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M.Sc. Botany, III Semester (CBCS)
Elective-II C. - Biofertilizers, Biopesticides and Mushroom Cultivation

MBOT.CC.T304 (Theory) 3 Hrs/week 3 Credits

UNIT- I . Biofertilizers:

1.1. Biofertilizers: Introduction, history, scope and importance of biofertilizers. Types of biofertilizers. Role of biofertilizers in sustainable agriculture.

1.2. Nitrogen Biofertilizers: Types, Symbiotic & Non-Symbiotic Nitrogen fixation. Nodul formation, Cyanobacterial Biofertilizers. Azolla in rice cultivation.

1.3 : Mycorrhizae: - Definition and Types (Ecto and Endo mycorrhizae) . VAM in detail- Isolation, colonization and multiplication. Role of mycorrhizae in Crop productivity and Forestry.

1.4. Phosphate biofertilizers: Phosphate solubilizing Fungi (PSF). Mechanism of phosphate solubilization and phosphate mobilization. Importance of P S in Agriculture.

1.5. General aspects of Biofertilizers - Storage, shelf life and marketing. Factors influencing the efficacy of Biofertilizers. Current status of biofertilizer production in India

Unit II. Biopesticides:

2.1 Biopesticides: Introduction, importance, scope and potential of Biopesticides. Classification of biopesticides- Pathogen, botanical pesticides and biorationals.

2.2 Microbial Biopesticides: Diversity, scope and Types (Viruses, Bacteria, Fungi).

2.3 Entomogenous fungi, Nematophagous fungi, Mycoherbicides. Application of biopesticides in plant disease control.

2.4 Botanical pesticides: Definition and types of Botanicals and biorational pesticides. Role of plant-based products in Organic farming and eco-friendly agriculture

2.5 Biocontrol agents: Definition and types of biocontrol agents. Fungi as biocontrol agents-Isolation, Selection, mass production of Trichoderma species and development of formulation.

2.6 General aspects of biopesticides: Methods of application, storage and quality control measures of biopesticides. Advantages and disadvantage of biocontrol agents. Constraints &possible solutions in production and use of Biopesticides.

UNIT III- Mushroom Cultivation.

3.1.Introduction to mushrooms: History and Scope of mushroom cultivation. Edible and Poisonous Mushrooms. Common edible mushrooms- Button, Oyster and Paddy straw mushroom

3.2. Cultivation of mushrooms: Detailed methodology for commercial cultivation of Oyster and Paddy straw mushroom. Present status of Mushroom industry in India.

3.3. Principles of Mushroom cultivation: Sterilization of substrates. Spawn production – culture media preparation- production of pure culture and multiplication of spawn. Preservation of mushrooms -freezing, dry freezing, drying, canning.

3.4.Composting Technology: Mushroom bed preparation. Spawning, harvesting. Problems in cultivation of mushrooms - diseases, pests, moulds and their management strategies.

3.5. Health benefits of mushrooms: Nutritional, Medicinal Therapeutic value of mushrooms. Development of value-added products and entrepreneurship in mushroom cultivation.

M.Sc. Botany, III Semester (CBCS)
Elective-II C. - Biofertilizers, Biopesticides and Mushroom Cultivation

(Practical) **4 Hrs/week 1 Credits**

MBOT.P.2.308

Major & Minor experiments:

1. Isolation and identification of AM Fungi from the soil
2. Estimation of root colonization of VAM fungi
3. Cultivation of Oyster mushrooms- preparation of bed, spawning, harvesting
4. Cultivation of Paddy straw mushroom- preparation of bed, spawning, harvesting
5. Isolation, Identification and mass production of Trichderma specie
6. Spawn production -production of pure culture and multiplication of spawn
7. Preparation of Botanical pesticides from the locally available plants
8. Preservation of mushrooms -freezing/ dry freezing/ drying/canning.
9. Study of root nodule structure in legume
10. Cultivation and Azolla as biofertilizers.

Spotters (Cultures/ Photographs/ Diagram)

11. Study of Phosphate solubilizing Fungi (PSF).
12. Study of Entomogenous fungi, Nematophagous fungi, Mycoherbicides.
13. Study of bacterial biopesticides
14. Study of Cyanobacteria as a Biofertilizers
15. Maintenance of record

Elective-II C. - Biofertilizers, Biopesticides and Mushroom Cultivation

- Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

REFERENCES:

1. Agrios, G.N. 1999. Plant Pathology. Academic Press

2. Annual Review of Phytopathology, 1999. Vol. 37, APS Press

3. Cairney, J.W.G. & Chambers, S.M. 1999. Ectomycorrhizal Fungi. Springer Publishers

4. Chandanwala, K. 1986. Introduction to Plant Pathology. Ammol Publishers and Distributors

5. Cheet,l. 1993. Biotechnology in Plant Disease Control. Wilen-Liss, Inc.

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13.Natish, S. Chopra, V.L. & Ramachandra, S. 1994. Biotechnology in Agriculture. Oxford

14. Rajak, R. 2000. Microbial Biotechnology for sustainable development and productivity. Scientific pub

15. Rudra P. Singh, Uma S. Singh & Keiisuke Kohmoto (eds.) 1995. Pathogenesis and host specificityin plant diseases. Vol. III Pergamon Press.

16.Scheffer, R.P. 199. The nature of disease in plants. Cambridge University Press

17.Tarr, S.A.J. 1987. Principles of Plant Pathology. Academic Press

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M.Sc. Botany, III Semester (CBCS)

Paper-III: Plant Biodiversity and Conservation

(Theory)

MBOT.T.2.303 **3 Hrs./week 3 Credits**

UNIT-I: Levels and Categories of Biodiversity

1.1. Biodiversity: Introduction, importance, objectives, structural and functional aspects.

1.2. Levels of Biodiversity: Genetic, Species and Ecosystem diversity.
1.3.Types of species for the maintenance of Biodiversity: Keystone species, Umbrella species, Flagship species, Indicator species, Priority species and Alien species
1.4.TUCN red list Categories of species: Least concern, Threatened, Vulnerable,Endangered, and Extinct species.
1.5.Endemism: Definition, types of endemism, Characters of endemism., Theories of endemism, and endemic species of Telangana State.

UNIT-II: Hotspots, Value and Loss of Biodiversity

2.1. Biodiversity Hotspots: Definition and importance. Four major biodiversity hotspots of India: Eastern Himalayas, Indo-Burma region, Western Ghats and. Sri Lanka, Sundaland.

2.2. Value of biodiversity: Consumptive, Productive, Social and Aesthetic value.

2.3. Loss of Biodiversity: Habitat loss, Pollution, over exploitation, ecosystem degradation and Invasive species.
2.4. Extinctions: Definition, types of extinctions: Extirpation, Co-extinction, Mass extinctions and planned extinctions.
2.5. Registering biodiversity; Red Data Book: History, objectives. colour codes and advantages of Red Data Book.

UNIT-II: Conservation of Biodiversity
3.1. Global approaches to biodiversity conservation. Species restoration, reintroduction and translocations. Benefits and risks of translocations.

