

BOTANY SYLLABUS - 2020 - 2021

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

I SEMESTER

BOTANY

TIME:4Hrs/Week

B 1102 (3)

FUNDAMENTALS OF MICROBES AND NON-VASCULAR PLANTS

Max.Marks:100

(VIRUSES, BACTERIA, FUNGI, LICHENS, ALGAE AND BRYOPHYTES)

w.e.f.20-21 admitted batch-"20AH" SYLLABUS

OBJECTIVES:

To enable the students to –

1. Understand importance of prokaryotes
2. Understand the position of the classification of the different groups namely Viruses,
Bacteria, Algae, Fungi & Lichens.
1. Realize the economic importance of Algae and fungi and Bacteria.
2. Understand the symbiotic association of Algae & fungi by study of lichens and their economic importance.
3. Identify and understand the disease cycle of some of the important plant disease and
their control measures.

COURSE OUT COMES:

CO1: Develop skills in microscopic methods

CO2: Be able to identify microbial diversity

CO3: Gain adequate knowledge on comparative account of various Algal, Fungal divisions.

CO4: skilled in the economic importance of algae, Fungi and Lichens.

CO5: Study the different algae in the local ecosystems and can grow the important algae.

CO6: identify and take care of the local vegetation from the plant diseases.

COURSE SYLLABUS:

UNIT – 1: Origin of life and Viruses

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

1. Brief account of Archaeobacteria, Actinomycetes and Cyanobacteria.
2. Cell structure and nutrition of Eubacteria. Gram staining technique.
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 and medicine).
5. A general account on symptoms of plant diseases caused by Bacteria; Citrus canker.

UNIT – 3: Fungi & Lichens

1. General characteristics of fungi and Ainsworth classification (upto classes).
2. Structure, reproduction and life history of (a) Rhizopus (Zygomycota) (b) Penicillium (Ascomycota) and (c) 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

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

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:

1. Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad
2. B. R. C. Murthy, M. Raghu Ram, K. Rama Krishna & V. S. T. Sai; Botany – Vol. I; Venkateswara Publications, Guntur, AP, India.
3. Pandey, B.P. (2013) College Botany, Volume-I, S. Chand Publishing, New Delhi

4. Hait,G., K.Bhattacharya &A.K.Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata

5. Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial Diversity, Kalyani Publishers, New Delhi.

Books for Reference:

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

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

I SEMESTER

BOTANY

TIME:3Hrs/Week

Max.Marks:50

B 1152 (2) FUNDAMENTALS OF MICROBES AND NON-VASCULAR PLANTS

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

w.e.f.20-21 admitted batch-“20AH” PRACTICAL SYLLABUS – IA

OBJECTIVES: To enable the students to –

- Acquire the skills on laboratory techniques
- Identify and distinguish between the different algal types, fungal types & prokaryotes included in the syllabus.
- Identify some importance plant diseases through the symptoms.
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COURSE OUT COMES:

CO1: Learn about basics of biosafety and good lab practices like safe chemical handling, Hazardous wastes

CO2: Learn about the principles of various basic and advanced microscopies.

CO3: Advanced learning of Algae, Fungi specimens under Microscopy and hands on experience.

CO4: Familiarize with the external and internal structure of lower group organism.

CO6: identify and take care of the local vegetation from the plant diseases.

Practical Syllabus:

1. Knowledge of Microbiology laboratory practices and safety rules.
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 credits during the accreditation by NAAC).
3. Demonstration of Gram's staining technique for Bacteria.
4. Study of Viruses (Corona, Gemini and TMV) using electron micrographs/ models.
5. Study of Archaeobacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams.
6. Study of Anabaena and Oscillatoria using permanent/temporary slides.
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 and fruiticose
 - c. Algae: Volvox, Spirogyra, Ectocarpus and Polysiphonia
 - d. Bryophyta: Marchantia and Funaria
9. Study of specimens of Tobacco mosaic disease, Citrus canker and Blast of Rice.

REFERENCES:

1. Practical Botany- Vol.I H.N.Srivastava (1991) – Pradeep Publications, Jalandhar.
Text Book of Practical Botany – Vol.I (227) – Bendre & Kumar – Rastogi Publications, Delhi.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM
II SEMESTER **BOTANY** **TIME:4Hrs/Week**
B 2102(3) **BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY**
Max.Marks:100
(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)
w.e.f.20-21 admitted batch-"20AH" SYLLABUS

OBJECTIVES: To be able to

- Know the systematic position of two cryptogamic groups and their classification
- Understand the life history of bryophyta and pteridophyte through the study of representative types
- Asses the phylogenetic aspects of two groups
- Get an insight into geological timescale
- Understand the plant anatomy like tissue, tissue systems in the plant body

COURSE OUTCOMES:

CO1: Compare and contrast various Bryophytes and pteridophytes.

CO2: Study and impart knowledge on the occurrence, distribution, structure and life history of lower

plants such as a, Bryophytes, Pteridophytes, gymnosperms and wood yielding plants.

CO3: Classify and characterize, ultra- structure of Bryophytes, Pteridophytes and Gymnosperms

CO4: Comprehend Fossilization and types of fossils, Bennettitales general account.

CO5: Realize geological time scale process.

C06: Familiarized to enlist some common wood yielding Plants of India.

COURSE SYLLABUS:

UNIT – 1: PTERIDOPHYTES

1. General characteristics of Pteridophyta; classification of Smith (1955) up to divisions.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of (a) Lycopodium (Lycopsida) and (b) Marsilea (Filicopsida).
3. Stellar evolution in Pteridophytes;
4. Heterospory and seed habit.

UNIT – 2: GYMNOSPERMS

1. General characteristics of Gymnosperms; Sporne classification up to classes.
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 time scale.
4. A brief account on Cycadeoidea.

UNIT – 3: BASIC ASPECTS OF TAXONOMY

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, Botanical gardens
4. Bentham and Hooker system of classification;
5. Systematic description and economic importance of the following families:
(a) Annonaceae (b) Curcubitaceae

UNIT – 4: SYSTEMATIC TAXONOMY

1. Systematic description and economic importance of the following families:
(a) Asteraceae (b) Apocyanaceae (c) Apiaceae (d) Euphorbiaceae
(e) Arecaceae and (f) Poaceae
3. Floral Biology of Calotropis and Orchid flowers
2. Outlines of Angiosperm Phylogeny Group (APG IV).

UNIT – 5: PHYTOGEOGRAPHY

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Endemism – types and causes.
3. Phytogeographic regions of World.
4. Phytogeographic regions of India.
5. Vegetation types in Andhra Pradesh.

Text books:

1. Botany – I (Vrukshasastram-I) : Telugu Akademi, Hyderabad
2. Botany – II (Vrukshasastram-II) : Telugu Akademi, Hyderabad
3. B. R. C. Murthy, M. Raghu Ram, K. Rama Krishna & V. S. T. Sai; Botany – Vol. I & II; Venkateswara Publications, Guntur, AP, India.

4. Acharya, B.C., (2019) Archchegoniates, Kalyani Publishers, New Delhi
5. Bhattacharya, K., G. Hait&Ghosh, A. K., (2011) A Text Book of Botany, Volume-II, New Central Book Agency Pvt. Ltd., Kolkata
6. Hait,G., K.Bhattacharya&A.K.Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata
7. Pandey, B.P. (2013)College Botany, Volume-I, S. Chand Publishing, New Delhi
8. Pandey, B.P. (2013)College Botany, Volume-II, S. Chand Publishing, New Delhi

BOOKS FOR REFERENCE:

1. Smith, G.M. (1971)CryptogamicBotanyVol. II., Tata McGraw Hill, New Delhi
2. Sharma,O.P.(2012)Pteridophyta. Tata McGraw-Hill, New Delhi
3. 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
4. Bhatnagar, S.P. &AlokMoitra (1996)Gymnosperms. New Age International, New Delhi
5. Coulter, J.M. &C.J.Chamberlain(1910) Morphology of Gymnosperms,The University of Chicago Press, Chicago, Illinois
6. Govil, C.M. (2007)Gymnosperms : Extinct and Extant. KRISHNA Prakashan Media (P) Ltd.Meerut& Delhi
7. Sporne, K.R.(1971)The Morphology of Gymnosperms.Hutchinsons Co. Ltd., London
8. Arnold, C.A., (1947) An introduction to PaleobotanyMcGraw –Hill Book Company,INC, New York
9. Stewart,W.N., and G.W.Rothwell (2005) Paleobotany and the evolution of plants Cambridge University Press, New York
10. Lawrence, George H.M. (1951) Taxonomy of Vascular Plants. The McMillan Co., New York
11. Heywood, V. H. and D. M. Moore (1984)Current Concepts in Plant Taxonomy. Academic Press, London.
12. Jeffrey, C. (1982)An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge. London.
13. Sambamurty, A.V.S.S. (2005)Taxonomy of Angiosperms I. K .International Pvt. Ltd., New Delhi
14. Singh, G. (2012). Plant Systematics: Theory and Practice.Oxford & IBH Pvt. Ltd., NewDelhi.
15. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA,U.S.A.
16. Cain, S.A . (1944)Foundations of Plant GeographyHarper & Brothers, N.Y.
17. Good, R. (1997)The Geography of flowering Plants (2nd Edn.)Longmans, Green & Co., Inc., London & Allied Science Publishers, New Delhi

18. Mani, M.S (1974) Ecology & Biogeography of India Dr. W. Junk Publishers, The Haque

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

II SEMESTER

BOTANY

TIME:3Hrs/Week

B 2151(2) BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

Max.Marks:50

(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

w.e.f 2020-2021 Batch PRACTICAL SYLLABUS – I B

OBJECTIVES:

1. Demonstrate the techniques of section cutting, preparing slides, identifying of the material and drawing exact figures.
2. Compare and contrast the morphological, anatomical and reproductive features of vascular plants.
3. Identify the local angiosperms of the families prescribed to their genus and species level and prepare herbarium.
4. Learn the skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are.
5. Gain the knowledge of Preparation and preservation specimens of local wild plants using herbarium techniques.

