slides/ electron micrographs/diagrams.
8. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts:
   a. Fungi : *Rhizopus,Penicillium*and*Puccinia*
   b. Lichens: Crustose, foliose andfruiticose
   c. Algae :*Volvox*, *Spirogyra*, *Ectocarpus*and*Polysiphonia*
   d. Bryophyta : *Marchantia*and *Funaria*
9. Study of specimens of Tobacco mosaic disease, Citrus canker and Blast ofRice.

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I B.Sc., BOTANY SYLLABUS

Semester – II

For the Academic year 2021-2022

PAPER II BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

(Pteridophytes, Gymnosperms,Taxonomy of Angiosperms and Phytogeography)

Total hours of Teaching 60hrs @4hrs/week Total Credits:03

Unit–1:Pteridophytes 12 Hrs.

1. General characteristics of Pteridophyta; classification of Smith (1955)uptodivisions.
2. Occurrence, morphology,anatomy, reproduction (developmental details are notneeded) and life historyof (a) *Lycopodium* (Lycopsida) and (b) *Marsilea* (Filicopsida).
3. Stelar evolution inPteridophytes;
4. Heterospory and seedhabit.

Unit–2:Gymnosperms 14 Hrs.

1. General characteristics of Gymnosperms; Sporneclassification uptoclasses.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) *Cycas*(Cycadopsida) and (b) *Gnetum*(Gnetopsida).
3. Outlines of geological timescale.
4. A brief account on*Cycadeoidea.*

Unit – 3:Basic aspectsof Taxonomy 13Hrs.

1. Aim and scope of taxonomy; Species concept: Taxonomic hierarchy, species, genus and family.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques,BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the followingfamilies:

   (a) Annonaceae (b)Curcurbitaceae

Unit – 4: Systematic Taxonomy 13 Hrs.

1. Systematic description and economic importance of the followingfamilies:

   (a) Asteraceae (b) Asclepiadaceae (c)Amaranthaceae

   (d)Euphorbiaceae (e) Arecaceaeand (f) Poaceae

2. Outlines of Angiosperm Phylogeny Group (APGIV).

Unit–5: Phytogeography 08 Hrs.

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuousspecies)
2. Endemism – types andcauses.
3. Phytogeographic regions ofWorld.
4. Phytogeographic regions of India.
5. Vegetation types in AndhraPradesh.

TEXT BOOKS*:*

- Botany – I (Vrukshasastram-I): Telugu Akademi,Hyderabad
- Botany – II (Vrukshasastram-II): Telugu Akademi,Hyderabad
- Acharya, B.C., (2019) Archchegoniates, Kalyani Publishers, NewDelhi
- Bhattacharya, K., G. Hait & Ghosh, A. K., (2011) A Text Book of Botany, Volume-II, New Central Book Agency Pvt. Ltd.,Kolkata
- Hait,G., K.Bhattacharya&A.K.Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd.,Kolkata
- Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, NewDelhi
- Pandey, B.P. (2013) College Botany, Volume-II, S. Chand Publishing, NewDelhi

BOOKS FOR REFERENCE:

- Smith, G.M. (1971) Cryptogamic BotanyVol. II., Tata McGraw Hill, New Delhi
- Sharma,O.P.(2012)Pteridophyta. Tata McGraw-Hill, NewDelhi
- Kramer, K.U.&P. S. Green (1990) The Families and Genera of Vascular Plants,Volume –I: Pteridophytes and Gymnosperms(Ed.K.Kubitzki) Springe-Verlag, New York
- Bhatnagar, S.P. &AlokMoitra (1996) Gymnosperms. New Age International, NewDelhi
- Coulter, J.M. &C.J.Chamberlain (1910) Morphology of Gymnosperms, The University of Chicago Press, Chicago,Illinois
- Govil, C.M. (2007) Gymnosperms: Extinct and Extant. KRISHNA Prakashan Media (P) Ltd.Meerut&Delhi
- Sporne, K.R.(1971)The Morphology of Gymnosperms.Hutchinsons Co. Ltd.,London
- Arnold, C.A., (1947) An introduction to PaleobotanyMcGraw –Hill Book Company,INC, NewYork
- Stewart,W.N., and G.W.Rothwell (2005) Paleobotany and the evolution of plants Cambridge University Press, NewYork
- Lawrence, George H.M. (1951) Taxonomy of Vascular Plants. The McMillan Co., New York
- Heywood, V. H. and D. M. Moore (1984)Current Concepts in Plant Taxonomy. Academic Press, London.
- Jeffrey, C. (1982)An Introduction to Plant Taxonomy. Cambridge UniversityPress, Cambridge.London.
- Sambamurty, A.V.S.S. (2005)Taxonomy of Angiosperms I. K .International Pvt. Ltd., NewDelhi
- Singh, G. (2012). Plant Systematics: Theory and Practice.Oxford & IBH Pvt. Ltd., NewDelhi.
- Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, SanDiego, CA,U.S.A.
- Cain, S.A . (1944)Foundations of Plant GeographyHarper & Brothers,N.Y.
- Good, R. (1997)The Geography of flowering Plants (2nd Edn.)Longmans, Green & Co., Inc., London & Allied Science Publishers, NewDelhi
- Mani, M.S (1974)Ecology & Biogeography of IndiaDr. W. Junk Publishers, TheHaque

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I B.Sc., PRACTICAL PAPER – II PRACTICAL SYLLABUS

PAPER II BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

Total hours of laboratory Exercises 30 hrs @ 2per week Totalcredits:02

1. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/mounts:
   a. Pteridophyta: Lycopodium and Marselia
   b. Gymnosperms: Cycas and Gnetum
2. Study of fossil specimens of Cycadeoidea and Pentoxylon (photographs /diagrams can be shown if specimens are not available).
3. Demonstration of herbarium techniques.
4. Systematic / taxonomic study of locally available plants belonging to the families prescribed in theory syllabus. (Submission of 30 number of Herbarium sheets of wild plants with the standard system is mandatory).
5. Mapping of phytogeographical regions of the globe and India.