3.2. Indian initiatives in Biodiversity conservation. Biodiversity act (2002), National biodiversity strategy and action plan (NBSAP 2002). Biodiversity Rules (2004).

3.3, National Legislations on conservation: Wildlife protection Act-1972; Forest Conservation Act- 1980; Biological diversity Act- 2002; Green Tribunal Act- 2009.

3.4, Organizations involved in conservation of Biodiversity: NBPGR, Botanical Survey of India (BSI), National Biodiversity Authority (NBA) and State Biodiversity Boards.

3.5.Conventions on Biological diversity: Conference of Parties (COP), Earth Summit (1992), Kyoto Protocol (1992), Nagoya protocol (2014).

REFERENCES:

1. Gaston, K.J and Spicer, J.I. 2004. Biodiversity: An Introduction. Blackwell) Publishing Company, USA.

2. Richard. B. Primack. 1998. Essentials of conservation biology. Sinauer Associates,, Inc. USA.

3. Maiti P.K. and Maiti P. 2011. Biodiversity Perecotion, Peril and Preservation. PHI) . Learning Private Limited, New Delhi.

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India. Oriental Enterprises, Dehradun.

6. Agrawal, K.C., 2000. Wildlife of India: Conservation and Management. Nidhi Publishers, India

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9. Meerabai, G. and Pullaiah T (2015). Plant Biodiversity, Management and) Conservation. Astral International Pvt Ltd.)
10. Heywood, V.H. 1995. Global Biodiversity Assessment. Cambridge University Press.)

M.Sc. Botany, III Semester (CBCS)

Paper-IV: Cultivation and Post-Harvest Technology of Medicinal and Aromatic Plants

3 Hrs. week/ 3 credits

MBOT.CC.T.304

UNIT — I: Cultivation practices

1.1 Methods of medicinal plant propagation: Seeds, Rhizomes, Stalks, Slips, Cuttings, micropropagation for endangered medicinal plants.

1.2 Active principles, uses, and cultivation practices for the following medicinal plants: a) Andrographis paniculata b) Asparagus racemosus c) Coleus forskohlii, d) Rauvolfia Serpentina e) Tinospora cordifolia f) Withania somnifera.

1.3 Active principles, uses and cultivation practices for the following aromatic plants: a) Acorus calamus b) Chrysopogon zizanioides c) Cymbopogon flexuosus b) Cymbopogon martini ¢) Cymbopogon winterianus

1.4 Advantages and Applications of Azospirillum, Mycorrhiza and Rhizobium as biofertilizers in the cultivation of medicinal plants.

1.5 Methods of organic farming of medicinal and aromatic plants, its significance.

Unit-II: Post-harvesting techniques

2.1.Harvesting: Time of harvesting, tools, methods, and post harvesting treatment.

2.2.Drying methods: Vacuum drying, osmotic drying and freeze drying, Drying tools,factors effecting drying.

2.3.Storage: Conditions, containers, duration, and post-storage treatment.

2.4.Processing techniques: Grinding, extraction, distillation, filtration and formulation.

2.5.Quality control: Identification, purity testing, microbial testing, heavy metal testing and residual solvent testing.

Unit I. Marketing and role of organizations

3.1. Demand and supply of medicinal plants, promotion of medicinal plant sector at national level and international level.

3.2. Export and import marketing value of medicinal and aromatic plants in India.

3.3. Role of National Medicinal Plant Board (NMPB), State Medicinal Plant Boards, other organizations CIMAP and NGOs.

3.4. Bio Trade and Access Benefit Sharing (ABS). Intellectual Property Rights (IPR) on medicinal and aromatic plants.

3.5. Guidelines and regulatory requirements for setting up Herbal drug industries in Indi

M.Sc. Botany, III Semester (CBCS)
Paper-IV: Cultivation and Post-Harvest of Medicinal plants

(Practical) **4 Hrs/week 1 Credits**

MBOT.P.308

Major & Minor Experiment:

1. Extraction of essential oil from Eucalyptus leaves using steam distillation.
2. Extraction of essential oil from Clove buds using Clevenger's apparatus.
3. Extraction of essential oil from flower petals using Enfleurage method
4. Estimation of Heavy metal content in Tinospora cordifolia growing at various places using AAS
5. Preparation of Biofertilizers (using any one microbe)
6. Histochemical identification of the following chemical substances:

a) Carbohydrates b) Amino acids d) Starch e) Tannins Study of the following spotters / tissues/ observation/Report

7. Visit to the local areas and identification and data collection of potential medicinal plants for introduction in cultivation.
8. Visit to the local medicinal plant institutions (CIMAP, Medicinal plant board, State Biodiversity board) nurseries, gardens and local forest areas.
9. Learning various drying techniques of crude drugs.
10. Histological identification of tissue systems and deposits

a). Epidermis, b) Parenchyma, c) Collenchyma, d) Phloem, e) Xylem, f) Crystals

11. Cultivation of any two Medicinal plants in an experimental plot and study of their phytoconstituents
12. Cultivation of any two aromatic plants in an experimental plot and study of their phytoconstituent
13. Market Research on Popular Medicinal Plants: Conduct a survey to identify popular medicinal plants in their region, gather information on demand, availability, and consumer challenges, and create a report on local demand and supply trends.
14. Prepare herbarium of medicinal and aromatic plants cultivated in the surrounding areas
15. Record

Elective-II F. Cultivation, Post-Harvest of Medicinal and Aroma plants - Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

K. Shailaja

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1. Medicinal Plants of Uttarakhand by C.p, Kala (2010),

2. Indian Medicinal Plants by P.C. Trivedi (2009),

3. Medicinal Plants of Indian Himalaya by S.S. Samant and U. Dhar,

4. Hand Book of Aromatic Plants by S.K. Bhattacharjee (2004),

5. Handbook of MAPs by S.K. Bhattacharjee (2009).

6. Cultivation and Utilization of Aromatic Plants by Atal and Kapoor.

7. A Handbook of Organic Farming by A.K. Sharma (2004).

8. Handbook of Medicinal and Aromatic Plants by S.K. Bhattacharjee (2004).

9. Recent Progress in Medicinal Plants Vol.12, Globalization of Herbal Health by ALK.

Sharma (2006).

