Department of Botany

Palamuru University

M.Sc. Botany Syllabuss
For University, Constituent and Affiliated
Colleges
With effect from
2016 – 2017

DEPARTMENT OF BOTANY, PALAMURU UNIVERSITY M.Sc. BOTANY (Effective from Academic Year 2016-2017)

Semester-I

Subject Code	Subject / Paper	Theory / Practical	Instruction Hrs /Week Th./ Pr.	Credits	Evaluation		Duration of External
					Internal	External	Examination
MBOT.CC.T.1.10	Phycology	Theory (Paper-I)	4	4	20	80	3
MBOT.CC.T.1.102	Bryophyta &Pteridophyta	Theory (Paper-II)	4	4	20	80	3
MBOT.CC.T.1.103	Taxonomy of Angiosperms and Medicinal plants	Theory (Paper-III)	4	4 .	20	80	3
MBOT.CC.T.1.104	Plant Biochemistry	Theory (Paper-IV)	4	4	20	80	3
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MBOT.CC.P.1.105	Practical Lab - I	Practical (Paper-I)	4	2	-	50	4
MBOT.CC.P.1.106	Practical Lab - II	Practical (Paper-II)	4	2	-	50	4
MBOT.CC.P.1.107	Practical Lab-III	Practical (Paper-III)	4	2	-	50	4
MBOT.CC.P.1.108	Practical Lab-IV	Practical (Paper-IV)	4	2	-	50	4
			32	24	600		

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Semester-II

Subject Code	Subject / Paper	Theory /	Instructio n Hrs /Week	Credit s	Evaluation		Duration of External
			Th./ Pr.		Internal	External	Examinati on
MBOT.CC.T.1.2	Mycology & Microbiology	Theory (Paper-I)	4	4	20	80	3
	Gymnosperms and Embryology	Theory (Paper-II)	4	4	20	80	3
MBOT.CC.T.1.2 03	Plant Anatomy and Palynology	Theory (Paper-III)	4 .	4	20	80	3
MBOT.CC.T.1.2 04	Plant Physiology	Theory (Paper-IV)	4	4	20	80	3
MBOT.CC.P.1.20 5	Practical Lab - I	Practical (Paper-I)	4	2	-	50	4
MBOT.CC.P.1.20 6	Practical Lab - II	Practical (Paper-II)	4	2	-	50	4
MBOT.CC.P.1.20 7	Practical Lab - III	Practical (Paper-III)	4	2	-	50	4
MBOT.CC.P.1.20 8	Practical Lab -,IV	Practical (Paper-IV)	4	2	-	50	4
			32	24	600		

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SEMESTER - III

Subject Code	Subject / Paper	Theory / Practical	Instruction Hrs /Week Th./ Pr.	Credits	Evaluation		Duration of External
					Internal	External	Examination
MBOT.CC.T.2.301	Cell Biology, Genetics and Biostatistics	Theory (Paper-I)	4	4	20	80	3
MBOT.CC.T.2.302	Environmental Pollution & Protection	Theory (Paper-II)	4	4	20	80	3
MBOT.EC.T.2.303	Specialization - (A/B).	Theory (Paper-III)	4	4	20	80	3
MBOT.EC.T.2.304	Specialization - (A/B)	Theory (Paper-IV)	4	4	20	80	3
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MBOT.CC.P.2.305	Practical Lab - I	Practical (Paper-I)	4	2		50	4
MBOT.CC.P.2.306	Practical Lab - II	Practical (Paper-II)	4	2	-	50	4
MBOT.EC.P.2.307	Practical Lab - III	Practical (Paper-III)	4	2	-	50	4
MBOT.EC.P.2.308	Practical Lab - IV	Practical (Paper-IV)	4	2		50	4
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SEMESTER - IV

Subject Code	Subject / Paper	Theory / Practical	Instruction Hrs /Week Th./ Pr.	Credits	Evaluation		Duration of External
					Internal	External	Examination
MBOT.CC.T.2.401	Ecology & Phytogeography	Theory (Paper-I)	4	4	20	80	3
MBOT.CC.T.2.402	Flant Mole - cular biology	Theory (Paper-II)	4	4	20	80	3
MBOT.EC.T.2.403	Specialization - (A/B/	Theory (Paper-III)	4	4	20	80	3
MBOT.EC.T.2.404	Specialization - (A/B/ Project*	Theory (Paper-IV) / Project*	4	4	20	80	3
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MBOT.CC.P.2.405	Practical Lab - I	Practical (Paper-I)	4	2	-	50	4
MBOT.CC.P.2.406	Practical Lab - II	Practical (Paper-II)	4	2	-	50	4
MBOT.EC.P.2.407	Practical Lab - III	Practical (Paper-III)	4	2	-	50	4
MBOT.EC.P.2.408	Practical Lab – IV / Project*	Practical (Paper-IV) / Project*	4	2	-	50	4
			32	24	600		

Total number of Credits for the 2-year M.Sc. Botany Programme: 96

Note: Specializations (A/B)

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SEMESTER - III

MBOT.CC.T.2.301: Paper-I: Cell Biology, Genetics and Biostatistics

MBOT.CC.T.2.302: Paper-II: Environmental Pollution & Protection

A= Specialization -A: Applied Mycology and Molecular Plant Pathology

MBOT.EC.T.2.303 / A: Paper-III: Principles of Plant Pathology

MBOT.EC.T.2.304 / A: Paper-IV: Applied Mycology

B= Specialization B: Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

MBOT.EC.T.2.303 / Paper-III: Biodiversity of Angiosperms

MBOT.EC.T.2.304 / B: Paper-IV: Cultivation and Phytochemistry of Medicinal Plants

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SEMESTER - IV

MBOT.CC.T.2.401: Paper-I: Ecology and Phytogeography

MBOT.CC.T.2.402: Paper-II: Plant Molecular biology

A= Specialization A: Applied Mycology and Molecular Plant Pathology

MBOT.EC.T.2.403 / A: Paper-III: Molecular Plant Pathology

MBOT.EC.T.2.404 / A: Paper-IV: Plant Diseases

B= Specialization B: Biodiversity of Angiosperms and Pharmacognosy of Medicinal

Plants

MBOT.EC.T.2.403 / **B**: Paper-III: Taxonomy of Angiosperms and Ethnobotany

MBOT.EC.T.2.404 / B: Paper-IV: Pharmacognosy

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M.Sc Botany I Semester

MBOT.CC.T.1.101

4 Hrs/week 4 Credits

Paper I: Phycology

UNIT - I

- 1. General characters and comparative study of important systems of classification in algae Fritsch and Parker systems of classifications.
- 2. Criteria used in the primary classification of algae: a). Pigments b). Reserve food materials c). flagella d). cell wall e). cell structures(Prokaryotic, Eukaryotic).
- 3. Algae of diverse habitats a). Terrestrial. b). freshwater algae and c). Marine algae
- 4. Reproduction of algae a). Vegetative b). Asexual Different types of spores. Sexual Zygotic, Sporic and Gametic with suitable examples.