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II B.SC BOTANY SYLLABUS III Semester – Paper – III
For the Academic Year 2021-2022

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Theory:

UNIT – I: ANATOMY OF ANGIOSPERMS (12 hrs)

1. Organization of apical meristems: Tunica-carpus theory and Histogen theory.
2. Tissue systems–Epidermal, ground and vascular.
3. Anomalous secondary growth in *Boerhaavia* and *Dracaena.*
4. Study of timbers of economic importance - Teak, Red sanders and Rosewood.

UNIT – II: EMBRYOLOGY OF ANGIOSPERMS (12 hrs)

1. Structure of anther, anther wall, types of tapetum. Microsporogenesis and development of male gametophyte.
2. Structure of ovule, megasporogenesis; monosporic (*Polygonum*), bisporic (*Allium*)and tetrasporic (*Peperomia*) types of embryo sacs.
3. Outlines of pollination, pollen – pistil interaction and fertilization.
4. Endosperm - Types and biological importance - Free nuclear, cellular,helobialandruminate. Development of Dicot (*Capsella bursa-pastoris*) embryo

UNIT –III: BASICS OF ECOLOGY (12 hrs)

1. Ecology: definition, branches and significance of ecology.
2. Ecosystem: Concept and components, energy flow, food chain, food web, ecologicalpyramids.
4. Plants and environment: Climatic (light and temperature), edaphic and bioticfactors.
5. Ecological succession:Hydrosere and Xerosere.

UNIT – IV: POPULATION, COMMUNITY AND PRODUCTION ECOLOGY (12hrs)

1. Population ecology: Natality, mortality, growth curves, ecotypes, ecads
2. Community ecology: Frequency, density, cover, life forms, biological spectrum
3. Concepts of productivity: GPP, NPP and Community Respiration
4. Secondary production, P/R ratio and Ecosystems.

UNIT – V: BASICS OF BIODIVERSITY (12hrs)

1. Biodiversity: Basic concepts, Convention on Biodiversity - Earth Summit.
2. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity
3. Biodiversity Hot spots in India. Biodiversity in North Eastern Himalayas and Western Ghats.
4. Principles of conservation: IUCN threat-categories, RED data book
5. Role of NBPGR and NBA in the conservation of Biodiversity.

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- Botany – II (Vrukshasastram-II) : Telugu Akademi, Hyderabad
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- Sharma,O.P.(2012)Pteridophyta. Tata McGraw-Hill, New Delhi
- Kramer, K.U.&P. S. Green (1990) *The Families and Genera of Vascular Plants, Volume –I*: *Pteridophytes and Gymnosperms*(Ed.K.Kubitzki) Springe-Verlag, New York
- Bhatnagar, S.P. &AlokMoitra (1996)*Gymnosperms*. New Age International, New Delhi
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- Govil, C.M. (2007)*Gymnosperms : Extinct and Extant*. KRISHNA Prakashan Media (P) Ltd.Meerut& Delhi
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- Heywood, V. H. and D. M. Moore (1984)*Current Concepts in Plant Taxonomy.* Academic Press, London.
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- Singh, G. (2012*). Plant Systematics: Theory and Practice.*Oxford & IBH Pvt.Ltd.,
- Simpson, M.G. (2006). *Plant Systematics.* Elsevier Academic Press, San Diego,CA,U.S.A.
- Cain, S.A . (1944)*Foundations of Plant Geography*Harper & Brothers, N.Y.
- Good, R. (1997)*The Geography of flowering Plants (2nd Edn.)*Longmans, Green& Co., Inc., London & Allied Science Publishers, New Delhi
- Mani, M.S (1974)*Ecology & Biogeography of India*Dr. W. Junk Publishers, TheHaque

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II B.Sc – SEMESTER – III BOTANY PRACTICAL – III

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Course Outcomes:

On successful completion of this practical course students shall be able to:

1. Get familiarized with techniques of section making, staining and microscopic study of vegetative, anatomical and reproductive structure of plants.
2. Observe externally and under microscope, identify and draw exact diagrams of thematerial in the lab.
3. Demonstrate application of methods in plant ecology and conservation of biodiversity and qualitative and quantitative aspects related to populations and communities of plants.

Practical Syllabus

1. Tissue organization in root and shoot apices using permanent slides.
2. Anomalous secondary growth in stems of *Boerhavia* and *Dracaena*.
3. Study of anther and ovule using permanent slides/photographs.
4. Study of pollen germination and pollen viability.
5. Dissection and observation of Embryo sac haustoria in *Santalum*or*Argemone.*
6. Structure of endosperm (nuclear and cellular) using permanent slides /Photographs.
7. Dissection and observation of Endosperm haustoria in *Crotalaria* or *Coccinia*.
8. Developmental stages of dicot and monocot embryos using permanent slides /photographs.
9. Study of instruments used to measure microclimatic variables; soil thermometer, maximum an minimum thermometer, anemometer, rain gauze, and lux meter. (visit to the nearest/local meteorolog station where the data is being collected regularly and record the field visit summary for the submissic in the practical).
10. Study of morphological and anatomical adaptations of hydrophytes andxerophytes (02 each).
11. Quantitative analysis of herbaceous vegetation in the college campus for frequency, density an abundance.
12. Identification of vegetation/various plants in college campus and comparison with Raunkiaer frequency distribution law.
13. Find out the alpha-diversity of plants in the area
14. Mapping of biodiversity hotspots of the world and India.

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II B.Sc. BOTANY SYLLABUS
IV Semester – For the Academic Year 2021-2022

PAPER –IV : PLANT PHYSIOLOGY AND METABOLISM

Unit – 1: Plant-Water relations 10 Hrs.