10. Handbook of Ayurvedic Medicinal Plants by L.D, Kapoor (2005)

11. Indian Medicinal Plants (Vol 1- 4) by K.R. Kirtikar and B.D. Basu (2006).

DEPARTMENT OF BOTANY, PALAMURU UNIVERSITY
M.Sc. BOTANY (CBCS)
New Syllabus - Course Structure
(Effective from Academic Year 2023-2025)

Semester - IV

S.No	Subject code	Paper No. and Subject title	Credits	Total marks
		THEORY		
1.	CORE I MBOT.CC.T.2.401	I: Plant Ecology, Biodiversity and Conservation Biology	3	100 (Int.40, Ex.60)
2.	CORE 2 MBOT.CC.T.2.402	II: Horticulture and Plant Breeding	3	100 (Int.40, Ex.60)
3.	Elective III- MBOT.CC.T.2.403	**Elective III- (A/B/C)**	3	100 (Int.40, Ex.60)
		PRACTICALS		
4.	MBOT.CC.P.2.405	Core I -Practical Lab I	2	50
5	MBOT.CC .P.2.406	Core II- practical Lab II	2	50
6	MBOT.CC.P.2.407	Elective III- Practical Lab (A/ B/C)	2	50
7	**Project**	**Project**	5	150
		Total	20	600

Semester -IV Elective III	(A/B/C)
A	Molecular Plant Pathology and Disease Management
B	Seed Technology and Nursery Management
C	Recombinant DNA Technology

M.Sc. Botany, IV Semester (CBCS)
Core I. Plant Ecology, Biodiversity and Conservation Biology
(Theory)

MBOT.CC.T401 **3 Hrs./week 3 Credits**

Unit I .Ecology

1.1 Ecosystem Ecology: Ecosystem structure and function, energy dynamics, primary production, mineral cycling — (Carbon and Nitrogen)
1.2 Population Ecology: Characteristics of a population (Density, Natality, Mortality, Dispersion, Population size, Age structure, Life tables) population growth curves, life history strategies(r and k selection)
1.3 Species interactions: Types of interactions, Positive interactions- Mutualism, symbiosis, commensalism, protocooperation
1.4. Negative interactions- Exploitation, herbivory, carnivory, antibiosis and competition
1.5. Ecological Succession: Types (Hydrosere & Xerosere) and mechanisms, Changes involved in succession. concept of climax- Monoclimax and Polyclimax theories

Unit II: Biodiversity

2.1.Community Ecology: Characteristics of communities, Analytical, Quantitative– Frequency, density, abundance, cover and basal area and
2.2. Qualitative-Physiognomy, phenology, stratification, sociability, vitality and life forms, Raunchier concept, Ecotones.
2.3.Principles of biodiversity: Biodiversity: Definition, Concepts, Levels of Biodiversity- Species, Ecosystem and Genetic Diversities.
2.4.Measurements of Biodiversity-Species Richness, Species Evenness, Diversity Indices- Shannon and Simpson's Index
2.5.Global distribution of Biodiversity: Distribution patterns, Biodiversity at global, national and local levels. India as a Mega diversity nation.

UNIT III: Conservation Biology

3.1 Strategies for conservation: Conservation, IUCN Red List, Categories of Threatened Species, Criteria to differentiate Threatened Taxa.
3.2 In situ Conservation methods: Biosphere Reserves, Sanctuaries, National Parks, Sacred Grooves. Advantages and Disadvantages of In Situ Conservation.
3.3 Ex situ Conservation methods: Botanical Gardens, Gene Banks, Seed Banks, Field Gene Banks, In vitro Gene Banks. Advantages and Disadvantages of Ex Situ Conservation.
3.4 National Legislations: Policies relevant to Biodiversity- Biological Diversity Act-2002; State Biodiversity Boards, Biodiversity Management Committees, Peoples Biodiversity Registers; National Biodiversity Action Plan (NBAP); National Biodiversity Targets.
3.5 Conservation practices: Brief account on organizations involved in resource conservation IUCN, WWF,UNEP,UNESCO.

M.Sc. Botany, IV Semester (CBCS)
Core I. Plant Ecology, Biodiversity and Conservation Biology
(Practical)

MBOT.P.2.405 **3 Hrs/week 3 Credits**

Major & Minor experiments:

1. Determination of quantitative characters by random quadrat method -Abundance, Density, Frequency and Dominance.
2. Determination of Important Value IndexIVI) of plant species in selected area.
3. Calculation of Similarity and Dissimilarity Index
4. Estimation of Carbonates and Bicarbonates
5. Estimation of Chlorides and Dissolved Oxygen
6. Morphology and Anatomy of Hydrophytes and their adaptations.
7. Morphology and Anatomy of Xerophytes and their adaptations
8. Evaluation of life form classes of local flora.
9. Preparation of frequency diagram of plant community by Raunkiaer method
10. Preparation of biological spectrum
11. Determination of Simpson index of dominance of a plant community.
12. Determination of Shannon Weiner diversity for plant community.
13. IUCN threatened categories: Rare, Endangered and Vulnerable categories of plant species from Telangana.
14. Mapping of in situ plant conservation in India.
15. Ex situ conservation: Seeds of crop plants.
16. Maintenance of Practical records

Core I. Plant Ecology, Biodiversity and Conservation Biology - Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

REFERENCE:

1. E.P. Odum 1996 Fundamentals of ecology
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E. Koromondy 19%0 Coco andervironment
4. S.P. Misra .S.N. 2010 Pandey Essential Environmental studies
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6. Gaston,K. J and Spicer,J.I.2004. Biodiversity: An Introduction (2nd Ed.) Blackwell Publishing Company.
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M.Sc. Botany, IV Semester (CBCS)
Core II. – Paper-II Horticulture and Plant Breeding
(Theory)

MBOT.CC.T403 **3 Hrs./week 3 Credits**

Unit I. Horticulture

1.1. Horticulture: Introduction, scope, branches and importance of Horticulture. Classification of horticultural crops based on soil, climatic requirements and seasons of growth.
1.2. Propagation of Horticultural plants: Natural propagation by Seeds (Seed structure & Types and germination types), vegetative propagation by runners, stolon, suckers, offshoots and detachable structures (bulb, com, tuber, rhizome).
1.2. Artificial Vegetative Propagation: Layering- different types and advantages. Cutting different types and advantages.
1.4. Artificial Vegetative Propagation: Grafting -root stock & scion, different types and advantages of grafting.
1.5. Artificial Vegetative Propagation: Budding, different types and advantages of budding. Application of Plant growth regulators in Horticulture.

Unit II. Nutrient and Disease Management of Horticultural Plants

2.1. Nutrient management: Macro and Micro nutrients- functions and deficiency symptoms. Integrative Nutrient management (INP)
2.2. Water Management: Different methods of irrigation. Drip irrigation system. Conservation of Soil moisture- Mulching.
2.3. Management of Fertilizers: Biofertilizers and Chemical fertilizers - Types, advantages and disadvantages. Manure- Types and their role soil fertility management.
2.4. Management of Diseases: Method of management of diseases of Horticultural crops- Prevention, cultural practices, biological and chemical control. Agri-clinics.
2.5. Management of Pest: Methods of management of pest of Horticultural crops- Mechanical, Physical, biological, chemical and cultural practices. Integrated Pest Management (IPM).

Unit III. Plant Breeding

3.1. Plant breeding objectives: Traits of interest - high yield, improved quality, disease and pest resistance, early maturity and resistance to biotic and abiotic stresses.
3.2 Conventional method of crop improvement: Principles of plant breeding, selective selfing and crossing techniques.
3.3. Traditional breeding methods: Selection methods - Mass selection, Pure line, Pedigree, Clonal selection. Merits and demerits of each method. Back cross breeding,
3.4. Hybridization: Methodology of production of commercial hybrids. Development of inbreed cultivars, Inbreeding depression. Heterosis- theories of and importance of Heterosis.
3.5. Mutation breeding: Induced polyploidy and its role in plant breeding. Importance of haploid and dihaploids in plant breeding.