COURSE OUT COMES:

CO1: Learn about the principles of various basic and advanced microscopy.

CO2: Advanced learning of Bryophytes, Pteridophytes and Anatomy slides and specimens under Microscope and hands on experience.

CO3: Familiarize with the external and internal structure of Bryophytes, Pteridophytes and Wood yielding plants.

CO4: Learn the double staining technique.

CO5: Learn to survey techniques to identify and evaluate the values of different timbers available locally.

PRACTICAL SYLLABUS:

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

- ## REFERENCES:

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ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

III SEMESTER

BOTANY

Time:4Hrs/Week

B 3101 (3)

PLANT DIVERSITY – III

Max.Marks:100

19-20 admitted batch (19AG) (ANGIOSPERMS – TAXONOMY & EMBRYOLOGY)

OBJECTIVES:To enable the students to

1. Understand the modern trends in Plant taxonomy
2. Realize the diversity of families of angiosperms especially locally available species.
3. Understand various aspects of embryology of Plants

COURSE OUTCOMES:

CO1: Get basic knowledge of principles of Taxonomy and the modern trends in plant Taxonomy

CO2: Gains the skills to become an Herbarium technician.

CO3: Become a member in BSI and able to establish Botanical gardens.

CO4: understand different types of systems of classification based on natural and evolutionary tendencies.

CO5: Acquires the skill s on the diversity of Embryology of Dicots and Monocots.

COURSE SYLLABUS:

UNIT – I: INTRODUCTION TO PLANT TAXONOMY

1. Fundamental components of taxonomy - identification, nomenclature, classification
2. Taxonomic resources: Herbarium- technique, functions & important herbaria, Botanical gardens, Flora, Keys- single access and multi-access.
3. Botanical Nomenclature- Principles and rules of ICBN - ranks and names; principle of priority, binomial system; type method, author citation, valid-publication.

UNIT-II: TAXONOMIC CLASSIFICATION

1. Types of classification- Artificial, Natural and Phylogenetic.
2. Bentham & Hooker's system of classification- merits and demerits.
3. Engler & Prantle's system of classification- merits and demerits
4. Phylogeny – origin and evolution of Angiosperms, APG System (Brief account)

UNIT – III: DIVERSITY OF ANGIOSPERMS – I

Systematic study and economic importance of plants belonging to the following families: Annonaceae, Brassicaceae, Rutaceae, Cucurbitaceae, Apiaceae

UNIT – IV: DIVERSITY OF ANGIOSPERMS – II

Asteraceae, Apocynaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Arecaceae & Poaceae.

UNIT – V: EMBRYOLOGY: History & Importance of Embryology

1. Anther: Structure and development of anther; Microsporogenesis, Development of male gametophyte.
2. Ovule: Structure, Types of ovules, Megasporogenesis, Female gametophyte – Structure, Types, development of Monosporic, Bisporic and Tetrasporic types of embryo sacs..
3. Pollination & Fertilization : Types of Pollination, A brief account of self-incompatability; Fertilization
4. Endosperm : Types : Nuclear, Cellular and Helobial
5. Embryo : Embryogenesis; Development of Dicot and Monocot embryo; Polyembryony, Apomixis, Parthenocarpy

TEXT BOOK: Plant Taxonomy and Embryology (2016) Dr. B.R.C. Murthy & V.S.T. Sai; Venkateswara Publications – Guntur.

REFERENCE BOOKS:

1. Lawrence, G.H.M. (1953): Taxonomy of Vascular Plants, Oxford & IBH Publishers, New Delhi, Calcutta.
2. Jefferey, C.(1968) : An Introduction to Plant Taxonomy J.A. Churchill, London.
3. Mathur, R.C.(1970) : Systematic Botany (Angiosperms) Agra Book Stores-Lucknow, Ajmer, Allahabad, Delhi.
4. Maheswari,P(1963) :Recent Advances in the Embryology of Angiosperms(Ed.,) International Society of Plant Morphologists- University of Delhi.
5. Swamy. B.G.L. & Krishnamoorthy. K.V.(1980):From flower to fruit Tata McGraw Hill Publishing Co., Ltd., New Delhi.
6. Maheswari, P.(1985):An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co.,Ltd., New Delhi.
7. Bhojwani, S.S. & Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4th Edition) Vikas Publishing House(P)Ltd., UBS Publisher's Distributors, New Delhi.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

III SEMESTER

BOTANY

Time:3Hrs/Week

B 3151 (2)

PLANT DIVERSITY – III

Max.Marks:50

19-20 admitted batch (19AG) (Angiosperms – Taxonomy & Embryology)

PRACTICAL SYLLABUS – II A

OBJECTIVES:

- Understand the angiosperm plant diversity
- To make the students understand and identify the different stages in reproduction leading to seed formation in angiosperms.

COURSE OUT COMES:

CO1: Understand the Angiosperm plant diversity and identify the members of the representative families

through taxonomic observations.

CO2: Acquire the skill of Herbarium Technique

CO3: Gains the skills in isolating and testing the viability of pollen.

CO4: Skilled in producing the genetically new varieties.

COURSE PRACTICAL SYLLABUS

I. SYSTEMATICS OF ANGIOSPERMS:

1. Demonstration of herbarium techniques.
2. Study of angiospermic plant diversity through taxonomic observations of locally available plant specimens belonging to the following families.

DICOTYLEDONAE

- **POLYPETALAE** : Annonaceae, Brassicaceae, Rutaceae, Mimosaceae, Cucurbitaceae,

Apiaceae

- **GAMOPETALAE** : Asteraceae, Apocynaceae, Asclpiadaceae, Lamiaceae.
- **MONOCHLAMYDEAE** : Amaranthaceae, Euphorbiaceae ,
MONOCOTYLEDONAE :Arecaceae, Poaceae.

II. ANGIOSPERMS - EMBRYOLOGY

Study of embryological stages through permanent slides or hand made preparations.

- Stages in Microsporogenesis

- Structure of pollen grains using whole mounts (Catharanthus, Hibiscus, Acacia, Grass).
- Pollen viability test in- vitro germination (Catharanthus).
- Ovule types and developmental stages of embryo sac using permanent slides /Photographs.
- Embryo Sac
- Pollen germination on stigma
- Endosperm – Types: nuclear and cellular
- Embryo Development – Dicot, Monocot using permanent slides / Photographs
- Isolation and mounting **of embryo (using Symopsis / Senna / Crotalaria)**

III. FIELD WORK

1. Field visits.
2. Study of local flora and submission of Field Note Book.

REFERENCES:

1. Practical Botany – Vol.II (2008). Bendre & Kumar Rastogi publications, Meerut.
2. Modern Practical Botany – Vol.II (2007). B.P.Pande S. Chand & Co., New Delhi.

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1. Mineral Nutrition – Essential macro and micro nutrients and their role in plant growth

2. Symptoms of mineral deficiency
3. Mineral Absorption – Passive and active processes.
4. Enzymes: Nomenclature, characteristics, brief outline of IUB classification of enzymes; Mechanism and regulation of enzyme action, factors effecting enzyme action.

UNIT – III: PHOTOSYNTHESIS

1. Photosynthesis: Photosynthetic pigments; Absorption and Action spectra; Red drop and Emerson Enhancement effect
2. Concept of two Photosystems, Mechanism of Photosynthetic electron transport and evolution of oxygen; Photophosphorylation.
3. Carbon assimilation pathways, Calvin cycle (C3), C4 pathway, CAM Cycle.
4. Photorespiration
5. Translocation of organic substances: Mechanism of Phloem transport; Source-Sink relationship.

UNIT IV: PLANT METABOLISM

1. Respiration: Aerobic & Anaerobic –Glycolysis, Krebs's cycle; Electron transport System; Oxidative Phosphorylation-Mechanism
Pentose Phosphate Pathway
2. Nitrogen metabolism: Biological Nitrogen fixation; Nitrate reduction; Ammonium assimilation, Protein synthesis
3. Lipid metabolism: Structure & functions of lipids, Fatty acid oxidation; β -oxidation; Conversion of lipids to carbohydrates – Glyoxylate Cycle

UNIT V: GROWTH AND DEVELOPMENT

1. Growth – Definitions, Phases and Kinetics of growth.
2. Phytohormones – Physiological effects of Auxins, Gibberellins, Cytokinins, ABA, Ethylene and Brassinosteroids.
3. Development: Physiology of flowering – Photoperiodism; Role of phytochrome in flowering,
Vernalization.
4. Physiology of Senescence and Ageing.

TEXT BOOK:

VST Sai, B.R.C Murthy & K. Ramakrishna – Plant Physiology and Metabolism (2019), Vikas Publications, Guntur.

REFERENCE BOOKS:

1. Noggle G.R. & Fritz G.A.- 1996 – Introductory Plant Physiology – Prentice Hall of India Pvt Ltd., New Delhi.

2. Salisbury, F.B.& Ross C.W. – 1992 – Plant Physiology CBS Publishers & Distributors, Delhi.
3. Delvin, R.M. (2000) Plant Physiology. CBS Publishers & Distributors, New Delhi.
4. Srivastava, H.N. – 2004 – Plant Physiology – Pradeep Publications, Jalandhar.
5. Mayer, Anderson & Bonning(1965): Introduction to Plant Physiology D.Van Nostrand . Publishing Co., N.Y.
6. Mukherjee, S. A.K. Ghosh (1998) Plant Physiology, Tata McGraw Hill Publishers(P) Ltd., New Delhi.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

IV SEMESTER

BOTANY

TIME: 3Hrs/week

B 4151 (2)

PLANT PHYSIOLOGY & METABOLISM

Max.Marks:50

19-20 Admitted Batch (19AG)

PRACTICAL SYLLABUS – II B

OBJECTIVES:

To enable the student to

1. Perform experiments, record observations, analyze the results and draw conclusions of different physiological processes.
2. Understand the principle of experiments related to plant metabolism, growth & development.