1. Importance of water to plant life, physical properties of water, diffusion,imbibition, osmosis. water potential, osmotic potential, pressure potential.
2. Absorption and lateral transport of water; Ascent of sap
3. Transpiration: stomata structure and mechanism of stomatal movements (K^+ ionflux).
4. Mechanism of phloem transport; source-sink relationships.

Unit – 2: Mineral nutrition, Enzymes and Respiration 14 Hrs.

1. Essential macro and micro mineral nutrients and their role in plants; symptoms ofmineral deficiency
2. Absorption of mineral ions; passive and active processes.
3. Characteristics, nomenclature and classification of Enzymes. Mechanism ofenzyme action, enzyme kinetics.
4. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transportsystem, mechanism of oxidative phosphorylation, Pentose Phosphate Pathway (HMP shunt).

Unit – 3: Photosynthesis and Photorespiration 12 Hrs.

1. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red dropand Emerson enhancement effect
2. Concept of two photosystems; mechanism of photosynthetic electron transportand evolution of oxygen; photophosphorylation
3. Carbon assimilation pathways (C3,C4 and CAM);
4. Photorespiration - C2 pathway

Unit – 4: Nitrogen and lipid metabolism 12 Hrs.

1. Nitrogen metabolism: Biological nitrogen fixation – asymbiotic and symbioticnitrogen fixing organisms. Nitrogenase enzyme system.
2. Lipid metabolism: Classification of Plant lipids, saturated and unsaturated fattyacids.
3. Anabolism of triglycerides, β-oxidation of fatty acids, Glyoxylate cycle

Unit – 5: Plant growth - development and stress physiology 12 Hrs.

1. Growth and Development: Definition, phases and kinetics of growth.
2. Physiological effects of Plant Growth Regulators (PGRs) - auxins, gibberellins,cytokinins, ABA, ethylene and brassinosteroids.
3. Physiology of flowering:Photoperiodism, role of phytochrome in flowering.
4. Seed germination and senescence; physiological changes.

Text books:

- Botany – IV (Vrukshasastram-II) : Telugu Akademi, Hyderabad
- Pandey, B.P. (2013) *College Botany, Volume-III,* S. Chand Publishing, New Delhi
- Ghosh, A. K., K. Bhattacharya &G. Hait (2011) *A Text Book of Botany, Volume-III,* New Central Book Agency Pvt. Ltd., Kolkata

Books for Reference:

- Aravind Kumar & S.S. Purohit (1998) *Plant Physiology – Fundamentals and Applications,*AgroBotanica, Bikaner
- Datta, S.C. (2007) *Plant Physiology,*New Age International (P) Ltd., Publishers,New Delhi
- Hans Mohr & P. Schopfer (2006)*Plant Physiology,* Springer (India) Pvt. Ltd.,New Delhi
- Hans-Walter heldt (2005) *Plant Biochemistry,*Academic Press, U.S.A.
- Hopkins, W.G. & N.P.A. Huner (2014)*Introduction to Plant Physiology,* WileyIndia Pvt. Ltd., New Delhi
- Noggle Ray & J. Fritz (2013)*Introductory Plant Physiology*, Prentice Hall (India),New Delhi
- Pandey, S.M. &B.K.Sinha (2006)*Plant Physiology*, Vikas Publishing House, NewDelhi
- Salisbury, Frank B. & Cleon W. Ross (2007)*Plant Physiology*, Thomsen &Wadsworth, Austalia&U.S.A
- Sinha, R.K. (2014) *Modern Plant Physiology*, Narosa Publishing House,NewDelhi
- Taiz, L.&E. Zeiger (2003)*Plant Physiology*, Panima Publishers, New Delhi
- Verma, V.(2007)*Text Book of Plant Physiology,*Ane Books India, New Delhi

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (A)

(Re-Accredited by NAAC with'B')
KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

II B.Sc. Semester IV BOTANY PRACTIVAL - IV
Plant Physiology and Metabolism

Course outcomes: On successful completion of this practical course, students shall beable to:

1. Conduct lab and field experiments pertaining to Plant Physiology, that is, biophysical and biochemical processes using related glassware, equipment,chemicals and plant material.
2. Estimate the quantities and qualitative expressions using experimental results andcalculations
3. Demonstrate the factors responsible for growth and development in plants.

Practical Syllabus

1. Determination of osmotic potential of plant cell sap by plasmolytic method using *Rhoeo*/ *Tradescantia* leaves.
2. Calculation of stomatal index and stomatal frequency of a mesophyte and axerophyte.
3. Determination of rate of transpiration using Cobalt chloride method / Ganong'spotometer (at least for a dicot and a monocot).
4. Effect of Temperature on membrane permeability by colorimetric method.
5. Study of mineral deficiency symptoms using plant material/photographs.
6. Demonstration of amylase enzyme activity and study the effect of substrate and Enzymeconcentration.
7. Separation of chloroplast pigments using paper chromatography technique.
8. Demonstration of Polyphenol oxidase enzyme activity (Potato tuber or Apple fruit)
9. Anatomy of C3, C4 and CAM leaves
10. Estimation of protein by biuret method/Lowry method
11. Minor experiments – Osmosis, Arc-auxonometer, ascent of sap through xylem,cytoplasmic streaming.

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (A)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

II B.Sc. DEGREE EXAMINATION 2021-2022

(At the End of IV Semester)

Botany Syllabus Paper - V

CELL BIOLOGY, GENETICS AND PLANT BREEDING

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Unit – 1: The Cell 12 Hrs.

1. Cell theory; prokaryotic vs eukaryotic cell; animal vs plant cell; a brief account on ultra-structure of a plant cell.
2. Ultra-structure of cell wall.
3. Ultra-structure of plasma membrane and various theories on its organization.
4. Polymorphic cell organelles (Plastids); Ultra structure of chloroplast. Plastid DNA.

Unit – 2: Chromosomes 12 Hrs.