UNIT - II

- 5. General characters, morphology, life history and classification of the following groups of algae: a. Cyanophyceae *Microcystis, Lyngbya and Aulosira*.
 - b. Chlorophyceae Eudorina, Pediastrum, Hydrodictyon, Pithophora, Ulva, Stigeoclonium, Draparnaldiopsis, Cosmarium, Closterium and Bryopsis
 - c. Charophyceae Nitella

UNIT-III

- 6. General characters, morphology, life history and classification of the following groups of algae
 - a) Bacillariophyceae-Cyclotella, Cymbella;
 - b) Phaeophyceae-Sargassum, Laminaria
 - c) Rhodophyceae- Porphyra, Corallina and Gracilaria.
- 7. Commercial importance of Phaeophyceae and Rhodophyceae

UNIT-IV

- 8. Algae as human food.
- Algae as Biofertilizers
- 10. Algae in Pharmacy
- 11. Algal blooms & Toxic Algae
- 12. Role of Algae in Industry (Alginic acid, Agar Agar and Carrageenan)

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Practical lab -I

- 1. Identification of the genera mentioned in Cyanophyceae, Chlorophyceae, Phaeophyceae and Rhodophyceae
- Collection and identification of algae occurring in and around university college/campus/local surrounding water bodies.
- 3. Introduction to basic algal collections and Preservation techniques and Lab. Safety; Methods of sterilization, media preparation and culturing.

Reference books

- 1. Fritsch, F.E. The structure and reproduction of algae volume 1 and 2
- 2. Robin South, G and Alan Whittick: Introduction to Phycology
- 3. Morris,I: An Introduction to Algae
- 4. Bold, H.C. and Wynne, M.D.: Introduction to the Algae structure and reproduction
- 5. H.D.Kumar: Introductory Phycology

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M.Sc. BOTANY- I SEMESTER

MBOT.CC.T.1.102

(CORE)

4 Hrs/week 4 Credits

PAPER - II: Bryophyta and Pteridophyta

UNIT - I

- 1. Classification systems of Bryophytes
- Distribution, structure and reproduction of the following groups:
 - a) Marchantiales; Marchantiaceae-Marchantia, Targionia
 - b) Jugarmanniales- Porella
 - c) Anthocerotales- Anthoceros, Notothyllas
 - d) Sphagnales -Sphagnum
 - e) Polytrichales- Polytrichum.

UNIT - II

- 3. Structure and evolution of gametophyte in Bryophytes
- 4. Structure and evolution of sporophytes in Bryophytes
- 5. Economic importance of Bryophytes
- Fossil & Fossilization, types of plant fossils
- Fossil Bryophytes. 7.

UNIT - III

- Classification systems of Pteridophytes
- Distribution, structure and reproduction of the following groups:

Psilotales- Psilotum

Filicales - Ophioglassum, Adiantum, Salvinia, Azolla

Lycopodiales- Lycopodium, Phylloglosum

Selaginellales-Selagenella

Isoetales- Isoetes,

Equisetales-Equisetum

Stelar evolution in Pteridophytes.

UNIT- IV

- 10. Telome theory & its application
- 11. Heterospory & seed habit
- 12. Geological time scale
- 13. Techniques employed in the types of fossils
- 14. Origin & evolution of early vascular plants
- 15. General characters of Lepidodendrales, Calamitales and Sphenophyllales.

Dana Gansar. 2016

MBOT.CC.P.1.106 Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab-II

- 1. Bryophytes: Morphologiocal and structural study using whole mount
 - a) Plagiochasma / Fimbirania
 - b) Targionia
 - c) Notothylas
 - d) Sphagnum / Fumaria.
- Pteridophyta, Morphology and anatomy of vegetative and reproductive organs using cleared whole
 mount sections. Macerations and permanent preparation of Psilotum, Isoetes, Ophioglossum,
 Adianthum, Salvinia, Azolla.

Reference books

- 1. Smith, G.M. Cryptogomic Botany. Vol.II
- 2. Parihar, N.S.: Bryophyta
- 3. Parihar, N.S.1976: Biology and Morphology of Pteridophytes
- 4. Sporne, K.R. Pteridophyta
- 5. Rashid: Introduction to Pteridophyta
- 6. Cavers, F. Inter-relations of Bryophytes.

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M.Sc. BOTANY- I SEMESTER

MBOT.CC.T.1.103

(CORE)

4 Hrs/week 4 Credits

Paper-III: Taxonomy of Angiosperms and Medicinal Botany

UNIT -I

- 1. Systems of classification: Phenetic and Phylognetic systems. Critical account of the systems of classifications of a) Hutchinson b) Cronquist and c) Takhtajan.
- 2. Taxonomic evidence and techniques used therein a) Morphology b) Micromorphology c) Epidermology d) Cytology e) Phytochemistry f) Nucleic acid hybridization.

UNIT-II

- 3. Nomenclature: a) Concept of ICBN b) Salient features of Botanical Nomenclature c) Ranks and Nomenclature of taxa d) Typification e) Rules of Priority f) Effective and valid publication g) Author citations.
- 4. Biosystematics: a) Concept b) Categories c) Species concept

UNIT-III

- 5. A comparative study of the following pairs of families_ and their treatment in recent systems:
 - a) Magnoliaceae & Winteraceae
 - b) Malvaceae & Sterculiaceae
 - c) Rutaceae & Meliaceae
 - d) Apocynaceae & Asclepiadaceae
 - e) Verbenaceae &Lamiaceae
 - f) Amaranthaceae & Chenopodiaceae
 - g) Cyperaceae & Poaceae
- 6. Origin of angiosperms, with reference to recent findings.

UNIT-IV

- Medicinal Botany:
 - a) Role of plants in medicine, its origin and development
 - b) Morphology, active principles and medicinal value of the following:
 - i. Andrographis paniculata
 - ii. Asparagus racemosus
 - iii. Clitoria ternata
 - iv. Phyllanthus emblica
 - v. Gymnema sylvestre

8. Flora of Telangana: Salient features of vegetational aspects.

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MBOT.CC.P.1.107 Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab-III

- 1. Study of the locally available plants and recording of the intraspecific variation.
- 2. Description and identification at family, genus and species levels using Floras.
- 3. Identification of key characters in a group of species of a genus and construction of keys.
- 4. Construction of indented keys for the given material
- 5. Simple Nomenclatural problems
- 6. Identification of families studied based on flowers or essential parts of the flowers
- 7. Knowledge of Herbarium techniques
- 8. Record and Herbarium

References:

- 1. Lawrence: Taxonomy of Vascular Plants
- 2. Sivarajan, V.V. (Ed. Robson). Introduction to Principles of Plant Taxonomy
- 3. Heywood, V.H. Plant Taxonomy
- 4. Naik, V.N. Taxonomy of Angiosperms (1988)
- 5. Stace, C.R. Plant Taxonomy and biosystematics (2nd Ed.)
- 6. Hutchinson, J. The families of flowering plants (3rd Ed.),1973
- 7. Cronquist, R. The Evolution and classification of flowering plants (1988)
- 8. Cronquist 1981. An integerated system of classification of flowering plants
- Takhtajan, K. Outline of classification of flowering plants. Botanical Rev. 46:225-359),1980
- 10. Flowering plants. Origin and Dispersal (Trans. By Jeffry),1969
- 11. Jones, S.B. & Luchsinger, A.E. Plant systematics, 1988
- 12. Davis, P.H. & V.H. Heywood. Principles of Angiosperm Taxonomy
- 13. Henry & Chandrabose. An aid to Interntional Code of Botanical Nomenclature
- 14. Bennet. Plant Nomenclature
- 15. Dunn, C. and B.S. Veritt. An introduction to Numerical Taxonomy
- 16.R.Jain, S.K. & Rao, .R. A Handbook of Field and Herbarium Methods.
- 17. Herborne, J.B. & B.L. Turner. Plant Chaemosystematics
- 18.International code of Botanical Nomenclature 2000. (Int. Association of Plant Taxonomist Pub.)
- 19. Takhtajan 1997. Diversity and Classification of flowering plants. Columbia Univ. Press, New York.
- 20.Nordenstam B., El/Gazalay and Kasas M. 2000. Plant Systematics for 21st Century. Portland Press Ltd., London.
- 21. Woodland DW 1991, Contemporary Plant systematics, Prentice Hall, New Jersy.