COURSE OUT COMES:

CO1: skilled with instrumentation.

CO2: 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. able to describe and use the basic techniques for studying

CO3: able to apply in plant physiological research.

CO4: Able to apply the importance of phyto hormones in various industries.

COURSE PRACTICAL SYLLABUS:

MAJOR EXPERIMENTS

1. Determination of osmotic potential of cell sap of Rhoeo leaves by plasmolytic method.
2. Determination of Relative rates of transpiration by Cobalt Chloride paper method.
3. Determination of Stomatal frequency using epidermal peelings/impressions.
4. Photosynthesis –
 - a. Measurement of photosynthesis by Hydrilla – funnel experiment.
 - b. Study of the effect of different factors - Co₂ and Light on photosynthesis.
5. Separation of Chloroplast pigments using Paper chromatography.
6. Determination of Catalase.
7. Determination of the R. Q. Value of the given Respiratory substrate.
8. Estimation of protein.

MINOR EXPERIMENTS

1. Demonstration of osmosis using egg membrane/ Potato osmoscope.
2. Measurement of transpiration by simple potometer.
3. Demonstration of ascent of sap/Transpiration pull.
4. Study of mineral deficiency symptoms using plant material/photographs.

5. Hydroponics
6. Effect of light intensity on oxygen evolution in photosynthesis using Wilmott' bubbler.
7. Measurement of growth by Arc Auxanometer.

REFERENCE BOOK

Bendre, A & Kumar 2005 – Practical Botany – Vol.II – Rastogi Publications, Jalandhar.



ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

V SEMESTER

BOTANY

TIME:3Hrs/Week

B 5101(3)

CELL BIOLOGY, GENETICS & PLANT BREEDING

Max.Marks:100

19-20 Admitted Batch (19AG)

SYLLABUS

OBJECTIVES:

- Understand the ultra structure of plant cell, nucleus, chromosomes and cell division.
- Understand and comprehend the basic principles of heredity
- Acquire the knowledge on the important insights of molecular biology.
- Knowledge is gained on the concepts, methods and recent trends of Plant Breeding

COURSE OUTCOMES:

CO1: Able to understand the life on earth and the unit of life cell and its Divisions.

CO2: Acquire an insight of molecular biology

CO3: Able to understand the genetically different variations in daily life forms.

CO4: Enable the students to know the different concepts, methods and recent trends of plant breeding

CO5: Acquire practical knowledge to understand the principles and techniques of plant breeding.

COURSE SYLLABUS:

UNIT-I: CELL BIOLOGY:

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 & solenoid model, Euchromatin and heterochromatin, Karyotype
4. Cell Division: Cell cycle(Brief account), Mitosis, Meiosis & their significance

UNIT-II: GENETIC MATERIAL:

1. DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment.
2. DNA structure -Watson & Crick model and replication of DNA: Semi-conservative method
3. Types of RNA - mRNA, tRNA, rRNA, their structure and function.

UNIT–III: MENDELIAN INHERITANCE:

1. Mendel's laws of Inheritance: Monohybrid and Dihybrid crosses; backcross and test cross.
2. Chromosome theory of Inheritance.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage maps based on two and three factor crosses.
4. Crossing Over: concept & significance.

UNIT–IV: PLANT BREEDING: INTRODUCTION & METHODS

1. Introduction to plant breeding
2. Methods of plant breeding: outlines of Procedure, advantages and limitations of
 - i) Plant Introduction
 - ii) Selection:
Types of Selection - Mass selection, Progeny selection, Pure line selection, Clonal selection
 - iii) **Hybridization:**
 - a) Procedure of Hybridization
 - b) Hybridization methods in Self-pollinated crops
 - c) Hybridization methods in Cross pollinated crops
3. Heterosis and Inbreeding Depression

UNIT–V: MUTATION BREEDING & BIOTECHNOLOGY IN CROP IMPROVEMENT:

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, RFLP.
4. International & National Research Institutes of Crop improvement – ICRISAT, IARI, ICAR

SUGGESTED ACTIVITY: Seminar, Debate, Quiz, observation of live cells and nucleus in Onion peels, observation of Meiotic nuclei in Maize pollen. Solving Genetics problems.

TEXT BOOKS:

Cell Biology, Genetics and Plant Breeding (2017) V.S.T. Sai and Dr. B.R.C. Murthy– (2011), A Text Book of B.Sc. Botany Third Year, Venkateswara Publications, Guntur, AP, India

REFERENCE BOOKS

1. Gupta, P.K.- (1999) – A Text Book of Cell and Molecular Biology, Rastogi Publications, Meerut.
2. Singh, B.D. – (1995) – Fundamentals of Genetics – Kalyani Publishers, New Delhi.
3. Sinnott, Dunn & Dobzhansky – (1999) Principles of Genetics. McGraw Hill Book & Co., New Delhi.
4. Snustad D.P. & Simmons M.J. – (2004) – Principles of Genetics ; John Wiley & Sons, Inc. New York.
5. Strickberger, M.W. – (1999) – Genetics – McMillan Publishing Corp, New York.
6. Agarwal .V.K. (2006) Genetics. S.Chand & Co. New Delhi.
7. Allard R.W(1999): The Principles of Plant Breeding, John & Wiley and Sons.
8. Gupta, P.K., Plant breeding, Rastogi Publications, 2008
9. Singh B.D., Plant Breeding principles & Methods , 2015
10. Plant Breeding by Chowdary

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

V SEMESTER

BOTANY

TIME:3Hrs/Week

B 5151(2)

CELL BIOLOGY, GENETICS & PLANT BREEDING

Max.Marks:50

19-20 Admitted Batch (19AG) PRACTICAL- IIIA

OBJECTIVES:

- Know the cytochemical methods of fixation and nuclear staining.
- Make suitable cytological preparations for study of mitosis, meiosis and karyotype.
- Solve problems in genetics.
- Understand principles and techniques of Plant Breeding

COURSE OUTCOMES:

CO1: Study the structure of plant cell through temporary mounts and cell organelles through

Microphotographs

CO2: Becomes a skilled person in identifying the different stages of Mitosis, Meiosis and Karyotype by squash preparations of Onion roots and flower buds.

CO3: Able to do Calorimetric estimation of DNA by diphenylamine method.

CO4: Develop analytical skills to solve Numerical problems in Genetics

CO5: Field skills to perform Emasculation and Hybridization methods in Plant Breeding.

COURSE PRACTICAL SYLLABUS:

CELL BIOLOGY

1. Demonstration of Cytochemical methods: Fixation of plant material and nuclear staining.
2. Study of structure of plant cell through temporary mounts.
3. Study of effect of temperature & organic solvent on permeability of cell membrane.
4. Study of the structure of cell organelles through photomicrographs.
5. Study of different stages of Mitosis by squash preparations of Onion roots.
6. Preparation of karyotype slides from dividing root tip cells of Onion.
7. Study of different stages of Meiosis by squash preparations of anthers of Onion/Maize flower buds.
8. Study of DNA packing by micrographs.
9. Calorimetric estimation of DNA by diphenylamine method

GENETICS

Numerical problem solving in Mendel' Laws of inheritance

1. Problems on Monohybrid Ratio
2. Problems on Dihybrid Ratio
3. Problems on Incomplete Dominance
4. Problems on Linkage

PLANT BREEDING

1. Hybridization techniques
 - i) Emasculation
 - ii) Hybridization
 - iii) Bagging & tagging
2. Field visit to a plant breeding research station.

REFERENCE BOOKS:

1. Santra. S.C., Chatterjee, T.P and as A.P. (1989) College Botany Practical – Vol. I. New Central Book Agency, Calcutta.
2. Sharma, O.P. (2001) Experiments and techniques in Plant Sciences – Vol. II. Pragati Prakashan, Meerut
3. Practical Handbook of Plant Breeding by Vikas Pal, 2016

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

V SEMESTER

BOTANY

TIME:3Hrs/week

B 5102(3)

PLANT ECOLOGY & PHYTOGEOGRAPHY

Max.Marks:100

19-20 Admitted Batch (19AG)

SYLLABUS

OBJECTIVES: To enable the students to

1. understand basic concepts of Ecology and environment.
2. understand the morphological, anatomical and physiological responses of plants to the environmental factors.
3. understand the importance of community ecology and ecological succession.
4. know the significance of Phytogeography and understand the Phytogeographical regions of India

Course outcomes:

CO1: Demonstrate Eco-friendly farming with enhanced productivity.

CO2: Develop Skills in ecological instrumentation which provide employability in weather forecasting.

CO3: Quantitative analysis of plant communities helps students to acquire jobs as Vegetation surveyors.

CO4: Biodiversity conservation methods provide opportunities as conservationists or work with NGOs and International Organizations.

CO5: Conservation of genetic resources help to establish local Seed Banks for sustainable agriculture practices and prevents genetic erosion.

COURSE SYLLABUS

UNIT – I: Concepts and Ecosystem Ecology

1. Introduction to Ecology: definition, branches and significance of ecology.
2. Ecosystem Ecology
 - a. Concepts and components (Abiotic and biotic)
 - b. Food chains, Food webs, Ecological pyramids, Energy flow
 - c. Bio-geo-chemical cycles of carbon, nitrogen and phosphorus.
3. Productivity of ecosystem-Primary, Secondary and Net productivity.
4. Methods to estimate Primary productivity

UNIT – II: Elements of Ecology

1. Climatic Factors: Light, Temperature, precipitation.
2. Edaphic Factor: Origin, formation, composition and soil profile.
3. Biotic Factor: Interactions between plants and animals.
 4. Ecological Adaptations of Plants

- a) Hydrophytes
- b) Xerophytes

UNIT – III: Population & Community Ecology

1. Population – Definition, Population Characteristics-Natality, Mortality, Growth curves, ecotypes, ecads
2. **Plant Communities** – characteristics of a community – Frequency, Density, Cover, and basal area, dominance, life forms, Biological spectrum, Important Value **Index (IVI)**, **competition**
3. Methods to Study Plant Communities.