1. Prokaryotic vs eukaryotic chromosome. Morphology of a eukayotic chromosome.
2. Euchromatin and Heterochromatin; Karyotype and ideogram.
3. Brief account of chromosomal aberrations - structural and numerical changes
4. Organization of DNA in a chromosome (solenoid and nucleosome models).

Unit – 3: Mendelian and Non-Mendelian genetics 14Hrs.

1. Mendel's laws of inheritance. Incomplete dominance and co-dominance; Multipleallelism.
2. Complementary, supplementary and duplicate gene interactions (plant based examples are to be dealt).
3. A brief account of linkage and crossing over; Chromosomal mapping - 2 point and 3 point test cross.
4. Concept of maternal inheritance (Corren's experiment on *Mirabilis jalapa*); Mitochondrial DNA.

Unit – 4:Structure and functions of DNA 12 Hrs.

1. Watson and Crick model of DNA. Brief account on DNA Replication (Semi-conservative method).
2. Brief account on Transcription, types and functions of RNA. Gene concept andgenetic code and Translation.
3. Regulation of gene expression in prokaryotes - Lac Operon.

Unit – 5:Plant Breeding 12 Hrs.

1. Plant Breeding and its scope; Genetic basis for plant breeding. Plant Introductionand acclimatization.
2. Definition, procedure; applications and uses; advantages and limitations of :(a)Mass selection, (b) Pure line selection and (c) Clonal selection.
3. Hybridization – schemes, and technique; Heterosis(hybrid vigour).
4. A brief account on Molecular breeding – DNA markers in plant breeding. RAPD,RFLP.

Text books :

- Botany – III (Vrukshasastram-I) : Telugu Akademi, Hyderabad
- Pandey, B.P. (2013) *College Botany, Volume-III,* S. Chand Publishing, New Delhi
- Ghosh, A.K., K.Bhattacharya&G. Hait (2011) *A Text Book of Botany, Volume-III,* New Central Book Agency Pvt. Ltd., Kolkata
- Chaudhary, R. C. (1996) *Introduction to Plant Breeding,* Oxford & IBHPublishing Co. Pvt. Ltd., New Delhi

Books for Reference:

- S. C. Rastogi (2008)*Cell Biology,*New Age International (P) Ltd. Publishers, NewDelhi
- P. K. Gupta (2002)*Cell and Molecular biology,*Rastogi Publications, New Delhi
- B. D. Singh (2008) *Genetics,*Kalyani Publishers, Ludhiana
- A.V.S.S. Sambamurty (2007) *Molecular Genetics,*Narosa Publishing House,NewDelhi
- Cooper, G.M. & R.E. Hausman (2009)*The Cell – A Molecular Approach,* A.S.M.Press, Washington
- Becker, W.M., L.J. Kleinsmith& J. Hardin (2007)*The World of Cell,* PearsonEducation, Inc., New York
- De Robertis, E.D.P. & E.M.F. De Robertis Jr. (2002)*Cell and Molecular Biology,*
- Lippincott Williams & Wilkins Publ., Philadelphia
- Robert H. Tamarin (2002)*Principles of Genetics,*Tata McGraw –Hill PublishingCompany Limited, New Delhi.
- Gardner, E.J., M. J. Simmons & D.P. Snustad (2004)*Principles of Genetics,* JohnWiley & Sons Inc., New York
- Micklos, D.A., G.A. Freyer& D.A. Cotty (2005) *DNA Science: A First Course,* I.K.
- International Pvt. Ltd., New Delhi
- Chaudhari, H.K.(1983)*Elementary Principles of Plant Breeding,* TMHpublishersCo., New Delhi
- Sharma, J.R. (1994)*Principles and Practice of Plant Breeding,* Tata McGraw- HillPublishers, New Delhi
- Singh,B.D. (2001)*Plant Breeding : Principles and Methods* ,Kalyani
- Pundhan Singh (2015) *Plant Breeding for Undergraduate Students,* KalyaniPublishers, Ludhiana
- Gupta, S.K. (2010)*Plant Breeding : Theory and Techniques,*Agrobios (India),Jodhpur
- Hayes, H.K., F.R. Immer& D.C. Smith (2009) *Methods of Plant Breeding,*BiotechBooks, Delhi
- Publishers,Ludhiana

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
(Re-Accredited by NAAC with'B')
KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

II B.Sc. DEGREE EXAMINATION 2021-2022

Practical Syllabus of Botany Paper

IV Semester Cell Biology, Genetics and Plant Breeding

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs. /Week)

Course Outcomes: After successful completion of this practical course the student shallbe able to:

1. Show the understanding of techniques of demonstrating Mitosis and Meiosis inthe laboratory and identify different stages of cell division.
2. Identify and explain with diagram the cellular parts of a cell from a model orpicture and prepare models
3. Solve the problems related to crosses and gene interactions.
4. Demonstrate plant breeding techniques such as emasculation and bagging

Practical Syllabus:

1. Study of ultra structureof plant cell and its organelles using Electron microscopic Photographs/models.
2. Demonstration of Mitosis in *Allium cepa*/*Aloe vera* roots using squashtechnique;observation of various stages of mitosis in permanent slides.
3. Demonstration of Meiosis in P.M.C.s of *Allium cepa*flower buds using squash technique; observation of various stages of meiosis in permanent slides.
4. Study of structure of DNA and RNA molecules using models.
5. Solving problems monohybrid, dihybrid, back and test crosses.
6. Solving problems on gene interactions (atleast one problem for each of the geneinteractions in the syllabus).
7. Chromosome mapping using 3- point test cross data.
8. Demonstration of emasculation, bagging, artificial pollination techniques forhybridization.