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M.Sc. BOTANY- I SEMESTER

MBOT.CC.T.1.104

(CORE)

4 Hrs/week 4 Credits

Paper-IV: Plant Biochemistry

UNIT -I

- Bioenergetics: Conservation of energy, Entropy and disorder, Gibbs free energy, Chemical reactions and equilibrium constants, Redox potential, energy currencies (ATP, NAD, NADP), ATP structure and reactions.
- 2. **Enzymes**: Properties of enzymes, Co-factors, Isozymes, enzyme kinetics, Michaelis Menten equation, mechanism of enzyme action, regulation of enzyme action.

UNIT -II

- Carbohydrates: Classification, structure and function of carbyhydrates a) monosaccharides b)
 oligosaccharides c) polysaccharides, storage polysaccharides, structural polysaccharides,
 glycoproteins.
- 4. **Lipids**: Classification of lipids simple lipids, compound lipids, sterols and terpenoids, biosynthesis of fatty acids, polyunsaturated fatty acids, lipoproteins, oxidation of fats, α-oxidation, β-oxidation, glyoxylate cycle, gluconeogenesis.

UNIT -III

- 5. Amino acids: a) General properties b) Classification and characteristics c) non protein amino acids d) peptide bonds e) Biosynthesis of amino acids with reference to GS and GOGAT.
- 6. Proteins: a) Classification of proteins, b) Structure of proteins and Ramachandran plot
- 7. Nucleic acids: a) Structure of DNA and types B, A and Z forms and DNA b) Structure of RNA m-RNA, t-RNA, r-RNA

UNIT -IV

- 8. Structure and function of membranes: a) Chemical composition b) Membrane models c) Functions of Membranes d) Membrane proteins e) Membrane lipids
- 9. Biochemistry of plant cell wall: cellulose, hemicelluloses, lignin, pectin, suberin and cutin.
- 10. Secondary metabolites: introduction, classification, distribution and functions.

MBOT.CC.P.1.108 Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab-IV

- 1. Determination of amylase activity
- 2. Estimation of fructose by resorcinol method
- 3. Estimation of protein by Biuret method
- 4. Estimation of reducing sugars in fruits.
- 5. Determination of iodine number.
- 6. Extraction and estimation of alkaloids from tea leaves/coffee seeds

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ea leaves/coffee seeds

References:

- 1. Plant Physiology, biochemistry and molecular biology. David, T: Dennis and Davis Turnip. Longman. Scientific and technical U.K. 1990.
- 2. Plant Biochemistry Voet, D and Voet J.G. International
- 3. Outlines of biochemistry. 5th edition Con E.E. and Stump P.K. 1995. Willey
- 4. Principles of biochemistry, Lehnenger, A.L. 1982 CBS Publication
- 5. Biochemistry, Strayer W.H. 1976. Foreman Company.
- 6. Introduction to Plant Physiology. Willium G. Hopkins and Norman P. A. Huner
- 7. Plant Physiology. Lincoln Taiz and Eduardo Zeiger. International Edition
- 8. Plant Biochemistry. P.M. Dey and J.B. Harborne
- 9. Plant Biochemistry. Hans-Walter Heldt
- 10. Physicochemical and Environmental Plant Physiology. Park S. Nobel

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M.Sc Botany II Semester

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MBOT.CC.T.1.102

4 Hrs/week 4 Credits

Paper I: Mycology and Microbiology

UNIT-I

 Introduction to Mycology - General characters of fungi; Hyphal ultrastructure and septa; main growth forms of fungi; mode of nutrition in fungi. Asexual and sexual reproductions in different groups of fungi.

2. Fungal cytology and genetics: Heterokaryosis, Parasexual cycle; Sex Pheromones (hormones) in fungi; Mechanisms of nuclear and extra-nuclear inheritance.

3. Outlines of nomenclature, ICN, origin and phylogeny; Recent taxonomic criteria; Classification of Fungi (Alexopoulos and Mims, 1996, Hibbett et. al., 2007 and Aftol, 2014)

UNIT-II

Systematic position, life cycle and brief account of the following types. Fungi like organisms-Stemonitis; Microsporidia- General account; Chytridiomycota-Synchytrium; Blastocladiomycota-Allomyces, Neocallimastigomycota-General account; Glomeromycota-Glomus.

 Oomycota-Perenospora; Ascomycota-Taphrina, Neurospora; Basidiomycota-Melampsora, Ustilago; Deuteromycotina- Alternaria, Cercospora.

6. Lichens: Thallus organization, reproduction, ecology and economic importance

UNIT-III

7. Introduction: A brief account of microbial diversity; Whittaker's classification.

 General account of Archaebacteria and Eubacteria; General characters of plant pathogenic bacteria -Ultra structure of bacterial cell, biochemistry of cell wall, nutritional and growth factors of bacteria.

9. Plasmids - significance of plasmids; molecular events in genetic transfer (conjugation, transformation and transduction) in bacteria.

UNIT-IV

 Viruses: Characteristics and ultrastructure of virions; isolation, purification, detection and characterization of viruses;

11. Classification (ICTV) of viruses; Symptomatology and Transmission of plant viruses; Importance of the viruses.

12. Mollicutes: General characters, transmission and diseases caused by Spiroplasmas and Phytoplasmas.

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Paper II: Mycology and Microbiology

- Introduction to basic Mycological Techniques and Lab. Safety; Methods of sterilization, media 1. preparation and culturing.
- Identification of fungal cultures, slides and specimens of Synchytrium, Allomyces, Glomus, 2. Neurospora, Melampsora and Stemonitis.
- Study of Symptomology of the following fungal diseases by taking sections and slide 3. preparation: Downy mildews, Tikka disease, Melampsora rust, Wheat rust and White rust.
- Study of Mushroom specimens 4.
- Staining of Gram + ve and Gram ve Bacteria 5.
- Herbarium of diseased plants (fungal, bacterial, viral & mycoplasma diseases available locally -6. at least 2-3 specimens of each to be submitted).

References Books

- John Webster and Roland W.S. Weber Introduction to Fungi
- 1. Alexopoulos C.J., C.W. Mims and M. Blackwell - Introductory Mycology 2.
- Mehrotra R.S. and K.R. Aneja An Introduction to Mycology 3.
- Smith, J.E. The Filamentous Fungi 4.
- Change, S.T. and P.G. Miles Edible mushrooms and their cultivation 5.
- Mosses, B.V.A. Mycorrhizae 6.
- Berry, R. Industrial mycology (Vol. I) 7.
- Dubey, S.C. Biotechnology. 8.
- Jeffrey C. Pommerville Alcamo's Fundamentals of Microbiology 9.
- Arora D.R. and B. Arora Text book of Microbiology 10.