K. Shaila

M.Sc. Botany, IV Semester (CBCS)
Core-II- Paper-II Horticulture and Plant Breeding
(Practical)

MBOT.P.2.406 **3 Hrs/week 3 Credits**

Major and Minor experiments:

1. Seed viability test by Tetrazolium test.
2. Estimation of moisture content in soil.
3. Determination of Soil pH
4. Study of types of manures.
5. Demonstration of vegetative propagation from locally available plants through following methods76. Stem cutting
6. Layering-Tip layering, Simple layering, mound layering, and Air layering.
7. Grafting- Cleft grafting, Whip or tongue grafting, Bark grafting,
8. Budding- T- budding, Chip budding, Patch budding
9. Study of Seed germination- Epigeal and Hypogeal.
10. Study of methods to overcome seed dormancy- Mechanical scarification, Soaking the seeds in water, Acid, scarification

Study of the following spotters/ cultures/ Photo graphs/diagrams

11. Study of Hybridization (Intraspecific, Interspecific)
12. Study of selfing and crossing pollination techniques:

A) Emasculation: B) Bagging C) Pollination and D) Tagging

13. Identification of Horticultural tools and implements and their uses
14. Study of Vegetative propagation through corms, bulbs, rhizomes.
15. Study of containers, preparation.
16. Preparation of Record

Core II Paper II. - Horticulture and Plant Breeding - Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

REFERENCES:

1. Plant propagation (Principles and practices) Hortman, Kester, Fred T Davies, Robert Genene
2. Floriculture in India - T.K. Bose
3. Principles of horticultural science - Janick
4. Beautiful shrubs - Prathibha P. Trivedi
5. Commercial flowers Vol. I & I- T.K. Bose, Yadav, P. Pal, P.Das, V.A. Parthasarathy.
6. Floriculture in India - Randhawa and Mukhopadhyaya Allied Publishers.
7. Biotechnology and its application in horticulture S.P. Ghosh- Narosa Publishers.
8. Agricultural dairy- published by Agriculture Department A.P.
9. Horticulture dairy- Horticulture Department A.P.
10. Field Crops research. By Poehlman.
11. Genetics by Sambamurthy.
12. Plant breeding by Allard.
13. Plant breeding by Randhawa
14. Plant Tissue Culture-Protocols in Plant Biotechnology by MC Gayathri& R.Kavyashree-Narosa Publ.

M.Sc. Botany, IV Semester (CBCS)
Elective-III- A Molecular Plant Pathology and Disease Management

(Theory) **3 Hrs/week 3 Credits**

MBOT.CC.T403/A

UNIT- I Molecular plant Pathology:

1.1. Molecular Plant Pathology: Genesis, importance and scope of molecular plant pathology. Basic and advanced Techniques in plant pathology- Electrophoresis- Principle, procedure and application.
1.2 Study of advanced techniques: Principle, Types, Methodology, and applications of ELISA, PCR (Polymerase Chain Reaction). Brief account of RT-PCR.
1.3 Diagnosis of variability in plant pathogens: Molecular variability of pathogens. Molecular markers-Definition & types. Detailed study of Principle, procedure and application of RFLP and RAPD. 1.4 Advances in Molecular biology: Fungal protoplasts isolation, culture and fusion.Brief account of Vegetative compatibility groupings (VCG).

1.5 Bioinformatics: Application of Information Technology in plant pathology - Databases, computer simulation, \, prediction & expert system, disease forecasting. Role of GPS, GIS and Remote Sensing in plant pathology.

Unit II. Fungal Biotechnology:

2.1.Fermentation: Fermenters, Different types of fermenters. Fermentation- processes,growth kinetics and scaling up biomass production.

2.2.Yeast: Types of yeast- Baker's, food, feed yeasts. Application of yeast in food,baking, feed industry. Role of yeast in industrial production of alcohols., Single Cell Proteins.

2.3.Fungal enzymes: Study on production and application of Industrial fungal enzymes(amylases, cellulases and chitinases).

2.4. Fungi in Industry: General account of production and application of primary metabolites from fungi (vitamins and proteins).

2.5.Fungi in Industry: Over view of production and application of secondary metabolites (antibiotics,pigments and alkaloids).

UNIT- III: Plant Disease management:

3.1.Disease Development: Effect various factors on disease development (moisture, temperature, wind, soil, host-plant nutrition). Disease triangle. Concept of Epidemiology. Elements of epidemics.
3.2.Principles of Plant Disease Management, Cultural practice, Biological Methods, Physical Methods 3.3.Chemical Method of disease management: Classification of fungicides. Chemical nature, mode of action and methods of application of fungicides- Sulphur fungicides, Copper fungicides, Mercurial compounds.
3.4.Plant Quarantine: Quarantine- General principles., domestic and International. Exotic pathogens and pathogens 'ntroduced into India. Sanitary and phytosanitary (SPS) issues under WTO and TRIPS 3.5. Integrated Disease management (IPM) -Introduction, history, importance, concepts, principles and tools of IPM. a) surveillance and forecasting of Insect pest.

M.Sc. Botany, IV Semester (CBCS)
Elective-III A- Molecular Plant Pathology and Disease Management

(Practical) **4 Hrs/week 1 Credits**

MBOT.P.2.403/A

Major and Minor experiments:

1.Seed viability test by Tetrazolium test.

2. Estimation of moisture content in soil.

3. Determination of Soil pH

4. Study of types of manures. Demonstration of vegetative propagation from locally available plants through following methods

4. Stem cutting.

5. Layering-Tip layering, Simple layering, mound layering, and Air layering.

6. Grafting- Cleft grafting, Whip or tongue grafting, Bark grafting,

7. Budding- T- budding, Chip budding, Patch budding

5. Study of Seed germination- Epigeal and Hypogeal.

6. Study of methods to overcome seed dormancy- Mechanical scarification, Soaking the seeds in water, Acid, scarification Study of the following spotters/ cultures/ Photo graphs/diagrams

7. Study of Hybridization (Intraspecific, Interspecific)

8. Study of selfing and crossing pollination techniques: A) Emasculation: B) Bagging C) Pollination and D) Tagging

9. Identification of Horticultural tools and implements and their uses

10. Study of Vegetative propagation through corms, bulbs, rhizomes.Study of containers, and preparation.

11. Preparation of Record.

Elective-III A- Molecular Plant Pathology and Disease Management

plants - Practical Model Paper

Time- 3hrs	**50 Marks**
Major Experiment (Mitosis Cell Division)	**16 M**
Minor (2 problems in Genetics) 2x6	**12 M**
Minor (2 Problems from Biostatistics) 2x6	**12 M**
Record and Viva	**10M**

Dr. Shailaja.