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

(Re-Accredited by NAAC with'B')

KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B.Sc. BOTANY SYLLABUS – 2021-2022

V Semester – Theory– Paper – V

CELL BIOLOGY, GENETICS AND PLANT BREEDING

Unit - I:Cell Biology (12 hrs)

1. Cell, the unit of life – Cell theory, Prokaryotic and eukaryotic cells, Eukaryotic cell components
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes : Morphology, Organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin.

Unit - II: Genetic material (12 hrs)

1. DNA as the genetic material: Griffith's and Avery's transformation experiment Heshey- Chase bacteriophage experiment.
2. DNA structure (Crick model) and replication of DNA (semi-conservative)
3. Types of RNA (mRNA, tRNA, rRNA) and their structure and functions

Unit - III: Mendelian inheritance (12 hrs)

1. Mendel's Laws of inheritance (Mono-and Dihybrid crosses); backcross and test cross.
2. Chromosome theory of inheritance.
3. Linkage : Concept & history, complete & incomplete linkage, Bridges' Experiment.
4. Coupling & repulsion, linkage maps based on two and three factor crosses.
5. Crossing Over : Concept & Significance, cytological proof of crossing over.

Unit - IV:Plant Breeding (12 hrs)

1. Introduction and Objectives of Plant breeding.
2. Methods of crop improvement : Procedure, advantages and limitations of introduction, Selection, and Hybridization (outlines only)

Unit - V:Breeding, Crop Improvement and Biotechnology (12 hrs)

1. Role of mutations in crop improvement.
2. Role of somaclonal variations in crop improvement.

3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RELP).

Reference Books

1. Old, R.W. and Primrose S.B. 1994, Principles of Gene Manipulation Black well Science London.
2. Grierson, D. and Convey S.N. 1989, Plant Molecular Biology, Blackie Publishers, New York.
3. Lea, P.J. and Leegood R.C. 1999, Plant Biochemistry and Molecular Biology, John Wiley and Sons, London
4. Power C.B., 1984, Cell Biology, Himalaya Publishing Co. Mumbai
5. De. Robertis 1998, Cell and Molecular Biology, K.M. Verghese and Company
6. Sinnott, E.W., L.C.Dunn&J.Dobshansky (1958): Principles of Geneties (5th Edition) MeGraw Hill Publishing Co., N.Y. Toronto, London.
7. Winehester, A.M. (1958): Geneties (3rd Edition) Oxford & IBM Publishing House, Calcutta, Bombay, New Delhi.
8. Singleton, R. (1963): Elementary Geneties, D. Van Nostrand Co., Ltd., Inc., N.Y. & Affiliated Ease West Press (P) Ltd., New Delhi.
9. Strickberger, M.W. (1976): Geneties (2 edition) MacMillan Publishing Co., Inc., N.Y. Londos.
10. Waston, J.D. (1977) : Molecular Biology of the Gene. W.A. Benjamin, Inc., Menlo Parks California, Reading - Massachusetts, London, Amsterdam, Don Mills, Ontario, Sydney.
11. Gardner, F.J &Snusted, D.P. (1984) : Principles of Genetics (7th edition) John Wiley & Sons, N.Y. Chichester, Brisbane, Toronto, Singapore

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

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III B.Sc. BOTANY SYLLABUS – 2021-2022

V Semester – Practical – Paper V

CELL BIOLOGY, GENETICS AND PLANT BREEDING

1. Study of the structure of cell organelles through photomicrographs.
2. Study of structure of plant cell through temporary mounts.
3. Study of various stages of mitosis using cytological preparation of Onion root tips
4. Study of DNA packing by micrographs.
5. Study of effect of temperature & Organic solvent on permeability of cell membrane.
6. Numerical problems solving mendel's Laws of inheritance.
7. Chromosome mapping using 3 point test cross data.
8. Hybridization techniques – emasculation, bagging (for demonstration only)
9. Field visit to a plant breeding research station.
10. Calorimetric estimation of DNA by dipheylamine method.

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B.Sc. BOTANY SYLLABUS – 2021-2022

V Semester – Theory– Paper – VI

PLANT ECOLOGY & PHYTOGEOGRAPHY

Unit - I:Elements of Ecology (12 hrs)

1. Ecology : definition, branches and significance of ecology.
2. Climatic Factors : Light, Temperature, Precipitation.
3. Edaphic Factor : Origin, formation, composition and soil profile.
4. Biotic Factor : Interactions between plants and animals.

Unit - II:Ecosystem Ecology (12 hrs)

1. Ecosystem : Concept and components, energy flow, Food chain, Food web, Ecological pyramids.
2. Productivity of ecosystem – Primary, Secondary and Net Productivity
3. Biogeochemical cycles – Carbon, Nitrogen and Phosphorous.

Unit - III:Population & Community Ecology (12 hrs)

1. Population – definition, characteristics and importance, outlines- ecotypes.
2. Plant communities – Characters of community, outlines – Frequency, density, cover, life forms, competition.
3. Interaction between plants growing in a community.

Unit - IV:Phytogeography (12 hrs)

1. Principles of phytogeography, Distribution (wides, endemic, discountinuous species).
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and causes.

Unit - V:Plant Biodiversity and its importance (12 hrs)

1. Definition, levels of biodiversity – genetic, species and ecosystem.
2. Biodiversity Hotspots – Criteria, Biodiversity hotspots of India.
3. Loss of biodiversity – causes and conservation (In-situ and ex-situ methods).
4. Seed banks – conservation of genetic resources and their importance.

Reference Books.