Kn. oct. 5,2016

M.Sc. BOTANY- II SEMESTER

MBOT.CC.T.1.202 (CORE)

4Hrs/week 4 Credits

Paper - II Gymnosperms and Embryology

UNIT - I

- 1. Distribution of Gymnosperms Past and present.
- 2. Classification of Gymnosperms Proposed by Sporne and Pant.
- 3. Economic importance of Gymnoperms
- 4. Wood anatomy of Conifers

UNIT - II

- 5. A general account of Gymnosperms with reference to their vegetative morphology and anatomy and male and female cones of the following taxa
 - a). Cycadales (Cycas, Zamia)
 - b). Ginkgoales (Ginkgo)
 - c). Coniferales (Araucaria, Podocarpus, Cupressus and Cedrus)
 - d) Taxales (Taxus)
 - e). Gnetales (Ephedra, Welwitschia)

- 6. Development and trends of evolution of male gametophyte in Gymnosperms
- 7. Structure of Ovule and development of female gametophyte.
- 8. Embryogeny in Gymnosperms
- 9. General Account of Pteridospermales, Pantoxylales and Cordaitales.

UNIT IV

- 10. Microsporangium: Anther, sporogenous tissue, formation of pollen wall, vegetative and generative nucleus.
- 11. Megasporangium: Ovule, types of ovule, Nucellus, Megasporogenesis, embryosac types, a special account of mature embryosac.
- 12. Fertilization: Double fertilization, self-incompatibility, barriers of fertilization.
- 13. Endosperm: Development and types of endosperms. Embryogeny of dicots. A general account of Apomixix and Parthenocarpy.
- 14. Embryology in relation to Taxonomy.

MBOT.CC.P.1.206 Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab-II

- 1. Gymnosperms: Comparative study of the vegetative, reproductive parts and Anatomy of the following: Zamia, Araucaria, Cedrus, Thuja, Ginkgo and Taxus.
- 2. Palaeobotany: Lyginopteris, Medullosa, Ptilophyllum and Glossopteris.
- 3. Embryology: Study of embryology by specimens and slides.
 - a) T.S. of anther.
 - b) Study of ovules by hand section.
 - c) Globular embryo
 - d) Mature embryo
 - e) Polyembryony
 - f) Pollen viability.

References

- 1. Chamberlain, C.J. Gymnosperms: Structure and evolution
- 2. Sporne K. R: The Morphology of Gymnosperms.
- 3. Vashistha, P.C. 1978: Gymnosperms.
- 4. Foster & Gifford. Comparative Morphology of Vascular Plants
- 5. Delevoryas, T.1963. Morphology and evolution of Fossil Plants
- 6. Arnold C.W. introduction to Paleobotany
- 7. Shukla & Mishra: Essentials of Paleobotany
- 8. Steward, W.N. 1988: Paleobotany & Evolution of plants
- 9. Sergeiv, Moyen: Fundamentlis of Paleobotany 1098
- 10. Taylor, T.N. 1981. Introduction to Fossils

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M.Sc. BOTANY- II SEMESTER

MBOT.CC.T.1.203 (CORE)

4 Hrs/week 4 Credits

Paper: III Plant Anatomy and Palynology

UNIT-I

- 1. Introduction, importance and relationships of Plant Anatomy
- 2. Shoot Development:
 - a) Recent views on organization of shoot Apical Meristem and types of vegetative shoot apex in Gymnosperms and Angiosperms.
 - b) Cytological zonation Anneaun initial and Meristem :c) d' attente
 - d) Sub-apical differentiation of tissues.
- 3. Root Development:
 - a) Organization of root apex and significance of Quiscent center
 - b) Recent experimental studies on differentiation of tissues.
- 4. Leaf: Structure with reference to C3 and C4 plants Kranz and CAM Syndrome.

UNIT-II

- 5. Epidermology:
 - a) Structural composition of Epidermal cells, stomata and trichomes
 - b). Epidermal cell complex Structure, orientation and arrangement
 - c). Stomatal complex—Basic structure with reference to subsidiaries and ultrastructure of guard cells. Ontogeny of Paracyctic, diacytic, and anisocytic stomata.
 - d) Trichome complex-Basic structure with reference to foot and body. Classification of trichomes.
- 6. Transfer cells: Structure, distribution, ontogeny and function.

UNIT-III

- 7. a). Secondary growth with reference to Dicot stem:
 - b) Significance of Dicots wood anatomy.
 - c). Morphology and arrangement of Vessels, Axial Parenchyma Fibres and Ray parenchyma and their value in wood identification.
- 8. Salient features of the following woods.
 - a). Tectona grandis
 - b) Terminalia tomentosa
 - c). Shorea robusta
 - d) Pongamia pinnata

UNIT - IV

- Palynology:
 - a). Introduction and scope of palynological science.
 - b). Pollen preparation, pretreatment, acetolysis.
 - c). Morphology of pollen Polarity, symmetry, size and shape, apertural pattern, exine stratification and ornamentation of pollen wall.
- Aeropalynology principles, dissemination, distribution of aerospora and meteorological factors. Monitoring of aerospora with air samplers; pollen and and spore allergy and clinical treatment.
- Melittopalynology and Bee botany pollen and nectar collection by Honey bees Importance of melittopalynology.
- 12. Role of Palynology in Taxonomy

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M.Sc. Botany III Semester CBCS

Common paper

MBOT.CC.T.2.301

(CORE)

4 Hrs/week 4 Credits

Paper-I: Cell Biology, Genetics and Biostatistics

UNIT-I

1. Brief account of DNA replication and transcription. Introns and exons.

3. Brief study of regulation of gene expression in prokaryotes (Lac-operon) and eukaryotes (promoters, transcription factors and enhancers).

 Overview of cell cycle. Control mechanisms: role of cyclins and cyclin-dependent kinases. Apoptosis and Programmed cell death.

UNIT-II

Mutations: Gene mutations (substitutions and frame-shift mutations), Chromosomal aberrations (structural), Transposon-induced mutations; Site-directed mutagenesis.

6. Brief study of DNA damage and repair mechanisms

7. Inherited human diseases: Haemophilia and Sickle cell Anaemia. Gene therapy

8. Brief account of Proto-oncogenes, oncogenes and tumor suppressor genes.

9. Mendelian inheritance. Gene interaction (12:3:1; 9:3:4; 9:7 ratios).

10. Linkage and chromosome mapping in eukaryotes

UNIT-III

11. Extra nuclear inheritance: Cytoplasmic male sterility

12. Hardy-Weinberg Law. Gene pool, Gene frequency and genotype frequency

13. Brief account of plant tissue culture, micropropagation and Transgenic plants.

14. Overview of recombinant DNA technology. Gene cloning, genomic / cDNA libraries, restriction mapping, blotting methods, polymerase chain reaction and DNA fingerprinting.

15. Brief overview of plant breeding methods: Conventional, mutation breeding, QTLs and MAS.

HNIT -IV

13. Basic concepts of gene sequencing, genomics, proteomics and Bioinformatics.

14. Mean, Variance, Standard deviation and Standard error.

15. Chi-square and Student's "t" test. Probability distribution (Binomial, Poisson and Normal).

16. Introduction to computers. Use of Word and PowerPoint in the preparation and presentation of documents. Use of Internet and World Wide Web in research.

MBOT.CC.P.2.305 Practicals (Labs)

Practical Paper-I (Common)

- ('ytological Squash preparation of onion root tips to study mitosis.
- 2. Problems in Genetics:
 - Mendelian inheritance and gene interaction.
 - Chromosome mapping in eukaryotes
 - Population Genetics
- 3. Problems in Restriction mapping of plasmids.
- Problems in Biostatistics:
 - Graphic representation of data: Histogram.
 - Mean, Variance, Standard Deviation and Standard Error.
 - Chi-square and Student's "t" test.
 - Problems on Probability.
- 5. Demonstration of Isolation of DNA from plants/Chicken spleen.
- Demonstration of plant tissue culture methods.
- Maintenance of Practical Record.