UNIT – IV: PHYTOGEOGRAPHY:

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

UNIT – V: PLANT BIODIVERSITY AND ITS IMPORTANCE

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
5. Role of Organizations in the conservation of biodiversity – IUCN, UNEP, WWF, **NBPGR, NBD.**

SUGGESTED ACTIVITY: Collection of different soils, studying their texture, observing polluted water

bodies, student study projects, debates on man's activity on ecosystem and biodiversity conservation

methods, visiting a nearest natural vegetation area. Visit to NGO, working in the field of biodiversity

and report writing; to study Honey Bees and plants yielding honey.

TEXT BOOK:

VST Sai, B.R.C Murthy & K. Ramakrishna (2011) Text Book of Common Core Botany – Vol.II – Vikas Publications. Guntur. 2019)

REFERENCE BOOKS:

1. Plant Ecology – R.S. Ambast – Students friends & Co., Varanasi, India – 1988.
2. Ecology & Environment – P.D. Sharma – Rastogi Publications, Meerut – 2001.
3. A. Treatise on Plant Ecology – K.N. Bhatia & Sharma K.K. – Pradeep Publications, Jalandhar – 1991.
4. Textbook of Environmental Studies of Undergraduate Courses. Bharucha, E.Universities Press (I) Pvt.Ltd., Hyderabad 2005
5. Concepts of Ecology, Kormondy, E.Prentice Hall of India, New Delhi 1989
6. Ecology, Michael S. Oxford University Press, London 1996.
7. Basics of Ecology Odum, E.P. Saunders International Students Edition, Philadelphia 1983
8. Elements of Ecology, Sharma P.D. Rastogi Publications, Meerut 1989
9. Environmental Biology Singh H.R, .S.Chand & Co. Ltd. New Delhi 2005
10. Kochhar, P.L. (1975): Plant Ecology. (9th Edn.,) New Delhi, Bombay, Calcutta- 226pp.,
11. Kumar, H.D. (1992): Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
12. Kumar H.D. (2000): Biodiversity & Sustainable Conservation Oxford & IBH Publishing 10. Co Ltd. New Delhi.
13. Chapman, J.L&M.J. Reiss (1992): ecology (Principles & Applications). Cambridge University Press, U.K.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

V SEMESTER

BOTANY

TIME:3Hrs/week

B 5152 (2)

ECOLOGY & PHYTOGEOGRAPHY

Max.Marks:50

19-20 Admitted Batch (19AG) PRACTICAL- III B

OBJECTIVES:

To enable the students

- learn the quantitative aspects of a plant community by quadrat method
- study various aspects of plant communities.
- Acquire knowledge of the Phytogeography and biodiversity of the region

Course outcomes:

CO1: Develop Skills in ecological instrumentation which provide employability in weather forecasting.

CO2: Demonstrate Soil testing methods to determine soil fertility

CO3: Field study of plant communities helps students to acquire skills as Vegetation surveyors.

CO4: Observe ecological adaptations of plants and study the Productivity patterns of different

ecosystems

CO5: Able to identify endangered plants, Phytogeographical regions and Biodiversity Hotspots

COURSE SYLLABUS:

1. Study of instruments used to measure microclimatic variables; soil thermometer, Maximum and Minimum thermometer, Anemometer, Psychrometer, Rain gauge, and Lux meter.

2. Permeability (percolation; total capacity as well as rate of movement) of different soil samples.

3. Determination of soil pH

4. Study of morphological and anatomical characteristics of hydrophytes and xerophytes

Hydrophytes - Hydrilla, Eichhornia, Pistia, Nymphaea, Utricularia, Vallisneria

Xerophytes - Cocoloba, Opuntia, Euphorbia, Asparagus, Ruscus,
Acacia melanoxylon, Casuarina

5. Quantitative Analysis of Herbaceous Vegetation: Study of frequency, density, abundance and biomass.

6. Study of Phytoplankton and macrophytes from water bodies.

7. Study of species diversity index of vegetation.

8. Estimation of Primary Productivity of an ecosystem

9. To study field vegetation with respect to stratification, canopy cover and composition.

10. To locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.

11. The following practical should be conducted in the Field/lab with the help of photo-

graphs, herbarium, Floras, Red data book- Study of endangered plants species, critically

endangered plants species, vulnerable plant species and monotypic endemic genera of India.

12. Minimum of two field visits to local areas of ecological / conservation of biodiversity importance (Sacred grove / reserved forest / botanical garden / zoo park / lake etc.)

REFERENCES:

1. Text book of Practical Botany (Vol .II) – Ashok Bendra & Kumar, Rastogi Publications, Meerut – 2001-2002
2. Practical Botany (Vol.II) – H.N. Srivastava, Pradeep Publications, Jalandhar – 200.
3. Modern Practical Botany – B.P.Pandey – S.Chand & Co., New Delhi – 1988.

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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

VI SEMESTER

BOTANY

TIME:4Hrs/Week

B-E1-6103 (3)

NURSERY, GARDENING AND FLORICULTURE

Marks:100

19-20 Admitted Batch (17AE)

SYLLABUS

OBJECTIVES: To enable the students to –

- Gain knowledge in Nursery management and Gardening methods
- Know the importance and uses of Landscaping
- Learn methods of propagation and Bonsai technique
- Be able to identify different types of plants
- Understand cultivation and harvest practices of flowering crops

COURSE OUTCOMES

CO1: Identify different types of Nursery plants

CO2: Demonstrate the skills of vegetative propagation techniques

CO3: Design garden layout

CO4: Master techniques of Floriculture

CO5: Operate a commercial plant nursery

COURSE SYLLABUS

UNIT- I: NURSERY:

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

UNIT- II: GARDENING

1. Definition, objectives and scope - different types of gardening.
2. Gardening operations: soil laying, manuring, watering
3. Some Famous gardens of India

4. Landscaping: Plant materials and design; home gardening; parks and its components, Landscaping highways, Educational Institutes
5. Computer applications in landscaping.

UNIT- III: PROPAGATION METHODS

- 1 Sowing/raising of seeds and seedlings, transplanting of seedlings.
2. Cutting, Layering, Air-layering, grafting methods, Hardening of plants.
3. Propagation of ornamental plants by rhizomes, corms tubers, bulbs and bulbils.
4. Green house, mist chamber, shade nets for propagation.

UNIT-IV: TYPES OF PLANTS

1. Ornamental Plants: Flowering plants: herbaceous annuals, perennials; Divine vines; Shade and ornamental trees.
2. Ornamental bulbous and foliage plants; Ornamental Ferns, palms; Cacti and succulents.
3. Indoor gardening
4. Bonsai: Introduction, Styles of Bonsai, Steps in Bonsai making.

UNIT-V: FLORICULTURE

1. Factors affecting flower production; Production, grading and packing of cut flowers; Flower arrangements; Methods to prolong vase life of flowers
2. Cultivation of Important cut flowers: Carnation, Aster, Dahlia, Anthuriums, Gladiolous, Rose, Lilium
3. Management of pests and diseases.
4. Methods of harvesting.

TEXT BOOK: K. Manibhushan Rao, 1991; Textbook of Horticulture; Macmillan India Limited; Delhi,
India

BOOKS FOR REFERENCE:

1. V. L. Sheela, 2011; Horticulture, MJP Publishers, Chennai, India
2. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
3. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
4. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.

Institution

5. Wasim Khan, 2004; Gardening-A Constructive Endeavour; Student Book Depot Publishers;
Delhi, India.
6. 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.

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS),VISAKHAPATNAM

VI SEMESTER

BOTANY

TIME:2Hrs/Week

B-E1-6152(2) NURSERY, GARDENING AND FLORICULTURE Marks: 50

19-20 Admitted Batch (19AG) PRACTICALSYLLABUS – IV

OBJECTIVES: To enable the students to –

- Develop practical skills in various propagation methods
- Design gardens and landscapes
- Identify different plants of Floriculture importance
- Understand cultivation methods of important Flower crops

COURSE OUTCOMES

CO1: Develop skills in vegetative propagation methods

CO2: Become expertise in identifying different types of nursery plants

CO3: Acquire skills to design gardens and landscapes

CO4: Demonstrate skills to enhance vase life of cut flowers

CO5: Gain marketing skills of nursery and floriculture products

COURSE SYLLABUS

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 flowering shrubs, trees, palms, ferns, ornamental grasses; cacti and succulents
5. Planning and designing of gardens,
6. Functional uses of plants in the landscape; Computer assisted Landscape Design
7. Preparation of land for lawn and planting.
8. Identification of commercially important flower crops and their varieties.
9. Use of chemicals and other compounds for prolonging the vase life of cut

flowers. Grading, packing and marketing of cut flowers.

10. Visit to commercial nurseries and commercial tissue culture laboratory
12. Study project under supervision of lecturer – nursery/ornamental flowers/
plants/lawn designing/landscape designing

REFERENCES:

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.

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), landscape drawings using computers, raising of healthy nurseries of flowering plants, managing vase life of cut flowers etc.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER	BOTANY	TIME:3Hrs/week
B-E2-6101(3)	PLANT DIVERSITY AND HUMAN WELFARE	Marks:100
19-20 Admitted Batch (17AE)	SYLLABUS	

OBJECTIVES: To enable the students to

1. Acquire knowledge in Agrobiodiversity
2. Get insight into management of Biodiversity
3. Learn Environmental Impact Assessment on Plant Biodiversity loss
4. Understand approaches to Crop and Biodiversity conservation
5. Recognize role of plants in Human welfare

COURSE OUTCOMES

- CO1: Apply knowledge of species diversity for livelihood options
- CO2: Explore methods to conserve Biodiversity in association with National and International organizations.
- CO3: Conduct Environmental Impact Assessment on local plant diversity
- CO4: Enumerate local wild and exotic species and create awareness on sustainable development goals
- CO5: Realize the economic importance of plants for human welfare.