REFERENCES:

1. Plant propagation (Principles and practices) Hortman, Kester, Fred T Davies,Robert Genene

2.Floriculture in India — T.K. Bose

3.Principles of horticultural science — Janick

4.Beautiful shrubs — Prathibha P. Trivedi

5.Commercial flowers Vol. I & I- TK. Bose, Yaday, P. Pal, P-Das, V.A. Parthasarathy.

6.Floriculture in India — Randhawa and Mukhopadhyaya Allied Publishers.

7.Biotechnology and its application in horticulture S.P. Ghosh- Narosa Publishers.

8.Agricultural dairy- published by Agriculture Department ALP.

9.Horticulture dairy- Horticulture Department AP.

10. Field Crops research. By Poehlman.

11. Genetics by Sambamurthy.

12. Plant breeding by Allard.

13. Plant breeding by Randhawa

14. Plant Tissue Culture-Protocols in Plant Biotechnology by MC Gayathri& R.Kavyashree-Narosa

M.Sc. Botany, IV Semester (CBCS)
Elective IIIB : Recombinants DNA Technology
(Theory)

MBOT.CC.T403/B **3 Hrs./week 3 Credits**

Unit-I: Gene cloning

1.1. Genetic engineering: Introduction, history and importance of gene cloning. Basic steps in gene cloning. Biosafety measures.
1.2. Enzymes in gene cloning: Restriction endonucleases: type I, II, III, DNA ligases, alkaline Phosphatases, Reverse transcriptase.
1.3.Gene cloning vectors: Plasmids, (PBR322) Bacteriophages, Cosmids, Phagemids, YAC, BAC, Ti and Ri plasmids
AGene Libraries: Construction of Genomic library and cDNA libraries, advantages and disadvantages.
1.5 Selection of Recombinants- Screening of recombinants by Marker genes, Reporter genes, Colony hybridization

Unit-II: Advances in rDNA technology

2.1: Genome Sequencing: DNA sequencing- Maxam-Gilbert and Sanger Method. Pyrosequencing. Next Generation Sequencing (NGS).
2.2. Molecular Markers: Definition, types and Applications. Restriction Fragment Length Polymorphism (RFLP), Random Amplified Polymorphic DNA (RAPD).
2.3. DNA Fingerprinting. Methodology and Applications in Forensic science, Medico legal aspects. RNAi technology
2.4. Gene therapy: Delivery techniques (Ex vivo & In vivo), Delivery vectors & application of gene therapy in inherited immunodeficiency syndromes. Genome editing (CRISPR-Cas9).
2.5. I-DNA technology: Application of recombinant DNA technology in Medicine, Industry and Agriculture.

Unit-III: Techniques in rDNA technology

3.1. Polymerase Chain Reaction (PCR) and RT-PCR: Principle, types, components, enzymes employed and applications of PCR
3.2. Gel electrophoresis: Principle and methodology- Agarose Gel Electrophoresis (AGE) and Polyacrylamide Gel Electrophoresis (PAGE)
3.3. Blotting Techniques - Northern, Southern and Western Blotting
3.4. Fluorescence Techniques: Fluorescence In Situ Hybridization (FISH) and Fluorescence-Activated Cell Sorting (FACS), Fluorochromes.
3.5. Autoradiography - Principle and applications. DNA Microarray and DNA chips.

M.Sc. Botany, IV Semester (CBCS)
Elective IIIB : Recombinants DNA Technology
(Practical)

MBOT.P.2.403/B **3 Hrs/week 3 Credits**

Major & Minor:

1. **DNA estimation by DPA method.**
2. **RNA estimation by Orcinol method.**
3. **Gene sequencing problems**
4. **Restriction mapping problems**
5. **RFLP problems.**
6. **Polymerase Chain Reaction (PCR)**
7. **Agarose Gel Electrophoresis (AGE)**
8. **Polyacrylamide Gel Electrophoresis (PAGE**
9. **DNA extraction from banana / tomato**

Study of following Spotters/ Photographs

10. **Plasmids-Structure**
11. **Reporter genes- GUS (glucoronidase) assay, Luciferase,**
12. **Southern blotting technique**
13. **Northern blotting technique**
14. **Western blotting technique**
15. **Next Generation Sequencing (NGS).**
16. **DNA Microarray**
17. **Fluorescence In Situ Hybridization (FISH)**
18. **Fluorescence Activated Cell Sorting (FACS),**
19. **Autoradiography**
20. **Record**

Elective III-B: Recombinants DNA Technology plants - Practical Model Paper

Time- 3hrs	**50 Marks**
Major Experiment (Mitosis Cell Division)	**16 M**
Minor (2 problems in Genetics) 2x6	**12 M**
Minor (2 Problems from Biostatistics) 2x6	**12 M**
Record and Viva	**10M**

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M.Sc. Botany — IV Semester (CBCS)
Elective-III C.
Seed Technology and Nursery Management (Theory)

MBOT.CC. T.2.403 III-C (Elective) **3 Hrs./week 3 Credits**

Unit 1. Seed morphology and methods

1.1 Introduction — Definition, Concept, Objectives, Role and Opportunities of seed technology.
1.2 Morphology of seed —Structure of seed, Seed coat anatomy, Seed dispersal.
1.3 Seed dormancy — Definition, Causes of seed dormancy, methods of breaking seed dormancy.
1.4 Methods of seed collection. Seed processing — Cleaning, Winnowing, Sieving, Drying and packing.
1.5 Methods of seed storage. Seed viability. Seed deterioration. Seed testing and Seed certification.

Unit 2. Gene banks and management

2.1 Gene banks Definition, types of gene banks - Seed gene bank, Cryo gene bank, Invitro gene bank, Field gene bank.

2.2 Gene banks management strategies and principles, access benefit sharing polices global level.

2.3 Global gene banks — Africa Rice, Biodiversity International, CI AT, CI MMYT.

2.4 Role of NBPGR and its regional stations in ex situ conservation of Indian plant genetic resources — crop plants, landraces, wild crop relatives, wild plants.

2.5 Role of Svalbard Global seed vault — Norway in long term seed storage and conservation of global plant genetic resources.

Unit 3.Seed germination methods and nursery management

3.1 Seed treatment —Organic seed treatments-Priming, Pelleting, Hot water treatment, Soaking, Scarification. Chemical seed treatment — Fungicide, insecticide, Sulfuric acid treatment.
3.2 Seed sowing - Stripe seeding, Point seeding, Broadcast seeding, Broad or line sowing, Dibbling, Transplanting, Planting.
3.3 Preparation of seed or nursery beds — Flat nursery beds, Raised nursery bed, Sunken nursery bed. Preparation of potting media — Soil, Compost, Sand, Sphagnum moss, Saw dust, Peat, Perlite, Vermiculite, Farmyard manure (FYM). Use growth regulators.
3.4 Transplanting techniques and methods. Factors influencing the survival rate of seedlings.
3.5 Seedling growth and management in Shade net/Net house, Polytunnel/Polyhouse and Glasshouse/Greenhouses.