List of books recommended

- 1. A. K. Sharma and A. Sharma. 1990. Chromosome techniques. Butterworths. 1990 Ed.
- 2. E.D.P. De Robertis and E. M. F. De Robertis. 1987. Cell and Molecular biology8th Ed(Indian Ed
- 3. G. M. Cooper. 1997. The Cell and Molecular approach. ASM Press. Ed.
- 4. Strickberger. Genetics. 3rd Ed. 1990. Ed.
- 5. Snustad and Simmons. 1997. Principles of Genetics. Ed.
- 6. Benjamin Lewis. 1999. Genes VII.
- 7. Daniel Hartl. 1994. Basic Genetics. Ed.
- 8. Griffiths, Miller, Suzuki, Lewontin & Gelbert 1999 An introduction to Genetic analysis
- 9. Winter, Hicky and Fletcher. 1999. Instant notes in Genetics. Ed.
- 10. A.V.S.S. Sambamurthy. 1999. Genetics.
- 11. Ahluwalia. 1993Genetics.
- 12. P.K. Gupta. 1990. Genetics.
- 13. U. Sinha and S. Sinha. 1994. Cytogenetics, Plant Breeding & Evolution. Ed.
- 14. K. K. De. 1992. Plant tissue culture.
- 15. Narayanaswamy. 1994. Plant cell & tissue culture.
- 16. Y.P.S. Bajaj. 1986 to 1990. Biotechnology in Agriculture and Forestry. Vol. 1 to 16. Ed..
- 17. I. Vasil. 1995. Plant tissue culture. Vol. 1 to 4. Ed.
- 18. Watson, Gilman, Wittkowsky and Zoller. 1992. Recombinant DNA.
- 19. Shaw, G. M. 1988. Plant Molecular Biology. A practical approach. Ed.
- 20. Twyman. 1998. Advanced Molecular Biology.
- 21. Turner, Mclennon, Bates and White. 1999. Instant notes in Molecular Biology.
- 22. Primrose. 1999. Molecular Biotechnology.
- 23. Prathibha Devi. Principles & Methods in Plant Molecular Biology, Genetics & Biochemistry, Agrobios.
- 24. Purohit. S. S. 1999. Agricultural Biotechnology.
- 25. Stansfield. 1996. Theory & Problems in Genetics. Schaum's Series. McGraw & Hill.
- 26. Khan, I. A. and A. Khanum. 1994Fundamentals of Biostatistics
- 27. B. N. Mishra and K. K. Mishra. Naya Prakash. 1983. Introductory practical Biostatistics
- 28. Jain, v. k. Computers for beginners. PustakMahal.
- 29. Vikas Gupta, 2000. Rapidex computer course. Rapidex series.
- 30. Cynthia Gibas. O'Reilly & Assoc.2000. Developing Bioinformatics Computer skills.
- 31. Balasubramainan. Ed. Concepts in Biotechnology. Universities Press. 1996.
- 32. Deepak Bharihoke.2000. Fundamentals of Information technology.
- 33. Gralla. 2000. How the Internet works.
- 34. White.2000. How computer works.

M.Sc. BOTANY III Semester Common paper

MBOT.CC.T.2.302

Core

4 Hrs/week 4 Credits

Paper-II: Environmental pollution and protection

UNIT I

. Kinds of pollution, Air pollution-Sources of air pollution,

- 2. Major air pollutants, Primary and Secondary Pollutants stationary and mobile sources.
- 3. Effects of air pollutants on plants, human beings and materials, control of air pollution.
- 4. Noise pollution- sources, effects and control measures.
- 5. Acid rain- causes and effects on terrestrial and aquatic systems.

UNIT II

- 6. Water pollution- Sources, Effects and control of water pollution.
- 7. BOD, COD, Hardness of water, criteria of water quality.
- 8. Primarytreatment (Industrial wastewater) Segregation, equalization, neutralization, sedimentation, flotation and oil separation.
- 9. Secondary treatment (Biological treatment)- Principlesofbiologicaltreatment
- 10. Waste stabilization ponds, Aerated lagoons-Activated sludge process, Trickling filters.

UNIT III

- 11. Soil pollution Sources, effects and control measures.
- 12. Bioremediation- Insitu and Ex-situ bioremediation
- 13. Bioremediation of toxic metals.
- 14. Concept of Phytoremediation

UNIT IV

- 15. Classification of solid wastes, types and sources. Disposal methods,
- 16. Management of Muncipal waste,
- 17. Hazardous and Biomedical waste.
- 18. Environmental (protection) Act-1986

MBOT.CC.P.2.306 Practicals (Labs)

4 Hrs/ week 2 Credits

Practicals Common paper

- 1. Estimation of the following in water:
 - a. Total hardness
 - b. Calcium
 - c. Organic matter
 - d. BOD
- 2. Estimation of noise.

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- 3. Qualitative estimation of the following:
 - a. Solid waste
 - b. Coal
 - c. Fly ash
 - d. Sugarcane bagasse
 - e. Wood
 - f. Cow dung

REFERENCE BOOKS

- 1. MN Rao, McGrace Hill 1993 Air pollution
- C.S.Rao- Environmental Engineering and technology
- 3. S.P. Misra and Pandey- Essential Environmental Studies
- Y.Anjaneyulu- Introduction to Environmental Science.
- P.D.Sharma- Ecology and Environment
- 6. P.C.Santra-Environmental Science

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III SEMESTER

Specialisation: A:

Applied Mycology & Molecular Plant Pathology

M.Sc. BOTANY- III SEMESTER

MBOT.EC.T.2.303 /A

4 Hrs/week 4 Credits

Specialisation: Applied Mycology & Molecular Plant Pathology

Paper III - Principles of Plant Pathology

UNIT- I

- 1. Introduction: Terminology, Disease concept. Pathogenectiy and Koch's postulates; disease quantification, Traditional and image analysis.
- 2. Parasitism and Disease Development: Host range of pathogens, disease development, disease cycle, penetration (chemical and physical), colonization and dissemination of pathogens.
- 3. Host pathogen interaction: Chemical Weapons of pathogens (Enzymes, Toxins and Growth regulators).

UNIT- II

- 4. Changes in Host physiological functions due to pathogenesis:
 - Photosynthesis
 - Translocation of water and nutrients
 - Respiration
 - Permeability of membrane.
- 5. Nutrition and Physiology of plant pathogenic fungi:
 - · Carbon, Nitrogen, phosphorous and trace elements.
 - Physiology of spore dormancy and spore germination.

UNIT-III

- 6. . Host defense mechanisms: Structural defense, Hypersensivity, Physical barriers, Metabolic or Biochemcial defense, Phenols, Phytoalexins and induced enzymes.
- 7. Effect of Environment on Disease Development: Effect of Moisture, Temperature, Wind, Soil, pH and Host-plant nutrition.
- 8. Plant disease Epidemiology: Elements of epidemics, Measurement of Plant diseases, Patterns of epidemics and pathogens factors. Computer simulation of epidemics, Disease Forecasting.