Unit- I: Plant diversity and its scope:

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

Unit -II: Loss of biodiversity:

- i. Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro biodiversity, projected scenario for biodiversity loss
- ii. 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:

- i. Environmental Impact Assessment (EIA), Geographical Information System GIS, Participatory resource appraisal, Ecological footprint with emphasis on carbon footprint, Resource accounting;

- ii. Solid and liquid waste management

Unit -IV: Conservation of biodiversity

- i. Conservation of genetic diversity, species diversity and ecosystem diversity, In situ and ex situ conservation,
- ii. Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

Unit- V: Role of plants in relation to Human Welfare

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

BOOKS:

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

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER	BOTANY	TIME: 3Hrs/week
B-E2-6151(2)	PLANT DIVERSITY AND HUMAN WELFARE	Marks:50
19-20 Admitted Batch (17AE)	PRACTICAL SYLLABUS	

OBJECTIVES: To enable the students to

1. Study diversity of plants
2. Understand preservation methods of different varieties of fruits
3. Learn disposal of solid and liquid waste

COURSE OUTCOMES

CO1: Identify and enumerate local plant diversity

CO2: Establish a small-scale canning centre

CO3: Conduct survey on forest vegetation

CO4: Develop skills in safe disposal of biodegradable and non- biodegradable waste

COURSE SYLLABUS

- 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.

REFERENCES:

1. Practical Botany – Vol. I & II – Srivastava H.N. – Pradeep Publications, Jalandhar., 1991
2. Text Book of Practical Botany – Vol.I& II– Ashok Bendre& Ashok Kumar – Rastogi Publications, Meerut., 2006.

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

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER	BOTANY	TIME:3Hrs/week
B-E3-6102(3)	PLANT BIOTECHNOLOGY AND APPLICATIONS	Max.Marks:100
19-20 Admitted Batch (19AG)	SYLLABUS	

OBJECTIVES: To enable the students to

1. Understand the basic principles of plant tissue culture
2. Understand the methods in biotechnology
3. Get an insight into Recombinant DNA technology and Methods of gene transfer.
4. Appreciate the applications of Biotechnology

COURSE OUTCOMES:

CO1: Able to develop tissue and organ cultures

CO2: Understanding about secondary metabolite production provides industrial employability opportunities

CO3: Knowledge in Genetic engineering enables students to produce genetically tailored desirable crops

CO4: Gain knowledge in Gene transfer techniques useful for Biotechnological Research and development

CO5: Develop skills to improve agronomic traits and production of improved Horticultural crops

COURSE SYLLABUS:

UNIT I: PLANT TISSUE CULTURE – 1

1. History of plant tissue culture - basic principles of plant tissue culture, Totipotency of cells, differentiation and dedifferentiation.
2. Sterilization Methods: physical and chemical methods; culture media – Murashige and Skoog's (MS) medium; Phytohormones
3. Callus culture, Maintenance of Callus culture, meristem/shoot tip culture, root culture, leaf culture
4. Morphogenesis in callus culture – organogenesis, somatic embryogenesis.

UNIT-II: PLANT TISSUE CULTURE -2

1. Anther and Pollen culture
2. Endosperm culture – Embryo culture, embryo rescue technique.
3. Production of secondary metabolites.
4. Cryopreservation; Germ plasm conservation.

UNIT- III: RECOMBINANT DNA TECHNOLOGY

1. Steps in r DNA Technology, Restriction Endonucleases - Types
2. Cloning Vectors: Prokaryotic - pBR322, Ti plasmid and Lambda phage, Eukaryotic Vectors -YAC and briefly BAC
3. Gene cloning -Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning
4. Construction of genomic and cDNA libraries

UNIT- IV: METHODS OF GENE TRANSFER

1. Methods of gene transfer- Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment.
2. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

UNIT- V: APPLICATIONS OF BIOTECHNOLOGY

1. Genetic modifications for crop improvement: Transgenic plants for pest resistance – Bt-cotton
2. Herbicide resistance - Round Up Ready soybean
3. Improved agronomic traits -Flavr Savr tomato, Golden rice
4. Improved horticultural varieties- Moon dust carnations; Edible vaccines

TEXT BOOKS:

Plant Biotechnology-P.K. Gupta, Rasthogi Publications, Delhi, India (2017)

Botany-Plant tissue culture and its biotechnological applications, by B. R. C. Murthy & V. S. T. Sai, Venkateswara Publications, Guntur, 2020

REFERENCEBOOKS:

1. Pullaiah. T. and M.V. Subba Rao. 2009. Plant Tissue culture. Scientific Publishers, New Delhi.
2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.
4. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms. Vikas Publication House Pvt. Ltd., New Delhi. 5th edition.
5. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons, U.K. 5th edition.

6. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.

SUGGESTED ACTIVITIES: In vitro initiation of callus on artificial medium, seminars on utilization of rDNA technology, debates on applications of Biotechnology (whether it is a boon or bane to the society) studying growth patterns, vegetative characteristics of Bt. cotton and identifying the features of its pest resistance

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM		
VI SEMESTER	BOTANY	TIME:3Hrs/week
B-E3-6152(3)	PLANT BIOTECHNOLOGY AND APPLICATIONS	Max.Marks:50
19-20 Admitted Batch (19AG)	PRACTICALSYLLABUS – IV	

OBJECTIVES: To enable the student to

- Learn skills to handle different instruments used in Biotechnology laboratory
- Be able to do sterilization processes and tissue culture methods
- Understand and perform isolation methods of DNA
- Study different gene transfer methods

COURSE OUTCOMES:

CO1: Execute sterilization methods

CO2: Develop practical skills in Tissue and organ culture

CO3: understand methods of gene transfer techniques

CO4: Gain knowledge about production of genetically engineered crops

CO5: Demonstrate isolation of DNA

COURSE PRACTICALSYLLABUS:

1. Preparation of MS medium.
2. Demonstration of in vitro sterilization methods and inoculation methods using leaf and nodal explants of Tobacco/ Datura/ Brassica etc.
3. Study of embryo culture, somatic embryogenesis, Preparation of artificial seeds – Demonstration / photographs.
4. Study of methods of gene transfer through photographs: Agrobacterium mediated, direct gene transfer by electroporation, microinjection, and micro projectile bombardment.
5. Different steps involved in genetic engineering for production of Bt. cotton, Golden rice, Flavr Savr tomato through photographs
6. Isolation of plasmid DNA.
7. Restriction digestion and gel electrophoresis of plasmid DNA (optional)
8. Field visit to a lab involved in tissue culture
9. Study project under supervision of lecturer – tissue culture/ genetic engineering

REFERENCES:

1. Plant Tissue Culture: Theory and Practice By S.S. Bhojwani and A. Razdan, 1998

2. Dr. Anurudh K. Singh, Santhosh K. Tiwari & Dr. J. P. Yadav (2017), Practical Manual, Plant Genetic Engineering. <https://www.researchgate.net/publication/322152584>

EXPECTED DOMAIN SKILLS TO BE ACHIEVED: Ability to prepare artificial nutrient media, preparing independently, applying various sterilization procedures for media, glassware and biological materials, in vitro propagation of Banana callus, morphogenesis, clonal propagation methods, isolation of plasmid DNA individually and as a group.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
VI SEMESTER **TIME:3Hrs/week**
B-A1-6102(3) **BOTANY** **Marks:100**
BIOLOGICAL INSTRUMENTATION AND METHODOLOGY
19-20 Admitted Batch (17AE) **SYLLABUS**

OBJECTIVES: To enable the students to

1. Understand the Principles of microscopy
2. Understand the structure and functioning of various biological instruments
3. Get enlighten their knowledge in various biochemical methods

COURSE OUTCOMES:

- CO1: Microscopy and other imaging techniques provide employability as medical lab technicians.
- CO2: Experience in instrumentation Techniques of centrifugation, Sonication, freeze drying and Spectrophotometry enables students to take up positions in Industrial Research & Development.
- CO3: Skills in Chromatographic techniques help in Drug discovery and Drug design.
- CO4: Biological Instrumentation skills fetch jobs in Quality & Control Departments of many Food Industries.
- CO5: Art of Scientific writing enables students to publish new findings in science.

COURSE SYLLABUS:

UNIT - I: IMAGING AND RELATED TECHNIQUES:

1. Principles of microscopy; Light microscopy; Fluorescence microscopy; Flow cytometry;
2. Electron Microscopy-TEM & SEM; sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.

UNIT- II: pH AND CENTRIFUGATION:

1. pH meter: Principles and instrumentation
2. Centrifugation: Principles, types of centrifuges, types of rotors, differential and density gradient centrifugation-applications
3. Sonication, Freeze drying.

UNIT- III: SPECTROPHOTOMETRY:

1. Principle involved in Spectrophotometer; Spectrophotometric techniques,

2. Instrumentation: ultraviolet and visible spectrophotometry

UNIT- IV: CHROMATOGRAPHY:

1. Chromatographic techniques: Principle and applications; Column Chromatography; Thin Layer Chromatography (TLC)
2. Paper Chromatography, Gas chromatography
3. Basic principles of electrophoresis; PCR - Polymerase Chain Reaction (Brief account)

UNIT-V: PREPARATION OF SOLUTIONS& THE ART OF SCIENTIFIC WRITING

1. Preparation of solutions: Dilutions. Percentage solutions. Molar, molal and normal solutions
2. Technique of handling micropipettes; Common toxic chemicals and safety measures in their handling.
3. The art of scientific writing and ethics; Introduction to copyright; Plagiarism in scientific writing.

TEXT BOOK: Bajpai, P.K. 2006. Biological Instrumentation and methodology. S.Chand & Co.Ltd.