M.Sc. Botany — IV Semester (CBCS)

Elective-III C. Seed Technology and Nursery Management

(Practical)

MBOT.CC.P.2.403 /C **(Elective)** **4 Hrs./week 1 Credit**

Questions from the following practicals:

1.Study of seed structure (Gymnosperm, Angiosperm seeds -Dicots, Monocots).
2.Study of seed coat anatomy of wild or crop plants locally available.
3.Tetrazolium test for seed viability and vigour in wild plants or cultivated crop seeds.
4.Study of natural methods of seed dormancy braking in hard seed coat seeds: Jitregi *(Dalbergia latifolia)*, Nallamaddi *(Terminalia tomentosa)* Errachandhanam *(Pterocarpus santalinus)*, Entada *(Entada rheedii)*.
5.Study of seed dormancy breaking by using chemical (sulphuric acid) in hard seed coat species: Tellapoliki *(Givotia rottleriformis)*, Srigandham *(Santalum album)*.

Minor questions from the following practicals:

6.Study of seed germination percentage in rare tree species — Andugu *(Boswellia serrata)*, Morri *(*Buchanania lanzan*)*, Tapsi *(*Kavalama urens*)*.
7. Methods of collection, processing and drying of seeds of local forest species.
8.Preparation of nursery beds, manure , filling of nursery bags, transplanting of seedlings.
9.Study of seed germination and nursery techniques in micro seeded plants - Ficus spp., Orchids.
10.Seed sowing and recording of germination and survival percentage of medicinal, vegetable and floricultural herbs (annuals).

Spotters from the following practicals:

11.Study of methods of application of growth regulators.
12.Methods of learning seed storage and preservation in gene banks.
13.Preparation of eco-friendly nursery bags and pots.
14.Methods of preparation of seed balls and scattering in the selected local forest area.
Visit to the local forest areas, gardens, nurseries, and horticultural institution and Visit to the gene banks - NBPGR Delhi and Hyderabad.
15.Field notebook and Record

Elective-III C. Seed Technology and Nursery Management Practical Model Paper

Time: 3 Hrs. **Max. Marks:50**

I Major question\experiment	15 M
II Minor question\experiment (2X8)	16M
III Spotters — A, B, C (3X 3)	9M
IV Record & Field note book (3 +2)	5M
V Viva	5M

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4. Rajeev Kumar. 2016. A Text Book of Seed Technology. Kalyani Publishers. New Delhi.

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M.Sc. Botany — IV Semester (CBCS)
Elective-III C.
Seed Technology and Nursery Management (Theory)

MBOT.CC. T.2.403 III-C (Elective) **3 Hrs./week 3 Credits**

Unit 1. Seed morphology and methods

1.1 Introduction — Definition, Concept, Objectives, Role and Opportunities of seed technology.
1.2 Morphology of seed — Structure of seed, Seed coat anatomy, Seed dispersal.
1.3 Seed dormancy — Definition, Causes of seed dormancy, methods of breaking seed dormancy.
1.4 Methods of seed collection. Seed processing — Cleaning, Winnowing, Sieving, Drying and packing.
1.5 Methods of seed storage. Seed viability. Seed deterioration. Seed testing and Seed certification.

Unit 2. Gene banks and management

2.1 Gene banks Definition, types of gene banks - Seed gene bank, Cryo gene bank, Invitro gene bank, Field gene bank.

2.2 Gene banks management strategies and principles, access benefit sharing polices global level.

2.3 Global gene banks — Africa Rice, Biodiversity International, CI AT, CI MMYT.

2.4 Role of **NBPGR** and its regional stations in ex situ conservation of Indian plant genetic resources — crop plants, landraces, wild crop relatives, wild plants.

2.5 Role of Svalbard Global seed vault — Norway in long term seed storage and conservation of global plant genetic resources.

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3.1 Seed treatment —Organic seed treatments-Priming, Pelleting, Hot water treatment, Soaking, Scarification. Chemical seed treatment — Fungicide, insecticide, Sulfuric acid treatment.
3.2 Seed sowing - Stripe seeding, Point seeding, Broadcast seeding, Broad or line sowing, Dibbling, Transplanting, Planting.
3.3 Preparation of seed or nursery beds — Flat nursery beds, Raised nursery bed, Sunken nursery bed. Preparation of potting media — Soil, Compost, Sand, Sphagnum moss, Saw dust, Peat, Perlite, Vermiculite, Farmyard manure (FYM). Use growth regulators.
3.4 Transplanting techniques and methods. Factors influencing the survival rate of seedlings.
3.5 Seedling growth and management in Shade net/Net house, Polytunnel/Polyhouse and Glasshouse/Greenhouses.

M.Sc. Botany — IV Semester (CBCS)

Elective-III C. Seed Technology and Nursery Management

(Practical)

MBOT.CC.P.2.403 /C **(Elective)** **4 Hrs./week 1 Credit**

Questions from the following practicals:

1.Study of seed structure (Gymnosperm, Angiosperm seeds -Dicots, Monocots).
2.Study of seed coat anatomy of wild or crop plants locally available.
3.Tetrazolium test for seed viability and vigour in wild plants or cultivated crop seeds.
4.Study of natural methods of seed dormancy braking in hard seed coat seeds: Jitregi *(Dalbergia latifolia)*, Nallamaddi *(Terminalia tomentosa)* Errachandhanam *(Pterocarpus santalinus)*, Entada *(Entada rheedii)*.
5.Study of seed dormancy breaking by using chemical (sulphuric acid) in hard seed coat species: Tellapoliki *(Givotia rottleriformis)*, Srigandham *(Santalum album)*.

Minor questions from the following practicals:

6.Study of seed germination percentage in rare tree species — Andugu *(Boswellia serrata)*, Morri (Buchanania lanzan), Tapsi (Kavalama urens).
7. Methods of collection, processing and drying of seeds of local forest species.
8.Preparation of nursery beds, manure , filling of nursery bags, transplanting of seedlings.
9.Study of seed germination and nursery techniques in micro seeded plants - Ficus spp., Orchids.
10.Seed sowing and recording of germination and survival percentage of medicinal, vegetable and floricultural herbs (annuals).

Spotters from the following practicals:

11.Study of methods of application of growth regulators.
12.Methods of learning seed storage and preservation in gene banks.
13.Preparation of eco-friendly nursery bags and pots.
14.Methods of preparation of seed balls and scattering in the selected local forest area.
Visit to the local forest areas, gardens, nurseries, and horticultural institution and Visit to the gene banks - NBPGR Delhi and Hyderabad.
15.Field notebook and Record

Elective-III C. Seed Technology and Nursery Management Practical Model Paper

Time: 3 Hrs. **Max. Marks:50**

I Major questionlexperiment	15 M
II Minor questionlexperiment (2X8)	16M
III Spotters — A, B, C (3X 3)	9M
IV Record & Field note book (3 −2)	5M
V Viva	5M

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M.Sc. Botany, IV Semester (CBCS)
Paper III . Phytogeography and Plant Systematics

MBOT.CC.T403 (Theory) 3 Hrs/week 3 Credits

Unit 1. Phytogeography and theories of plant distribution

1.1. Introduction, definition, divisions of Phytogeography and importance.
1.2. Plant distribution - Types and pattern of distribution - Continuous distribution,discontinuous distribution., types and theoretical explanation.
1.3. Plant migration and barriers of migration, vicarious and relict species - types and examples.
1.4. Theories and principles of plant distribution. Continental drift; Age and Area theory andLand – Bridge theory.
1.5. Lowerence principles on plant distribution: Principles concerning environment, plantresponses, Migration & climaxes, perpetuation & evolution of floras and climaxes.