UNIT- IV

Principles of Plant Disease Management

- 9. Quarantine
- 10. Cultural practices
- 11. Biological Methods
- Physical Methods
- 13. Chemical Methods:-
 - Classification of fungicides
 - Chemical nature, mode of action and methods of application of the following: Sulphur fungicides, Copper fungicides, Mercurial compounds, Quinones, Heterocyclic compounds, Oxanthiins. & Benzimidazoles and Miscellaneous fungicides.
- 14. Integrated Disease management- General account (importance and basic principles).

MBOT.EC.P.2.307/A Practicals (Labs) 4 Hrs/ week 2 Credits

Practical Lab (Special)

- 1.Diagnosis of plant diseases and proof of pathogenicity according to Koch's postulates.
- 2. Measurement of plant diseases- Disease scoring.
- 3. Calculation of spore count using Haemocytometer.
- 4. Observation of plant disease in the field,
- 5. Preparation of semi permanent slides of diseased material
- 6.Herbarium of diseased plants
- 7. Record.

Reference Books:

- 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
- 6. Cheet, I. 1993. Biotechnology in Plant Disease Control. Wilen-Liss, Inc.
- 7. Dennis Allsopp and Seal, K.J. 1986. Introduction to Biodeterioration. E Edward Arnold Ltd.
- 8. Frisvad, J.C. Bridge, P.D. Arora, D.K. 1998. Chemical fungal taxonomy Marcel and Dekker Inc.
- 9. Horsfall, J.G. & Cowelling. 1978. Plant Diseases An Advance Treatise Vol.
- II& IV Acad Press
 10. Ignacimuthu, S.J. 1996. Applied Plant Biotechnology. Tata Megrew –Hill Publ Company Ltd.
- 11. Mahadevan, A. 1991. Post infectional defense mechanisms. Today and Tomorrow's Printers and
- publishers
- 12. Mehrotra, R.S. 1991. Plant Pathology. Tata Mcgraw Hill Publishing Company Ltd.
- 13. Miles, P.G. and Chang, S.T. 1997. Mushroom Biology. World Scientific Publ. Company
- 14. Natish, S. Chopra, V.L. & Ramachandra, S. 1994. Biotechnology in Agriculture. Oxford and IBH Publishing Company

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15. Rajak, R.c?. 2000. Microbial Biotechnology for sustainable development and productivity. Scientific

publishers (India) Jodhpur

16. Roberts, S. Fritz & Elien. I. Simms. 1992. Plant Resistance to Herbivors and Pathogens (Ecology,

Evolutin and Genetics), University of Chicago Press.

17. Rudra P. Singh, Uma S. Singh & Keiisuke Kohmoto (eds.) 1995. Pathogenesis and host specificity in

plant diseases. Vol. III Pergamon Press.

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

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

20. Verma, A & Hock, B. 1999. Mycorrhizae. Springer Publishers

M.Sc. BOTANY- III SEMESTER

Specialization: Applied Mycology and Molecular Plant Pathology

MBOT.EC.T.2.304 / A

4 Hrs/week

4 Credits

Paper IV - Applied Mycology

UNIT-1

Diversity of Fungi

1. Diversity of Fungi - General account

2. Fungi in diversified habitats- soil, water and air.

- 3. Fungi on plant surfaces- Phyllosphere, Rhizosphere and Spermosphere
- 4. Keratinophilic fungi- Distribution, Isolation and economic importance
- 5. Biology of some important fungi: Saccharomyces, Aspergillus and Neurospora.
- 6. Isolation, identification, selection and strain improvement of some useful fungi.

UNIT - II-

Biofertilizers and Mushrooms

- 7. Glomeromycota- Recent trends in-mycorrhizal taxonomy
- 8. Isolation and multiplication of mycorrhizae; role in crop productivity and forestry.
- 9. Phosphate solubilizing fungi (PSF)
- General account of Oyster, white button, paddy straw, Morels, Truffles & Poisonous mushrooms.
- 11. Cultivation and economics of Agaricus bisporus, Pleurotus and Volvoriella
- 12. Medicinal and nutritional value of edible and poisonous mushrooms
- 13. Effect of environmental, nutritional and chemical factors on mushroom cultivation (intensive and extensive cultivation methods).
- 14. General techniques and their application in improving mushroom production (protoplast fusion, Dimon matings and sporeless mutants, breeding of high performing strains and germ plasm conservation).

UNIT-III

Fungi as biopesticides

- 15. Entomogenous fungi
- 16. Nematophagous fungi
- 17. Mycoherbicides
- 18. Fungi in plant disease control
- Selection, production and formulation of fungal biopesticides and commercial use of biocontrol agents
- 20. Exploitation of biocontrol agents by genetic manipulation.
- 21. Gene source from Trichoderma for GM crops.

UNIT-IV

Fungal Biotechnology

- Fermentation methods and biomass production of fungi, growth kinetics, fermenter systems scale up, fermentation processes.
- 23. Yeast genome genetic analysis of yeast; Baker's yeast, food and feed yeasts, Glycerol and adhesive, bio-polymer from yeasts.

- 24. General account of production and application of Industrial fungal enzymes (amylases, cellulases, pectinases and chitinases).
- 25. General account of production and application of primary metabolites (vitamins and proteins).
- 26 General account of production and application of secondary metabolites (antibiotics, mycotoxins, pigments and alkaloids).

Chandenwaln, K. 1986, introduction to Plant Pathology. Ammol Publishers and

9. Horsfull J.G. & Cowelling, 1978, Plant Discusses. An Advance Treatise Vot II &

la

Environmental and regulatory aspects of using genetically-modified microbes in the field.

MBOT.EC.P.2.308 / A Practicals (Labs) 4 Hrs/ week 2 Credits

Practical Lab- (Special)

- 1. Techniques of isolation of fungi: Dilution method, soil plate method, agar plate method and
- single spore isolation. 2. Collection, isolation and identification and of fungi from soil, litter, water, air, leaf, root and seed.
- 3. Isolation and identification of AM Fungi and estimation of root colonization.
- 4. Mushroom cultivation.
- 5. Demonstration of antagonistic fungi
- a) Antibiosis b) Competition c) Mycoparasitism
- 6. Estimation of organic acids in fungal culture filtrates.
- 7. Estimation of enzymes: Cellulases, Pectinases, Chitinases and Amylases.
- 8. Estimation of sugars, proteins and amino acids in fungal mycelium and culture filtrate.
- 9. Record

Reference Books:

- 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
- 6. Cheet, I. 1993. Biotechnology in Plant Disease Control. Wilen-Liss, Inc.
- 7. Dennis Allsopp and Seal, K.J. 1986. Introduction to Biodeterioration. E Edward Arnold Ltd.
- 8. Frisvad, J.C. Bridge, P.D. Arora, D.K. 1998. Chemical fungal taxonomy Marcel and Dekker Inc.
- 9. Horsfall, J.G. & Cowelling. 1978. Plant Diseases An Advance Treatise Vol. II& IV Acad Press
- 10. Ignacimuthu, S.J. 1996. Applied Plant Biotechnology. Tata Megrew -Hill Publ Company Ltd.
- 11. Mahadevan, A. 1991. Post infectional defense mechanisms. Today and Tomorrow's Printers publ
- 12. Mehrotra, R.S. 1991. Plant Pathology. Tata Mcgraw Hill Publishing Company Ltd.
- 13. Miles, P.G. and Chang, S.T. 1997. Mushroom Biology. World Scientific Publ. Company

14. Natish, S. Chopra, V.L. & Ramachandra, S. 1994. Biotechnology in Agriculture. Oxford and IBH

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

16. Roberts, S. Fritz & Elien. I. Simms. 1992. Plant Resistance to Herbivors and Pathogens (Ecology,

Evolutin and Genetics), University of Chicago Press.