SUGGESTED READINGS:

1. K. Wilson and J. Walker Eds. 2005. Biochemistry and Molecular Biology. Cambridge University Press.
2. K. Wilson and KH Goulding. 1986. Principles and techniques of Practical Biochemistry. (3 edn) Edward Arnold, London.
3. Dawson, C. (2002). Practical research methods.UBS Publishers, New Delhi.
4. Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995).Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.
5. Ruzin, S.E. (1999). Plant micro technique and microscopy. Oxford University Press, New York, U.S.A.

SUGGESTED ACTIVITIES: Preparing various laboratory reagents, operating laboratory instruments, noting instrument readings, calculating results accurately, Skills on writing scientific articles, presentation of scientific results through tables, graphs, poster presentations and practicing power point presentations.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
VI SEMESTER **BOTANY** **TIME:2Hrs/week**
B-A1-6151(2) BIOLOGICAL INSTRUMENTATION AND METHODOLOGY Marks:50
19-20 Admitted Batch (19AG) PRACTICAL SYLLABUS – IV A1

OBJECTIVES: To enable the students to

- Get insight into Microscopy and related techniques
- Learn handling of various biological instruments
- Gain skills in different chromatographic and spectrophotometric techniques.

COURSE OUTCOMES

CO1: Execute techniques of Microscopy

CO2: Gain hands on experience of handling various biological instruments

CO3: Learn to measure microscopic objects

CO4: Able to demonstrate the Principle & operation of Centrifuge,
Spectrophotometer, Colorimeter, PCR and pH meter useful in industry

CO5: Learn to prepare molar, molal, normal solutions and solutions of different dilutions

COURSE SYLLABUS

1. Microscopy – Light microscopy: principles, parts & function
2. Micrometry- principle and measurement of microscopic objects: Low power and high power.
3. Principle & operation of Centrifuge
4. Preparation of various solutions-normal, molar, and percent solutions by serial dilutions
5. Study of principle and working of pH meter
6. Measurement of pH of Milk, Pepsi, Lemon juice etc. using pH paper and pH meter
7. Study of principle of Chromatography and separation of amino acids mixture by ascending Paper Chromatography
8. Principle & operation of Colorimeter
9. Principle & operation of Spectrophotometer
10. Principle and operation of Column Chromatography
11. Principle and technique of TLC (demonstration)

12. TLC separation of Amino acids from purified samples and biological materials(demonstration)
13. PCR - The Polymerase Chain Reaction (protocol) –demonstration
14. Study visit to an institute /laboratory

REFERENCES:

1. An Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer; Tata McGraw Hill Edu. Pvt.Ltd. New Delhi, India.
2. Biochemical Methods,1st Edition, (1995), S.Sadashivam, A.Manickam; New Age International Publishers, India.
3. Experimental Biochemistry: A Student Companion, 1st Edition, (2005), Beedu Sashidhar Rao & Vijay Deshpande; I.K. International Publishing House Pvt. Ltd, India.

DOMAIN SKILLS EXPECTED TO ACHIEVE:

Skill in operating laboratory equipment, their upkeep, and adept at various biological techniques. Ability to prepare molar, molal, normal solutions and solutions of different dilutions. Interpreting scientific results, and ability to present results in a scientific way through graphs, photographs, poster presentations and power point presentations.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER

BOTANY

TIME:3Hrs/week

B-A2-6102(3)

MICROBIOLOGY-METHODS AND APPLICATIONS Marks:100

19-20 Admitted Batch (17AE)

SYLLABUS

OBJECTIVES: To enable the students to-

- Trace the history of Microbiology
- Understand the characteristic features of important microorganisms
- Understand the methods and techniques used in Microbiology
- Appreciate the applications of Microbiology in the areas of Environment, Industry and Medicine.

COURSE OUT COMES:

CO1: Microscopy and other imaging techniques provide employability as medical lab technicians.

CO2: Experience in instrumentation Techniques of centrifugation, Sonication, freeze drying and Spectrophotometry enables students to take up positions in Industrial Research & Development.

CO3: Skills in Chromatographic techniques help in Drug discovery and Drug design.

CO4: Biological Instrumentation skills fetch jobs in Quality & Control Departments of many Food Industries.

CO5: Art of Scientific writing enables students to publish new findings in science.

COURSE SYLLABUS

UNIT-I: HISTORY AND DIVERSITY OF MICRO ORGANISMS

1. Land marks in the history of Microbiology
2. Contributions of Anton Von Leuwenhoek, Louise Pasteur, Robert Koch to the field of Microbiology
3. Morphology of important microorganisms:
Bacteria, Actinomycetes, Cyanobacteria: Nostoc, Anabaena
Viruses: TMV, Bacteriophage, HIV, Influenza virus
Algae: Chlorella, Scenedesmus, Spirulina, Diatoms

Fungi: Yeast, Penicillium, Aspergillus, Rhizopus, Mucor, Mushroom

UNIT–II: TECHNIQUES IN MICROBIOLOGY

1. Sterilization methods – physical and chemical
2. Staining techniques: Basic staining, Acidic staining, Differential staining by Gram's staining technique, Acid fast staining, special staining methods for spores and capsules
3. Microscopic Techniques:
 - a) Hanging drop technique
 - b) Micrometry
 - c) Counting the microbial cells and spores

UNIT–III: METHODS IN MICROBIOLOGY

1. Different types of Culture Media
2. Inoculation Methods to Isolate Pure Cultures: Serial dilution technique, Pour plate method, Streak plate method, Spread plate method, Special culture methods.
3. Maintenance and methods of Preservation of Pure Microbial cultures

UNIT–IV: APPLICATIONS OF MICROBIOLOGY IN ENVIRONMENT& MEDICINE

1. Role of Microbes in Agriculture-Soil fertility, Biofertilizers, Biopesticides, Bio-weedicides; as Decomposers; Biofuels, Biofouling; Environmental Cleanup – Bioremediation; Single Cell Proteins; Insulin production; Plant and animal diseases.
2. Microbiology of Water: Municipal Water Purification; Bacterial analysis of water
3. Microbiology of Sewage: Sewage treatment – Small scale treatment, Large scale treatment.
4. Microbes and Human health: Important Microbial diseases in man; Disease control –Vaccines and interferons; Antibiotics-Most commonly used Antibiotics, Mode of action of Antibiotics, Antibiotic sensitivity assays.

UNIT–V: INDUSTRIALAPPLICATIONS

1. Microbiology of Milk and Dairy products- Composition and Microflora of Milk, Methods of Pasteurization, important Dairy products.
2. Microbiology of Foods: Vegetables, fruits, poultry, eggs, sea foods and meat; Methods of Food Preservation; Food poisoning.
3. Fermentation: Types of Fermentation, Structure of Fermenter; Production of Ethanol from molasses using Yeast; Production of Citric acid using Aspergillus
4. Production of Alcoholic Beverages: Beer, Wine and Vinegar

TEXT BOOK: Microbiology {2015}, P.D. Sharma, Rasthogi Publications, New Delhi, India.

REFERENCES:

1. Elements of Microbiology – Michael J Pelczar& E.C.S. Chan, Mc Graw Hill International Book Company, New York (1995)
2. An Introduction to Microbiology- P. Tauro K.K. Kapoor, K.S. Yadav, Wiley Eastern Ltd., New Delhi.
3. Microbiology- Anna K Joshua, Popular Book Depot, Madras (1998)
4. A Text book of Microbiology – By R.C.Dubey, D.K.Maheshwari, S.Chand Publications, Delhi, 2005
5. General Microbiology – By R.P.Singh, Kalyani Publications, 2005.
6. Microbiology and Cell Biology-R.N. Bhattacharjee, Kalyani Publishers, New Delhi, 2017

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNA

VI SEMESTER

BOTANY

TIME:2 Hrs/week

B-A2-6152 (2) MICROBIOLOGY-METHODS AND APPLICATIONS

Max. Marks: 50

19-20 Admitted Batch (19AG) PRACTICAL SYLLABUS – IV A2

OBJECTIVES: To enable the students to

- Learn rules and regulations in Microbiology laboratory and to become familiarise with the equipment.
- Observe and identify important microorganisms.
- Learn staining techniques and methods of microscopic observation.
- Perform experiments for culturing Bacteria & Fungi on Nutrient Agar medium.
- Develop skills to isolate pure cultures

COURSE OUTCOMES:

CO1: Develop Competence in Microbiological techniques to gain employability in industry in Quality & Control divisions.

CO2: Operate Inoculation methods to isolate pure cultures help to discover new strains for drug discovery.

CO3: Master in microbial culture methods and become an entrepreneur in Biofertilizer, Bio pesticide and Bio-weedicide production.

CO4: Acquire Expertise in vaccines and Antibiotic synthesis and administration provide employment opportunities in Hospitals and clinical laboratories.

CO5: Establish and execute Food and Beverage production & processing units.