1. Daubenmire, R.F. ( ): Plants & Environment (2nd Edn.,) John Wiley & Sons., NewYork
2. Puri, .G.S. (1960): Indian Forest Ecology (Vol.I& II) Oxford Book Co., New Delhi & Calcutta.
3. Billings, W.B. (1965): Plants and the Ecosystem Wadsworth Publishing Co., Inc.,Belmont.
4. Misra, R. (1968): The Ecology work Book Oxford & INH Publishing Co.,Calcutta
5. Odum E.P. (1971): Fundamentals of Ecology (2nd Edn.,) Saunders & Co., Philadelphia &Natraj Publishers, Dehradun.
6. Odum E.P. (1975): Ecology By Holt, Rinert&Winston.
7. Oosting, H.G. (1978): Plants and Ecosystem Wadworth Belmont.
8. Kochhar, P.L. (1975): Plant Ecology. (9th Edn.,) New Delhi, Bombay,Calcutta-226pp.,
9. Kumar, H.D. (1992): Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
10. Kumar H.D. (2000): Biodiversity & Sustainable Conservation Oxford & IBHPublishing Co Ltd. NewDelhi.
11. Newman, E.I. (2000): Applied Ecology Blackwell Scientific Publisher,U.K.
12. Chapman, J.L&M.J. Reiss (1992): ecology (Principles & Applications). Cambridge University Press,U.K.
13. Cain, S.A . (1944): Foundations ofPlant Geography Harper & Brothers, N.Y.
14. Mani, M.S (1974): Ecology & Biogeography of India Dr. W. Junk Publishers, TheHaque
15. Good, R. (1997): The Geography of flowering Plants (2nd Edn.) Longmans, Green & Co., Inc., London & Allied Science Publishers, NewDelhi

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B.Sc. BOTANY SYLLABUS – 2021-2022

V Semester – Practical– Paper – VI

PLANT ECOLOGY & PHYTOGEOGRAPHY

1. Ecological instruments Knowledge
2. Permeability (Percolation; Total capacity as well as rate of movement of different soil samples.
3. Determination of Soil pH.
4. Study of morphological, Anatomical adaptations of hydrophyte and Xerophytes
5. Determination of minimnal Quadrat size for the study of herbaceous vegetation in college Campus by species area Curve method.
6. Study of phytoplankton and Macrophytes from water bodies, species diversity index of vegetation.
7. Estimation of Primary Productivity of an Ecosystem.
8. Field vegetation with respect of stratification canopy cover and composition
9. Plants included in Agro-forestry and Social forestry.
10. To locate the hotspots: Phytogeographical regions and distribution of endemic plant in the map of India.
11. Field & Laboratory – Practical
12. Project Work : Study of Biodiversity in and around the Kakinada - ADDITIONAL INPUT

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B. Sc - BOTANY SYLLABUS

SEMESTER- VI – For the Academic Year 2021-2022

PAPER – VII (B) : ELECTIVE

NURSERY, GARDENING AND FLORICULTURE

Total hours of teaching 60hrs @ 3hrs per week

Unit I: Nursery: **(12 hrs.)**

1. Definition, objectives, scope and building up of infrastructure for nursery.
2. Planning and seasonal activities - Planting - direct seeding and transplants.
3. Nursery Management and Routine Garden Operations.

Unit II: Gardening **(12 hrs.)**

1. Definition, objectives and scope - different types of gardening.
2. Landscape and home gardening - parks and its components, plant materials and design .
3. Computer applications in landscaping.
4. Gardening operations: soil laying, manuring, watering.
5. Landscaping Places of Public Importance: Landscaping highways and Educational Institutions)
6. Some Famous gardens of India.
7.

Unit III: Propagation methods **(12 hrs.)**

1. Sowing/raising of seeds and seedlings, transplanting of seedlings.
2. Air-layering, cutting, selection of cutting, propagule collecting season, treatment of cutting
    a. rooting medium and planting of cuttings - Hardening of plants.
3. Propagation of ornamental plants by rhizomes, corms tubers, bulbs and bulbils.
4. Green house - mist chamber, shed root, shade house and glass house for propagation.

Unit IV: Floriculture: **(12 hrs.)**

1. Ornamental Plants: Flowering annuals; herbaceous, perennials; Shade and ornamental trees.
2. Ornamental bulbous and foliage plants; Cacti and succulents.
3. Ornamentals - palms.

4. Cultivation of plants in pots; Indoor gardening; Bonsai.

Unit V: Commercial Floriculture (12 hrs.)

1. Factors affecting flower production; Production and packaging of cut flowers; Flower arrangements; Methods to prolong vase life of flowers
2. Cultivation of Important cut flowers (Aster, Dahlia, Gerbera, Anthuriams, Marigold, Rose, Lilium)
3. Management of pests, diseases and harvesting.
4. Methods of harvesting.

Books for Reference:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. institution)
4. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

Suggested Activities:

Raising a nursery, managing it, studying and drawing various land scaping designs, practicing layering methods, using shade nets to protect horticultural crops, practicing indoor gardening techniques, visiting florists and recording their methods of prolonging vase life of commercial cut flowers.

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

(Re-Accredited by NAAC with'B')
KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B. Sc - BOTANY PRACTICAL SYLLABUS
SEMESTER- VI – For the Academic Year 2021-2022
Paper VII-(B): NURSERY, GARDENING AND FLORICULTURE
Total hours of teaching 30hrs @ 2hrs per week

1. Tools, implements and containers used for propagation and nursery techniques.
2. Propagation by cutting, layering, budding and grafting
3. Seed propagation- preparation of portable trays, seed treatments, sowing and seedling production.
4. Identification and description of annuals, herbaceous perennials, climbers, creepers, foliage and flowering shrubs, trees, palms, ferns, ornamental grasses; cacti and succulents..
5. Planning and designing of gardens, functional uses of plants in the landscape
6. Preparation of land for lawn and planting.
7. Identification of commercially important flower crops and their varieties.
8. Propagation practices in flower crops, sowing of seeds and raising of seedlings of annuals.
9. Use of chemicals and other compounds for prolonging the vase life of cut flowers.
10. Grading, packing and marketing of cut flowers.
11. Visit to commercial nurseries and commercial tissue culture laboratory
12. Study project under supervision of lecturer – nursery/ornamental flowers/ plants/lawn designing/ landscape designing

Expected domain skills to be achieved:

Ability to use a variety of garden tools and implements, proficiency in layering and grafting techniques (cleft grafting and bud grafting), land scape drawings using computers, raising of healthy nurseries of flowering plants, managing vase life of cut flowers etc.