17. Rudra P. Singh, Uma S. Singh & Keiisuke Kohmoto (eds.) 1995. Pathogenesis and host specificity in

plant diseases. Vol. III Pergamon Press.

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

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

20. Verma, A & Hock, B. 1999. Mycorrhizae. Springer Publishers

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III SEMESTER

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Specialization: 8:

Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

M.Sc. BOTANY- III SEMESTER

Specialization: Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

MBOT.EC.T.2.303 / 3

4 Hrs/week 4 Credits

Paper-III: Biodiversity of Angiosperms

UNIT -I

- 1. Concept of Biodiversity, its origin and development
 - a) Definition b) Past history c) Ranks recognized in Biodiversity studies, taxonomy and others d) Keystone taxa.
- 2. Aims and objectives of Biodiversity
- 3. Characterization of Biodivieirsity
- a) Levels of Biodiversity b) Measurement of Genetic diversity, species diversity and community diversity.

- 4. Magnitude and Distribution of Biodiversity
 - a) Current magnitude of Global Biodiversity
 - b) Botanical regions and Hot spots
 - c) Distribution of Biodiversity
 - d) Endemism and Biodiversity
- 5. Degeneration Maintenance and Loss of Biodiversity
 - a) Diversification of species
 - b) Ecological extinctions
 - c) Proximate causes

- 6. Inventorying, Monitoring and Assessment of resource base for Biodiversity
 - a) Inventorying: Definition, purpose, orientation, completeness and intensity. Indicator selection for Biodiversity inventory.
 - Monitoring of Biodiversity at different biological levels: Genetics, Population level and Species level; Species turnover in Ecosystems-Landscape levels.
 - b) Monitoring:
 - Definition, purpose, orientation, completeness and intensity
 - Monitoring in marine environment and freshwater ecosystems. Long-term monitoring of
 - c) Inventorying and monitoring for conservation: RAMSAR convention, sites, Red data (books and lists).
- 7 Biotechnology and Biodiversity
 - a) Assessment and use of molecular DNA data on Biodiversity
 - h) Application of Biotechnology for the utilization of Biodiversity

- 8 Economic value and utilization of Biodiversity with reference to the following taking five examples for each: a) Food b) Fodder c) Fibre d) Oils e) Drugs f) Timber g) Rubber h) Spices I) Essential oils j) Gums and Resins k) Insecticides and Pesticides I) Ornamentation
- 9. A brief account of origin of cultivated plants
- 10. Biodiversity convention: a) Initiative from UN b) Rio Conference c) Recent efforts

- 11. Conservation of Biodiversity
 - a) in-situ conservation
 - b) ex-situ conservation

MBOT.EC.P.2.307/Q

Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab- (Special)

- 1. Interpretation of Biodiversity and vegetation based on the data provided
- 2. Comparison of floristic elements of Biodiversity in published Floras:
 - a) Comparison of ten dominant families in different Floras
 - b) Genetic diversity (number of Genera)
 - c) Ten dominant Genera
- 3. Comparative study of species diversity of different Genera from published Floras (Jaccard index
- Coefficient). The student should be provided data on specific Genera represented in the relevant Floras.
- 4. Field study Record and Field Note Book.

Reference

- 1. Global Biodiversity assessment Heywood, V.H. and Watson, RT Ed. 1995.
- 2. Biodiversity measurement and estimtioin.Ed. Hawksworth. Chapman & Hall, 1995.
- 3. Biodiveirsity and eecosystem function.Ed.B7 Schulze, ED and Mooney,
- 11A Springer Verlag. NY. 1996.
 4. Functional roles of Biodidversity: A Global Perspective. Mooney, HA, Cushman, JH, Miduo, E, Sale, OE and Schulze, ED. 1995.
- 5. Biodiversity prospecting: Using Genetic resources for suitable development. Reid et al. WRI, USA,
- 6 Conserving Biodiversity for suitable development, Ramakrishnan, AK.Das and Saxena INSA, N.Delhi. 1995.
- 7. Biodiversity and Forest Genetic Resources. D.N. Tewari. International Book Distrib. Dehradun
- 8. Biodiversity and its conservation in India S.S. Negri. 1996.
- 9 Biodiversity in Managed landscapes. Theory and practice. R.C. Szatro and D.W. Johnston. Oxford University Press. 1996.
- 10. General Ecology. HD. Kumar. Vikass Publ. House Pvt. Ltd. 1995.
- 11 Global Biodiversity. Trivedi.
- 12. Biodiversity. Agarwal K.C.
- 13 Kumar, U Biodiversity
- 14. Navadanya The Biodiversity convention to its impact on III World.

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M.Sc. BOTANY- III SEMESTER

Specialization: Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

MBOT.EC.T.2. 304/B

4 Hrs/week 4 Credits

Paper-IV: Cultivation and Post-harvest technology of Medicinal Plants

- 1. Introduction: Origin, development and evolution of Medicinal Botany
- 2. Importance of active principles and uses of medicinal plants in different traditional systems of medicine and Allopathy

UNIT-II

- 3. Origin, Historical background. Active principles uses and cultivation practices of the following medicinal plants a) Andrographis paniculata b) Asparagus racemosus c) Bacopa monnieri d) Coleus forskohlii e)Rauwolfia serpentina f)Withania somnifera
- 4. Origin, Historical background, Active principles uses and cultivation practices (including organic farming) of the following aromatic plants: a) Lemon grass (Cymbopogon flexuosus) b)Citronella c) Palmarosa d) Eucalyptus citriodora

UNIT-III

- 5. Post-harvest Management of Medicinal plants: Drying / Distillation, grading, packing and storage
- 6. Distillation of aromatic plants: a) Description of distillation UNIT s b) Principles of distillation c) Methods of distillation d) Maintenance and precautions for distillation UNIT's se) Yields and recoveries of different aromatic plants

UNIT-IV

- 7. Conservation of Medicinal Plants; Threatened and endangered Medicinal Plants in-situ and ex-situ conservation
- 8. Preparation of Crude drugs in different systems of medicine
- 9. Financial aspects of medicinal plants: a) Loans b) Subsidies
- 10. IPR Patents

Reference

- 1. Cultivation of medicinal and aromatic crops by Farooqui and Sreeramulu..Univ. Press
- 2. Textbook of Pharmacognosy by Young Ken Heber W and Young Ken
- 3. Pharmacognosy of indigenous drugs by K. Raghunathan and Roma Mitra
- 4. Pharmacognosy- Kokate et al
- Pharmacognosy- Mohammed Ali
- 6. Pharmacognosy- Wallis
- 7. Pharmacognosy- Trease & Evans-1996
- 8. Pharmacognosy- Shaw and Quadri
- 9. Pharmacognosy- Tyler, Brady and Robbins
- 10. Cultivation of Medicinal plants-Purohit & Vyas CBS, 2006
- 11. Introduction to Medicinal Chemistry (12996). Aler Gingauz. Wiley publications.
- 12. Medicinal Chemistry (2001). Graham L. Patrick. Oxford University Press

MBOT.EC.P.2.308/Q

Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab- (Special)

1. Germination studies and nursery management of medicinal and aromatic plants.

2. Organoleptic and Microscopic analysis, identification and adulteration check of the following crude drugs.

a)	Leaf drugs	Cassia augustifolia
b)	Root drugs	Rauwolfia serpentina vs. R. tetraphyla
c)	Bark drugs	Hollahrena pubiscente vs Wrightia tinctoria
d)	Flower drugs	Saffron-vs Safflower
e)	Whole plant drugs	Catharanthus roseus

 Histochemical identification of the following chemical substances: a) Carbohydrates b)Proteins, c)Amino acids d)Starch e)Tannins f)Enzymes

4. Histological identification of tissue systems and deposits a)Epidermis, b)Parenchyma, c)Collenchyma, d)Phloem, e)Xylem, f)Crystals etc.