COURSE PRACTICAL SYLLABUS – IV A2

1. Rules and regulations to be observed in a Microbiology laboratory.
2. Microbiological Equipment:
 - Hot air oven
 - Autoclave
 - Laminar airflow
 - Incubator
 - Colony counter
3. Identification of important microorganisms belonging to Bacteria, Cyanobacteria, Algae and Fungi.
4. Microbiological Methods:
 - a. Cleaning and sterilization of glassware; wrapping and plugging

- b. Culture media
 - i) Preparation of Nutrient Broth (NB) and Nutrient agar (NA) for Bacteria, Potato Dextrose Agar (PDA) for Fungi
 - ii) Sterilization and distribution of media.
- c. Inoculation methods:
 - i) Pour plate method
 - ii) Streaking of plates and slants
 - iii) Stab method
 - iv) Inoculation of liquid media
- d. Report of cultures:

Microbiological examination of Bacterial and Fungal growth in cultures and presentation of reports.
- 5. Special Techniques:
 - a. Gram staining technique
 - b. Hanging drop method
 - c. Micrometry
 - d. Counting Microbial cells or spores
- 6. Antibiotic sensitivity assay by Agar diffusion method.
- 7. Preparation of Wine from grapes by simple fermentation process.
- 8. Visit to Microbiology laboratory in Hospital or Research station, Dairy farm, Brewing or backing industry, Mushroom cultivation unit, Municipal Water treatment plant, Sewage treatment plant, Solid waste management unit, Canning industry etc

PRACTICAL BOOKS:

- 1. Experiments with Microorganisms (1986) R.N. Bhattacharya, EMKAY Publications, Delhi, India.
 - 2. Laboratory Manual in Microbiology, Dr. P. Gunasekharan, New Age International (P) Ltd. Publisher, Delhi & Mumbai, India.
 - 3. Practical Microbiology (2002), R.C. Dubey & D.K. Maheswari; S. Chand & Company Ltd., New Delhi, India.
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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
VI SEMESTER **BOTANY** **TIME:4Hrs/week**
B-A3-6102(3) **MEDICINAL BOTANY & PHARMACOGNOCY** **Marks:100**
19-20 Admitted Batch (17AE) **SYLLABUS**

OBJECTIVES: To enable the students to

1. Understand the importance of Medicinal plants in primary health care
2. Understand the role of medicinal plants in modern medicine
3. Learn different systems of traditional medicine
4. Get an insight into identify drug adulteration and methods of drug evaluation
5. Gain knowledge about the production and applications of secondary metabolites

COURSE OUTCOMES:

CO1: skilled in identification of Medicinal Plants

CO2: understand the role of Modern and traditional medicine

CO3: infused with the knowledge of drug adulteration

CO4: skilled in applying the evaluation methods in locally available drugs.

CO5: skilled in isolation methods of drugs from secondary metabolites.

COURSE SYLLABUS:

UNIT – I: IMPORTANCE OF MEDICINAL PLANTS.

1. History, Scope and Importance of Medicinal Plants.
2. Significance of the following plants in primary health care practices along with their habitat and morphology
 - a) Azadirachta indica, b) Ocimum sanctum, c) Vitex negundo,
 - d) Tribulus terrestris, e) Phyllanthus niruri f) Aloe vera g) Senna auriculata
 - h) Curcuma longa, i) Andrographis paniculata

UNIT – II: ROLE OF MEDICINAL PLANTS IN MODERN MEDICINE

Role of Medicinal plants in modern medicine with special examples of

- a) Rauvolfia serpentina, b) Trichopus zeylanicus, c) Artemisia annua,
- d) Withania somnifera, e) Catharanthus roseus, f) Gymnima sylvestris

UNIT - III: TRDITIONAL MEDICINAL SYSTEMS

1. AYURVEDA: Definition and Scope, History, origin. panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
2. UNANI: History, Basic concepts: treatments/therapy, polyherbal formulations (in brief).
3. HOMEOPATHY: History, Basic concepts, Treatment/ Therapy, Drugs & dosage

UNIT- IV: PHARMACOGNOSY

1. Pharmacognocny-Definition, Importance,
2. Classification of drugs - Chemical and Pharmacological
3. Drug Adulteration,
4. Drug evaluation methods

UNIT - V: ORGANOLEPTIC STUDIES AND SECONDARY METABOLITES

1. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants of
 - a) Alstonia scholaris(bark), b) Adhatoda vasica(leaf), c) Strychnos nuxvomica(seed), d) Rauwolfia serpentina(root) e) Zinziber officinalis
2. Secondary Metabolites: Definition of primary and secondary metabolites and their differences, major types - terpenes, phenolics, alkaloids, terpenoids, steroids.
3. A brief idea about extraction of alkaloids.
4. Origin of secondary metabolites – detailed account of acetate pathway, mevalonate pathway.

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

- 2) Glimpses of Indian. Ethnobotny, 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) Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India
- 5) Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.
- 6) Wallis, T. E. 1946. Text book of Pharmacognosy, J & A Churchill Ltd. 2. Roseline, A. 2011. Pharmacognosy. MJP Publishers, Chennai.
- 7) Gurdeep Chatwal, 1980. Organic chemistry of natural productis. Vol. I. Himalaya Publishing house.
- 8) Kalsi, P.S. and Jagtap, S., 2012. Pharmaceutical medicinal and natural product chemistry N. K. Mehra Narosa Publishing House Pvt Ltd. New Delhi.
- 9) Agarwal, O.P. 2002. Organic chemistry – chemistry of organic natural products. Vol. II. Goel Publishing house, Meerut.
- 10) Harborne, J.B. 1998 Phytochemical methods – a guide to modern techniques of plant analysis 3rd edition, Chapman and Hall.
- 11) Datta & Mukerji, 1952. Pharmaocgonosy of Indian roots of Rizome drugs. Bulletin No.1 Ministry of Health, Govt. of India.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNA		
VI SEMESTER	BOTANY	TIME:2Hrs/week
B-A3-6151 (2)	MEDICINAL BOTANY & PHARMACOGNOCY	Marks:50
PRACTICAL SYLLABUS – IV A3		
19-20 Admitted Batch (19AG)		

OBJECTIVES:

- To create their own medicinal garden
- Students can identify various locally available medicinal plants.
- Students gain the skills to test the unorganised drugs and extraction of drugs.

COURSE OUT COMES:

CO1: to become more vigilant in identifying the locally available medicinal plants.

CO2: to become skilled in testing the unorganized drugs.

CO3: the sources of plant drugs are identified.

CO4: to grow the locally available medicinal plants

PRACTICALS SYLLABUS

1. Identification of plants in Primary health care
2. Identification of plants used in modern medicine
3. Physical and chemical tests for evaluation of unorganized drugs- Asaphoetida. Honey, Castor oil. Acacia
4. Identification of bark drugs – cinchona, cinnamom
5. Identification of fruit drugs – Cardamom, Coriander
6. Identification of root and rhizome drugs- Ginger, Garlic, Turmeric
7. Identification of whole plant – Aloes, Vinca, Punarnava
8. Instruments used in plant drug extraction

9. Herbarium of medicinal plants (minimum of 20 plants)

10. Collection of locally available crude drugs from local vendors (minimum of 20)

REFERENCES:

1. Practical Botany – Vol. I & II – Srivastava H.N. – Pradeep Publications, Jalandhar., 1991
2. Text Book of Practical Botany – Vol I & II– Ashok Bendre & Ashok Kumar – Rastogi Publications, Meerut., 2006.

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

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER

BOTANY

TIME:3Hrs/Week

B-E1-6102 (3) HORTICULTURE PRACTICES & POST HARVEST TECHNIQUES Marks:100

19-20 Admitted Batch (17AE)

SYLLABUS

- Gain knowledge in Horticultural methods
- Know the importance and nutritive value of Horticultural crops
- Learn methods of propagation
- Be able to identify different types of fruit and vegetable plants
- Understand cultivation and post-harvest practices of Horticultural crops

- CO1: Identify different types of Horticulture plants
CO2: Demonstrate the skills of vegetative propagation techniques
CO3: Design garden layout
CO4: Master in techniques of post- harvest handling of Horticultural produce
CO5: Prepare biofertilizers and apply phytohormones

Scope of Horticulture, classification of horticultural crops and their nutritive value, cropping systems, intercropping, multi-tier cropping, exports and imports, fruit and vegetable zones of India and of different states,

Water management; Soil management; Nutrients management- Manures, Fertilizers; Production practices for fruit, vegetable and floriculture crops, Principles and methods of pruning and training of fruit crops, types and, water management, weed management, mulching, use of growth regulators in horticulture

Types of Gardens-vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities.

Unit-IV: Propagation Methods:

sexual and asexual methods of propagation, methods and techniques of cutting, layering, grafting and budding, techniques of propagation through specialized organs, corm, runners, suckers.

Propagation Structures: Mist chamber, humidifiers, greenhouses, glasshouses, cold frames, hot beds, poly-houses, nursery tools and implements, use of growth regulators in seed and vegetative propagation

Unit-V: Post Harvest Techniques

Handling of Horticulture produce; Post-harvest treatment; Regulation of ripening; Storage of Horticultural crop produce; Packing systems; Quality and Grade specification; Transportation of Horticulture produce.

BOOKS FOR REFERENCE:

1. V. L. Sheela, 2011; Horticulture, MJP Publishers, Chennai, India
2. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
3. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
4. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. Institution
5. Wasim Khan, 2004; Gardening-A Constructive Endeavour; Student Book Depot Publishers; Delhi, India.
6. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Pubshers.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM
VI SEMESTER BOTANY TIME:2Hrs/Week
B-E3-6153(2) HORTICULTURE PRACTICES & POST HARVEST TECHNIQUES Marks: 50
PRACTICAL SYLLABUS – IV
19-20 Admitted Batch (19AG)

OBJECTIVES: To enable the students to –

- Develop practical skills in various propagation methods
- Design Orchards and Nutritional gardens
- Identify different plants of Horticultural importance
- Understand cultivation methods of important fruit and vegetable crops

COURSE OUTCOMES

CO1: Develop skills in vegetative propagation methods

CO2: Become expertise in identifying different types of Horticultural plants

CO3: Acquire skills to design layout of orchards and vegetable gardens

CO4: Demonstrate skills to enhance post- harvest quality

PRACTICAL SYLLABUS

1. Tools, implements and containers used for propagation and nursery techniques.
2. Layout of orchard and nutrition garden
3. Preparation of nursery beds for sowing of vegetable seeds
4. Digging of pits for fruit plants, planting systems, training and pruning of orchard trees
5. Propagation by cutting, layering, budding and grafting
6. Seed propagation- preparation of portable trays, seed treatments, sowing and seedling production.
7. Preparation of fertilizer mixtures and field application
8. Preparation and application of growth regulators
9. Identification of commercially important fruit and vegetable crops and their varieties.
10. Grading, packing and Storage of Fruits and Vegetables
11. Visit to Horticulture and Post- harvest Technology institute
12. Study project under supervision of lecturer – Horticulture crops/ post- harvest technologies

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), apply post-harvest techniques to avoid crop losses and prolong shelf life

BOOKS FOR REFERENCE:

1. V. L. Sheela, 2011; Horticulture, MJP Publishers, Chennai, India
 2. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
 3. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
 4. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. Institution
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ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER	BOTANY	TIME:3Hrs/week
B-B2-6101(3)	ORGANIC FARMING AND SUSTAINABLE AGRICULTURE	Marks:100
19-20 Admitted Batch (17AE)	SYLLABUS	

OBJECTIVES: To enable the students to

1. Understand principles of organic farming
2. Gain knowledge about Propagation methods and water management
3. Learn preparation of Organic manures and Green manuring
4. Understand pesticide and weed management
5. Develop skills of organic crop production and its marketing strategies

COURSE OUTCOMES

CO1: Realize need, principles, types and requirement for organic farming

CO2: Develop skills in plant propagation techniques

C03: Prepare and apply organic manures and biofertilizers.