Unit 2. Vegetation types and Floristic studies

2.1.Major types of vegetation of world - Forests, Grasslands, Coastal, Tundra and Deserts.
2.2. Types of forest in the world -Boreal or taiga forests, Temperate forests, sub tropical and tropical forests. Forest types in India (Champion and Seth 1968).
2.3. Floristic regions of India. Floristic studies and Floristic wealth of Telangana state.
2.4. Taxonomic aids: Taxonomic keys, Floras, Manuals, Monographs, Revisions and e-Floras.
2.5.Applications of GPS and GIS in Plant Taxonomy: Mapping and monitoring of plant species, habitats, threat evaluation and hotspot analysis.

Unit 3. Synthetic and Novel approaches in plant Systematics

3.1.Chemotaxonomy: Role of secondary metabolites-alkaloids, phenolic compounds,terpenoids, amino acids and glycosylates in identification of plants.

3.2. Palynotaxonomy: Role of pollen morphology-Pollen units, size & shape, symmetry, polarity, aperture patterns and exine ornamentation in identification of plants.

3.3. Cytotaxonomy: Role of Chromosome number, Morphology and Chromosomal behaviorin identification of plants.

3.4.Molecular systematics -Definition, techniques, methods and approaches. DNA barcoding.

3.5.Cladistics: definition, development history, importance. Characters used: Plesiomorphic

M.Sc. Botany, IV Semester (CBCS)
Paper III. Phytogeography and Plant Systematics

MBOT.P.2.407 **(Practical)** **4 Hrs/week 1 Credits**

Major & Minor questions from the following Practicals

1. Preparation of taxonomic keys to the Families/Genera/Species - Indented, Bracketedand

Descriptive keys.

2. Identification of families, Genera and species by using Floras.

3. Slura of vegetation and forest types found in the Telangana State from published

4. GPS mapping of some important tree species from your institution/nearby park/forest.

5. Study and analysis of endemism and endemic plants in Eastern Himalayan, North Eastern Western Ghats regions and Telangana State. (from published floras.)

6. Mapping of phytogeographical regions of the globe and India.

7. Solve the simple cladogram related problems (Data sheets will be provided to students)

8. Preparation of cladogram by using Mesqite software with any 10-15 characters (byusing Morphology, Anatomy, palynology or Molecular data).

9. Hands on training on Herbarium techniques and methodology (collection, processing, poisoning, drying, mounting, stitching, labelling and deposition).

Study of the following by Spotters/ observation/diagrams

10. Study of method of describing a new species as per ICN guidelines.

11. Methods of sample collections for molecular systematics or DNA barcoding.

12. Identify the species by using The DELTA format (DEscription Language for TAxonomy) computer software.

13. Study of some taxonomic instruments- Vasculum, Plant pressers, E-Herbarium sheet, GPS.

14. Visit to the plant molecular and phylogenetic lab to learn molecular methods and techniques.

15. Field visit to the any local biodiversity rich area.

16. Filed notebook and Record

Elective-II F. Cultivation, Post-Harvest of Medicinal and Aroma plants - Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

K. Shailaja.

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P. Chays kishail Asasit RaniBravan

M.Sc. Botany, IV Semester (CBCS)
Paper-IV- F.Pharmacognosy of Medicinal Plants

MBOT.CC.T404 **(Theory)** **3 Hrs/week 3 Credits**

UNIT — I: Pharmacognosy

1.1 Introduction: Scope and Importance of pharmacognosy, future prospects of pharmacognosy.
1.2 Classification of crude drugs: Morphological, taxonomical, chemical, pharmacological and alphabetical.

1.3 Raw drug repository: collection, preservation, storage

1.4 Substitutes and adulterants for crude drugs of commercial importance

1.5 Phyto-pharmaceuticals and herbal medicines. Challenges and opportunities in herbal drug development.

Unit-II: Phytochemical aspects of medicinal plants :Phytochemical profile, Identification tests, and Uses

2.1 Root drugs: Asparagus racemosus, Boerhavia diffusa, Rauvolfia serpentina, Withania isomnifera.

2.2 Leaf drugs: Andrographis paniculata, Senna angustifolia, Centella asiatica, Daturastramionium |

2.3 Bark drugs: Terminalia arjuna, Cinnamomum zeylanicum, Holarrhena pubescens,Cinchona officinalis :

2.4 Seed drugs: Abrus precatorius, Piper longum, Psoralea corylifolia, Strychnos mux-vomica

2.5 Flower drugs: Crocus sativus, Hibiscus rosa-sinensis, Clitoria ternatea, woodfordiafruticosa

Unit-II: Analytical pharmacognosy
3.1 Chromatographic techniques: Thin layer chromatography (TLC), High performance Thin Layer Chromatography (HPTLC), High performance liquid chromatography(HPLC), and Gas chromatography (GC).

3.2 Spectroscopic techniques: Principles of FT-IR, NMR, Mass spectrometry (MS).

3.3 Structure elucidation of the following compounds by spectroscopic techniques like UV, FT-IR, Mass, NMR (/H, Os) a. Menthol, b. Kaempferol

3.4 Quality control: Standardization and quality assurance of medicinal plants, quality control parameters.
3.5 Safety and toxicity evaluation: Adverse effects of medicinal plants, herbal drug interactions, AYUSH guidelines for safety monitoring.