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

(Re-Accredited by NAAC with'B')

KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B. Sc - BOTANY SYLLABUS

SEMESTER- VI – For the Academic Year 2021-2022

Paper VIII, CLUSTER ELECTIVE, Cluster-A,

Paper VIII-A-1 : PLANT DIVERSITY AND HUMAN WELFARE

Total hours of teaching 60hrs @ 3hrs per week

Unit- I : Plant Diversity and its Scope: **(12hrs)**

1. Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agro biodiversity and cultivated plant taxa, wild taxa.
2. Values and uses of biodiversity: Ethical and aesthetic values,
3. Methodologies for valuation, Uses of plants.

Unit –II : Loss of Biodiversity: **(12hrs)**

1. Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projected scenario for biodiversity loss
2. Management of plant biodiversity: Organizations associated with biodiversity management-Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.

Unit-III: Contemporary practices in Resource Management: **(12hrs)**

1. Environmental Impact Assessment (EIA), Geographical Information System GIS,Participatory resource appraisal, Ecological footprint with emphasis on carbon footprint, Resource accounting;
2. Solid and liquid waste management

Unit -IV: Conservation of Biodiversity **(12hrs)**

1. Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation.
2. Social approaches to conservation, Biodiversity awareness programmes, Sustainable development

Unit- V: Role of plants in relation to Human Welfare **(12hrs)**

1. Importance of forestry, their utilization and commercial aspects
   a. Avenue trees, b) ornamental plants of India. c) Alcoholic beverages through ages.
2. Fruits and nuts: Important fruit crops their commercial importance. Wood, fiber and their uses.

Suggested Readings:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Suggested activities:

Study of flora and its diversity in the college campus or local area,enumerating wild and exotic species (*Parthenium*,Water hyacinth etc.)

Project work on any one of the International organizations striving for preservation of biodiversity, study of conservation efforts of local people, and civic bodies, study of locally available fruits in different seasons, enumerating the avenue plantations and their diversity in your town/city

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B. Sc - BOTANY PRACTICAL SYLLABUS
SEMESTER- VI – For the Academic Year 2021-2022

Paper – VIII-A-1 :PLANT DIVERSITY AND HUMAN WELFARE

Total hours of teaching 30hrs @ 2hrs per week

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1) Study of plant diversity (flowering plants).

2) Study of exotic species- Identification and morphological characteristics.

3) Identification of forest trees through bark, wood, flowers, leaves and fruits.

4) Maceration, Study of wood (Tracheary elements, fibres).

5) Methods of preservation and canning of fruits.

6) Visit to the local ecosystem to study the plants.

7) Write up on the conservation efforts of International organizations.

8) Study of Solid and Liquid waste management systems in rural/urban areas.

Domain skills expected to achieve: Identification of exotic plant species, identification of forest trees based on the characteristics of bark, flowers and fruits, understanding the preservation methods of fresh and dry fruits, understanding the methods of safe disposal of biodegradable and non-biodegradable wastes

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

(Re-Accredited by NAAC with'B')
KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B. Sc - BOTANY SYLLABUS
SEMESTER- VI – For the Academic Year 2021-2022
Paper VIII-A-2 : ETHNOBOTANY AND MEDICINAL BOTANY
Total hours of teaching 60hrs @ 3hrs per week

Unit –I: **Ethnobotany** **(12 hrs)**

1. Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethno botany in the present context
2. Major and minor ethnic groups or Tribals of India, and their life styles.
3. Plants used by the tribal populations:
   a) Food plants, b) intoxicants and beverages,
   c) Resins and oils and miscellaneous uses.

Unit -II: **Role of ethnobotany in modern Medicine**: **(12 hrs)**

1. Role of ethnobotany in modern medicine with special example *Rauvolfiaserpentina, Trichopuszeylanicus, Artemisia annua, Withaniasomnifera.*
2. Medico-ethnobotanical sources in India
3. Significance of the following plants in ethno botanical practices (along with their habitat and morphology)
   a) *Azadirachtaindica*, b*) Ocimum sanctum,* c) *Vitexnegundo*, d) *Gloriosasuperba*,
   e) *Tribulusterrestris,* f) *Phyllanthusniruri* ,g) *Cassia auriculata, h) Indigoferatinctoria* , *i) Senna auriculata*j) *Curcuma longa*.
4. Role of ethnic groups in the conservation of plant genetic resources.

Unit-III: Ethnobotany as a tool to protect interests of ethnic groups (12 hrs)

1. Sharing of wealth concept with few examples from India.
2. Biopiracy, Intellectual Property Rights and Traditional Knowledge.

Unit -IV: History, Scope and Importance of Medicinal Plants. indigenous Medicinal Sciences (12hrs)

1. Definition and Scope- **Ayurveda**: History, origin, panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
2. **Siddha**: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine.
3. **Unani**: History, concept: Umoor-e- tabiya, tumors treatments/ therapy, polyherbal formulations (in brief).

Unit -V: Conservation of endangered and endemic medicinal plants: **(12hrs)**

1. Definition: endemic and endangered medicinal plants,
2. Red list criteria
3. *In situ* conservation: Biosphere reserves, sacred groves, National Parks
4. *Ex situ* conservation: Botanical Gardens.

Suggested Activities:

Studying plant utilization methods by tribal/rural/migrant populations for their beverages, food, medicinal and uses, seminars on role of ethnic groups in conservation of plant genetic resources, project work on traditional knowledge about plant medicines, study of indigenous medicinal sciences and their efficacy.

Suggested Readings:

1. S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.

2. Glimpses of Indian. Ethnobotany, Oxford and I B H, New Delhi – 1981

3. S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.

4. S.K. Jain, 1990. Contributions of Indian ethnobotany.Scientific publishers,Jodhpur.

5. Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons – Chichester

6. Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in Andhra Pradesh, India.Botanical Survey of India. Howrah.

7. Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.

8. Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.

9. Pal, D.C. & Jain, S.K., 1998. Tribal Medicine. Naya Prakash Publishers, Calcutta

10. Raychudhuri, S.P., 1991. (Ed.) Recent advances in Medicinal aromatic and spice crops. Vol.1, Today& Tomorrow's printers and publishers, New Delhi

A.S.D GOVT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

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KAKINADA 533002 EASTGODAVARI, ANDHRA PRADESH

III B. Sc - BOTANY PRACTICAL SYLLABUS
SEMESTER- VI – For the Academic Year 2021-2022

Paper – VIII-A-2 :ETHNOBOTANY AND MEDICINAL BOTANY

Total hours of teaching 30hrs @ 2hrs per week

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1. Specimens as prescribed in theory syllabus
2. Detailed morphological and anatomical study of medicinally important part(s) of locally available plants (Minimum 8 plants) used in traditional medicine.
3. Field visits to identify and collect ethno medicinal plants used by local tribes/folklore.

Domain skills expected to achieve: Identification of various plant parts used as medicines by ethnic groups, understanding the difference between ancient wisdom and modern system of medicine, traditional medicine at the rescue of curing drug resistant maladies like malaria and viral diseases, understanding the role of spices in Indian kitchens, their therapeutic role

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III B. Sc - BOTANY SYLLABUS
SEMESTER- VI – For the Academic Year 2021-2022
Paper VIII, CLUSTER ELECTIVE, Cluster-A,
Paper VIII-A-3: PHARMACOGNOSY AND PHYTOCHEMISTRY

Total hours of teaching 60hrs @ 3hrs per week

Unit-I: Pharmacognosy (12hrs)

Definition, Importance, Classification of drugs - Chemical and Pharmacological, Drug evaluation methods

Unit –II: Organoleptic and microscopic studies: (12hrs)

Organoleptic and microscopic studies with reference to nature of active principles and common adulterants of *Alstoniascholaris*(bark), *Adhatodavasica*(leaf), *Strychnosnuxvomica*(seed), R*auwolfia serpentine* (root) and *Zinziberofficinalis, Catharanthusroseus.*

Unit-III: Secondary Metabolites: (12hrs)

1. Definition of primary and secondary metabolites and their differences, major types - terpenes, phenolics, alkaloids, terpenoids, steroids.
2. A brief idea about extraction of alkaloids. Origin of secondary metabolites – detailed account of acetate pathway, mevalonate pathway, shikimate pathway.

UNIT-IV: Phytochemistry: (12hrs)

Biosynthesis and sources of drugs:

1. Phenols and phenolic glycosides : structural types, biosynthesis, importance of simple phenolic compounds, tannins, anthraquinones, coumarins and furanocoumarins, flavones and related flavonoid glycosides, anthocyanins, betacyanins, stilbenes, lignins and lignans).
2. Steroids, sterols, saponins, withanolides, ecdysones, cucurbitacins: Biosynthesis, commercial importance.
3. Alkaloids: Different groups, biosynthesis, bioactivity.
4. Volatile oils, aromatherapy.

UNIT-V: Enzymes, proteins and amino acids as drugs: **(12hrs)**

1. Vaccines, toxins and toxoids, antitoxins, immune globulins, antiserums,
2. Vitamins, Antibiotics – chemical nature, mode of action.
3. Pharmacological action of plant drugs – tumor inhibitors, PAF antagonists, antioxidants, phytoestrogens and others.
4. Role of different enzyme inhibitors.

Suggested Activities:

Isolation techniques of active principles from various parts of popular medicinal plants, debates on the efficacy of plant medicines and palliative cure, volatile oils from plants-extraction methods, project work on crude drugs

BOOKS FOR REFERENCE:

1. Wallis, T. E. 1946. Text book of Pharmacognosy, J & A Churchill Ltd. 2. Roseline, A. 2011. Pharmacognosy. MJP Publishers, Chennai.
2. Gurdeep Chatwal, 1980. Organic chemistry of natural productis. Vol.I.Himalaya Publishing house.
3. Kalsi, P. S. and Jagtap, S., 2012. Pharmaceutical medicinal and natural product chemistry N.K. Mehra. Narosa Publishing House Pvt. Ltd.New Delhi.
4. Agarwal, O. P. 2002. Organic chemistry–Chemistry of organic natural products. Vol. II. Goel publishing house , Meerut.
5. Harborne, J. B. 1998. Phytochemica l methods –a guide to modern techniques of plant analysis 3 rd edition, Chapman and Hall
6. Datta&Mukerji, 1952. Pharmacognosy of Indian roots of Rhizome drugs. Bulletin No.1 Ministry of Health, Govt. of India.

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III B. Sc - BOTANY PRACTICAL SYLLABUS
SEMESTER- VI – For the Academic Year 2021-2022
Paper – VIII-A-3 : PHARMACOGNOSY AND PHYTOCHEMISTRY
Total hours of teaching 30hrs @ 2hrs per week

1. Physical and chemical tests for evaluation of unorganized drugs - Asaphoetida. Honey, Castor oil. Acacia
2. Identification of bark drugs – cinchona, cinnamom
3. Identification of fruit drugs – Cardamom, Coriander
4. Identification of root and rhizome drugs- Ginger, Garlic, Turmeric
5. Identification of whole plant – Aloes,Vinca, Punarnava
6. Herbarium of medicinal plants (minimum of 20 platns)
7. Collection of locally available crude drugs from local venders (minimum of 20)

Domain skills expected to achieve:

Identification of various plant parts used as medicines, extraction of active principles from them, isolation by chromatographic techniques, learning callus culture techniques for secondary metabolite enrichment and understanding ethno-pharmacological principles