CO4: Comprehend weed management

CO5: Demonstrate skills in organic crop production, farm economics and commerce.

COURSE SYLLABUS

Unit - I: Concept of organic farming:

1. Introduction: Farming, organic farming, concept and development of organic farming.
2. Principles of organic farming, types of organic farming, biodynamic farming.
3. Benefits of organic farming, need for organic farming, conventional farming v/s organic farming
4. Scope of organic farming; Andhra Pradesh, National and International status.
5. Agencies and institutions related to organic agriculture.
6. Requirements for organic farming, farm components for an organic farm.

Unit - II: Organic plant nutrient management:

1. Organic farming systems, soil tillage, land preparation and mulching.
2. Choice of varieties.
3. Propagation-seed, planting materials and seed treatments, water management
4. Green manuring, composting- principles, stages, types and factors, composting methods,

Vermi composting

5. Bulky organic manures, concentrated organic manures, organic preparations, organic amendments and sludges.
6. Bio-fertilizers- types, methods of application, advantages and disadvantages, standards for organic inputs- fertilizers

Unit-III: Organic plant protection:

1. Plant protection- cultural, mechanical, botanical pesticides, control agents
2. Weed management
3. Standards for organic inputs- plant protection.

Unit- IV: Organic crop production practices:

1. Organic crop production methods- rice, coconut.
2. Organic crop production methods- vegetables- Okra, Amaranthus, Cucurbits.
3. Livestock component in organic farming.
4. Sustainable Agriculture-Apiculture, Mushroom cultivation.

Unit- V: Organic Certification

1. Farm economy: Basic concept of economics- demand & supply, economic viability of a farm.
2. Basic production principles, reducing expenses, ways to increase returns, cost of production system. Benefit/ cost ratio, marketing, imports and exports.
3. Policies and incentives of organic production.
4. Farm inspection and certification.
5. Terrace farming.

Books for Reference:

1. Palaniappan SP & Anandurai K. 1999. Organic Farming–Theory and Practice. Scientific Publishers, Jodhpur
2. Joshi, M. 2014. New Vistas of Organic Farming 2nd Ed. Scientific Publishers, Jodhpur.
3. Farming system: Theory and Practice - S. A. Solaimalai
4. Organic Farming: Theory and Practice- S. P. Palaniappan and K.A. Annadurai
5. A hand book of Organic Farming by A. K. Sharma

Suggested Activities: Preparation of Vermicompost in small scale, observing sewage sludge disposal mechanisms in urban/semi urban areas, studying the usage, of green

manures, neem oil, neem cake, Pongamia oil in organic farming, livestock component in various farming methods, visiting an Apiculture centre, drawing various terrace

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER

BOTANY

TIME:2Hrs/week

B-B2-6151(2)

ORGANIC FARMING AND SUSTAINABLE AGRICULTURE

Marks:50

19-20 Admitted Batch (17AE)

PRACTICAL SYLLABUS

OBJECTIVES: To enable the students to

1. Study pest control methods
2. Understand nutrient deficiency symptoms
3. Learn composting methods
4. Gain skills in methods of green manuring

COURSE OUTCOMES

CO1: Apply pesticides judiciously for crop protection

CO2: Compare and contrast deficiency symptoms of nutrients

CO3: Prepare and apply organic manures and biofertilizers.

CO4: Improve soil fertility

COURSE SYLLABUS

1. Study of different bio pesticides, weedicides, inorganic and organic fertilizers
2. Deficiency symptoms of nutrient deficiency symptoms (photographs)
3. Soil testing, liming, and fertilizing
4. Preparation of enriched Farm Yard Manure.
5. Study of composting methods.
6. Preparation of vermicompost.
7. Study of recycling of farm waste.
8. Study of methods of green manuring.
9. Study of steps in mushroom cultivation
10. Visit to urban waste recycling unit.

11. Study project report under supervision of lecturer – farm manure preparation/vermi-compost/waste management/ green manures/ mushroom cultivation / nutrient requirements of vegetables

Expected domain skills to be achieved: Performing Soil analysis, soil enrichment methods, composting procedure, recycling of wastes, use of waste materials in mushroom cultivation, understanding nutrient requirement of various crops, identifying various methods of keeping soil health

BOOKS:

1. Palaniappan SP & Anandurai K. 1999. Organic Farming–Theory and Practice. Scientific Publishers, Jodhpur
 2. Farming system: Theory and Practice - S. A. Solaimalai
 3. Organic Farming: Theory and Practice- S. P. Palaniappan and K.A. Annadurai
 4. A hand book of Organic Farming by A. K. Sharma
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VI SEMESTER **BOTANY** **TIME: 3Hrs/week**
B B3 6101 (3) **MUSHROOM CULTURE AND TECHNOLOGY** **Max.Marks:100**
w.e.f.2015 – 2018 ("15AC" Batch)

1. Understand the importance of mushroom cultivation
2. Develop knowledge in various methods in mushroom cultivation
3. Recognize the nutrition value of mushrooms.
4. Learn different storage and food preparation methods

CO1: Identify edible mushrooms and realize their nutritional value.
CO2: Apply various methods in mushroom cultivation
CO3: skilled to prepare mother spawn
CO4: Prepare Mushroom bed and preserve them
CO5: Gain skills in the preparation of different types of foods with mushrooms
CO6: Identify the marketing methods and realize export value of mushrooms

UNIT-I: INTRODUCTION, HISTORY:

Introduction - history - scope of edible mushroom cultivation, Types of edible mushrooms available in India –*Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms.

Pure culture - preparation of medium (PDA and Oatmeal agar medium) sterilization - preparation of test tube slants to store mother culture – culturing of *Pleurotus mycelium* on Petri plates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

UNIT–III: CULTIVATION TECHNOLOGY: Infrastructure:

Substrates (locally available) Polythene bags, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, composting technology in mushroom production.

UNIT-IV: STORAGE AND NUTRITION:

Short-term storage (Refrigeration - up to 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content – Vitamins.

UNIT-V: FOODPREPARATION:

Types of foods prepared from mushrooms; soup, cutlet omlette, samosa, pickles and curry, Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.

BOOKS:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
4. Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.
5. Biswas, S., M. Datta and S.V. Ngachan. 2011. Mushrooms: A Manual For Cultivation. PHI learning private Ltd., New Delhi, India.
6. Chang, S. and P.G. Miles. 2004. Mushrooms: cultivation, nutritional value, medicinal effect, and environmental impact. CRC Press. USA.
7. Miles, P.G. and S. Chang. 1997. Mushroom Biology: Concise basics and current developments. World Scientific Publishing Co. Pvt. Ltd. Singapore.

SUGGESTED ACTIVITIES: Growing spawn on laboratory prepared medium in Petri plates and maintaining, preparing compost and compost beds, packing of beds, spawning, maintaining moisture, picking, blanching and packing. Collecting naturally growing mushrooms and identifying them properly, visits to mushroom houses.

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM
VI SEMESTER **BOTANY** **TIME: 2Hrs/week**
B B3 6151(2) **MUSHROOM CULTURE AND TECHNOLOGY** **Max. Marks: 50**
PRACTICAL SYLLABUS – IV A3
w.e.f.2015 – 2018 (“15AC” Batch)

OBJECTIVES: To enable the students to

1. Know various types of Mushrooms.
2. Develop skills in spawn preparation
3. Recognize the techniques behind the postharvest handling and packing

COURSE OUT COMES:

CO1: Observe anatomical features of different mushroom

Species at microscopic level

CO2: prepare Compost and Mushroom beds

CO3: skilled in Inoculation and spawning of compost, Incubation and harvesting of mushrooms.

CO4: cultivate mushrooms and become an entrepreneur.

PRACTICAL SYLLABUS

1. Identification of different edible and poisonous mushrooms.
2. Microscopic and anatomical observations of different mushroom species.
3. Pure culture - preparation of medium (PDA and Oatmeal agar medium) sterilization.
4. Isolation and preparation of spawn under controlled conditions (preparation of mother spawn in saline bottle and polypropylene bag and their multiplication).
5. Types of Compost preparation and sterilization.
6. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves/waste.

7. Inoculation and spawning of compost.
8. Incubation and harvesting of mushrooms (collection, drying and preservation).
9. Diseases of mushrooms (photographs).
10. Post-harvest technology steps (photographs).
11. Study tour to mushroom cultivation farms
12. Project work – cultivation of paddy straw/ oyster/white button mushrooms.

DOMAIN SKILLS EXPECTED TO ACHIEVE:

Identification of different edible species, skill in media and substrate preparation, isolation of pure culture for spawn, compost preparation, and practices in growing methods of different cultivated mushrooms, Postharvest handling and packing

REFERENCE BOOKS:

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
 2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
 3. Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.
 4. Nita Bahl (1984-1988) Handbook of Mushrooms, II Edition, Vol. I & Vol. II.
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