K. Shailaja

M.Sc. Botany, IV Semester (CBCS)
Paper - IV- F.Pharmacognosy of Medicinal Plants

(Practical) **4 Hrs/week 1 Credits**

MBOT.P.2.408

Major & Minor questions from the following Practicals

1.Perform identification tests for Zerminalia arjuna bark for tannin

2.Estimation of total flavonoid content using UV-Visible spectrophotometer

3.Analysis of Sample using FT-IR: Identify and Report the Functional Groups Present in plant extract

4. Qualitative and Quantitative analysis of the following (in any two medicinal plants) using HPTLC a. Quercetin b. Rutin c. Kaempferol d. Gallic acid

5.Phytochemical profiling of Cinnamomum zeylanicum using GC-MS

6. Estimation of Reserpine content in the Rawvolfia serpentina root using HPLC

7. Powder analysis of the following a) Turmeric b) Cloves c) Senna d) Fennel e)Cinnamon

8. Determination of swelling index of Isabgol seeds (to identify adulteration)Study of the following spotter/ Herbarium/ observation

9. Identification of locally available crude drugs based on morphological & anatomical characters (any two)

10. Determination of Haemolytic properties of saponin rich plants (any two)

11. Histochemical analysis of plant material for identification volatile oils and pigments

12. Histochemical analysis of starch grains obtained from various sources

13. Formulation and evaluation of herbal products of market value (gels/ creams/lotions/oils/powders)

14. Preparation of Herbarium of the medicinal plants mentioned in the theory.

15. Record

Elective-II F. Cultivation, Post-Harvest of Medicinal and Aroma plants - Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

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P. Chays kishail Asasit RaniBrava

M.Sc. Botany, IV Semester (CBCS)
Paper-III. Medicinal Botany and Phytochemistry

MBOT.CC.T403 **(Theory)** **3 Hrs/week 3 Credits**

Unit-I: Traditional systems of medicine

1.1. Introduction: Origin, development and evolution of Medicinal Botany, Types of Indian traditional systems of medicines
1.2. Ayurveda system: origin, development, Principles, Diagnosis, treatment and plants used and preparation of drugs.
1.3. Siddha system: origin and development, fundamental concepts, diagnosis treatment and plants used and preparation of drugs.
1.4. Unani system: origin, development, fundamental principles, components, diagnosis, treatment and plants used and preparation of drugs.
1.5. Homeopathy system: origin, development, fundamental principles, treatment and preparation of drugs.

Unit-II: Ethnobotany

2.1. Introduction: History, Definition, Objectives, Scope, Significance, and as inter-disciplinary science. 2.2. Methods and techniques: field data collection, documentation, Identification, Herbarium preparation, plant authentication.
2.3. Ethnomedicine: Plants used by ethnic groups as food, medicines, beverages, fodder, fibre, resins, oils, fragrances, natural dyes, natural sweeteners and other uses. |
2.4. Use of plant Products: NWFP (Non-Wood Forest Produces), animal products, minerals, artefacts, |and rituals, used by Tribal and Folk Communities of Telangana
2.5. Application of Ethnobotany: Role of ethnomedicine and its scope in drug discovery. Importance of ethnobotany in conservation and sustainable development.

UNIT —III: Phytochemistry

3.1. Phytochemicals: Definition. Classification of phytochemicals based on their chemical nature, general properties and their applications.
3.2. Biosynthesise of Secondary metabolites: Brief study of basic metabolic pathways and formation of different secondary metabolites through - Shikimic acid pathway, Acetate mevalonate pathway and Amino acid pathway
3.3. Extraction of Phytochemicals: Methods of extraction (Maceration, percolation, soxhlation and others) Various types of separation techniques (distillation, crystallization, partition).

3.4. Photochemical Screening: Preliminary phytochemical screening using various chemical tests (Alkaloids, Saponins, Phenols, Tannins, Flavonoids , Glycosides)
3.5. Role of phytochemicals: Role of phytochemicals in the natural products drug discovery. Phytochemicals as a source of anticancer, antimicrobial, anti-inflammatory, Immuno-modulatory and anti-obesity medicine, .

K. Shailaja

M.Sc. Botany, IV Semester (CBCS)
Paper-III. Medicinal Botany and Phytochemistry

(Practical) **4 Hrs/week 1 Credits**

MBOT.P.407

Major & Minor experiments:

1.Chemical tests for Alkaloids

2. Chemical tests for Tannins

3.Chemical tests for Flavonoids

4.Chemical tests for Saponins

5.Extraction of caffeine from tea powder.

6. Extraction and detection of sennosides from Senna leaves.

7.Extraction and detection of flavonoids from citrus peels.

8.Extraction and detection of tannins from Arjuna bark

9. Perform Thin Layer Chromatography (TLC) for the crude extract and observe the effect of polarity on the Rf (retention factor) value. Study the following material/spotter/ observations

10. Field visit and collection of ethno-botanical data from the local tribes.

11. Identification and collection of local medicinal plants (three) for phytochemical analysis

12.Compare and assess the efficiency of extraction techniques (maceration, decoction, and Soxhlet) in the extraction of phytochemicals from given plant material.

13. Assessment of Medicinal Plant Quality through organoleptic evaluation and ash content

14.Purification of secondary metabolites through recrystallization technique

15.Prepare herbarium with local medicinal plant

16: Record.

Elective-I F. Medicinal Botany and Phytochemistry - Practical Model Paper

Time- 3hrs	50 Marks
Major Experiment (Mitosis Cell Division)	16 M
Minor (2 problems in Genetics) 2x6	12 M
Minor (2 Problems from Biostatistics) 2x6	12 M
Record and Viva	10M

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Minutes of the meeting of Board of Studies held in the Department of Botany, University college of Science, Osmania University.

The Board of studies meeting for M.Sc. Botany has been held on 05.11.2024 in the Department of Botany, University college of Science, Osmania University.

The following members have attended the meeting:

1. Prof B. Ramadevi	-	Chairperson, BOS in Botany Department of Botany, Head, Department of Botany,University College of Science, OU
2. Prof P. Kamalakar	-	Department of Botany,University College of Science, OU
3. Prof. K. Shailaja	-	Department of Botany, University College of Science, OU
4.Dr. B Kiran Kumar	-	Department of Botany, University College of Science, OU
5. Dr. DSR Rajendar Singh		Joint Director, CCE, HYD
6. Sri P. Srinivasulu		Department of Botany, Dr.B.R.R. Govt. Degree College, Jadcherla
7.Head,Department of Botany		

Board of studies meeting has been conducted on 05-11-2024 at 2:00 P.M. in the, Department of Botany, University College of Science, OU. The following members are present in the meeting and approved the **M.Sc. Botany structure, III & IV Semesters** syllabi with effect from the academic year **2024-2025**

1. Dr. B. Rama Devi, Professor and Head, Dept. Of Botany,UCS,OU

2. Dr. P. Kamalakar,
Professor, Dept. Of Botany,
UCS, OU.

3. Dr. K. Shailaja,
Professor, Dept. Of
Botany, UCS, OU.

4. Dr. B. Kiran Kumar,
Asst. Professor, Dept. Of
Botany, UCS, OU, Hyd.

5. Dr. DSR Rajendar Singh , Joint Director, CCE, HYD

6. Dr. P. Srinivasulu,
Dept. of Botany, DR.
B.R.R. College, Jadcherla

7. Head, Dept. of Botany

Minutes of the Meeting

1. The meeting was conducted to discuss the syllabus of M.Sc. Botany, III & IV Semester as per the new credit system.
2. The syllabus of all two common core papers and four electives have been discussed by the BoS committee
3. It has been resolved to reduce the number of units to three and frame the syllabus as per the guidelines
4. The changes suggested by the members of BOS committee, senior faculty and Subject experts were incorporated in the syllabus, following UGC Guidelines.
5. It is resolved to approve the revised syllabus of all two common core papers and four electives of M. Sc. **III & IV** Semester and to be implemented from the Academic year 2024-2025, present second year students.