5. Estimation of oil content in aromatic crops (Clevenger apparatus) and GSC analysis of oil samples for identification of major compounds.

1. Record

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DEPARTMENT OF BOTANY

III Semester

Inter-Disciplinary Paper

2 Hrs / Week 2 Credits

Paper-V: Principles of Horticulture and Plant breeding

Unit-I

- 1. Importance and propagation of horticultural plants:
 - a. Propagation through seeds.
 - b. Propagation through cuttings i.e., leaf, stem and roots.
 - c. Grafting- normal and special grafting procedures.
- Micropropagation of horticulture plants for mass-production.
- 3. Nutrient management: General account of chemical fertilizers and biofertilizers.
- 4. Disease and pest management of horticultural plants:
 - a. Identification and Symptoms
 - b. Remedies and Control measures

Unit-II

- 5. Plant breeding objectives. Traits of interest for field crops, fruits and vegetable crops (yield, duration, adaptability and tolerance / Resistance to Biotic and Abiotic stresses.
- 6. Selection. Back cross breeding and usefulness of marker-assisted selection.
- 7. Development of commercial hybrids. Heterosis.
- 8. Mutation breeding. Induced polyploidy in plant breeding. Transgenic technology: Bt-Cotton.

References:

- 1 Plant propagation (Principles and practices) Hartman, Kester, F. T Davies, R. Genene
- 2 Horiculture in India T.K. Bose
- 1. Principles of horticultural science Janick
- 1 Commercial flowers Vol. I & T.K. Bose, Yadav, P. Pal, P.Das, V.A. Parthasarathy.
- 5. Floriculture in India Randhawa and Mukhopadhyaya Allied Publishers.
- 6. Biotechnology and its application in horticulture S.P. Ghosh-Narosa Publishers.
- 7. Agricultural dairy- published by Agriculture Department A.P. 2013
- 8 Horticulture dairy- Horticulture Department A.P. 2013.
- 9. Field Crops research. By Poehlman.
- 10. Genetics by Sambamurthy.
- 11.Plant breeding by Allard.
- 12.Plant breeding by Randhawa 13.Pl ant Tissue Culture-Protocols in Plant Biotechnology by MC Gayathri & R.K.Kavyashree-Narosa Publ.

MBOT.CC.T.2.401

(CORE)

4 Hrs/week 4 Credits

Paper-I: Ecology and Phytogeography (common paper)

UNIT I

1. The Environment: Physical environment; biotic and abiotic interactions.

2. Habitat and Niche: Concept of habitat and niche; Niche width and overlap; Fundamental and realized niche; Resource partitioning; Character displacement- Allopatric and Sympatric.

3. Ecosystem Ecology: Ecosystem structure and function; Food Chain, Food Web, Energy flow and Mineral cycling (C,N); Primary production and Methods of measurement of primary productivity;

UNIT II

4. Population Ecology: Characteristics of a population (Density, Natality, Mortality, Dispersion Population size, Age structure, Life tables); Population growth curves; Population regulation; life history strategies (r and K selection);

5. Species Interactions: Types of Interactions, Positive interactions- Mutualism, Symbiosis,

commensalism, Protocooperation.

Negative interactions - Exploitation, Herbivors, Carnivors, antibiosis, competition.

UNIT III

- CommUNIT y Ecology: Characteristics of commUNIT ies Analytical Quantitative Frequency, density, Abundance, Cover and Basal area. Qualitative - Physiognomy, Phenology, Stratification, sociability, vitality and Life form and Synthetic - Prensence and constance, Fidelity Dominance.); Raunkiaer concept; Levels of species diversity and its measurement; Ecotones. Biodiversity: Monitoring; Hotspots (with reference to India), Major drivers of biodiversity change;
- Ecological Succession: Types; mechanisms; Changes involved in succession;
- Concept of climax- Monoclimax and Polyclimax theories.

UNIT IV

10. Biogeography: Plant distribution, Theory on plant distribution (Age and area theory, Theory of tolerance), Major terrestrial biomes; Biogeographical zones of India. Classification of climate -Koppens and Thornthwaites classification.

11. Applied Ecology: Pollution -Global environmental change -Atmosphere composition and structure

Green house gases, Global warming, Ozone depletion.

12. Conservation Biology: Principles of conservation In situ - Protected areas, National parks, Wildlife sanctuaries, Biosphere reserves and Project tiger. Ex situ - Botanical gardens, Zoological parks and cryopreservation.

MBOT.CC.P.2.405 Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab-I (Common)

1. Determination of quantitative characters by random quadrat method -Abundance, Density ,Frequency ,IVI and Dominance: Similarity And Dissimilarity Index

2. Estimation of Carbonates , Bicarbonates , Chlorides and Dissolved Oxygen

3. Morphology And Anatomy of Hydrophytes and Xerophytes And their Adaptations

4. Maintenance of Practical records

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Reference books

- 1. E.P. Odum 1996 Fundamentals of ecology
- 2. E.J Koromondy .1996 Concept of Ecology
- 3. P.D Sharma . 1996 Ecology and environment
 4. S.P. Misra .S.N. 2010 Pandey Essential Environmental studies
- 5. N.S Subrahmanyam and Sambamurty 2000 Ecology

M.Sc. BOTANY- IV SEMESTER Common Paper

MBOT. CC.T.2.402

core

4 Hrs/week4 Credits

Paper-II . Plant Molecular Biology

UNIT-I

- 1. Overview of Plant Molecular Biology and Biotechnology.
- 2. Plant tissue culture, culture media and culture techniques. Totipotency and cyto-differentiation.
- 3. Micropropagation, Somatic embryos, Synthetic seeds and Somaclonal variation. *In vitro* production of secondary metabolites.
- 4. Brief account of anther culture and haploidy. Isolation and fusion of protoplasts.

UNIT-II

- 5. Recombinant DNA technology. Biosafety measures. Intellectual property rights and Patents.
- 6. Vectors, Restriction endonucleases and DNA ligases. Gene cloning, genomic and cDNA libraries. Detection and isolation of a gene within a library by immuno-detection of proteins and nucleic acid (colony) hybridization.
- 7. Southern, northern and western blotting. Restriction fragment length polymorphisms (RFLPs) and DNA Fingerprinting. RNAi technology, Gene knockout technology.

UNIT-III

- 8. Genetic engineering for production of transgenic plants: *Agrobacterium* and microprojectile gun mediated methods of gene transfer, Genetic transformation of chloroplasts. Hairy root cultures. Status of transgenic plants in India.
- 9. Sanger's method of DNA sequencing. Human genome project. Brief account of chemical synthesis of genes.
- 10. Importance of cryopreservation and germplasm storage.

UNIT-IV

- 12. Polymerase Chain reaction. Brief account of molecular markers: Randomly Amplified Polymorphic DNA (RAPD), Amplified length fragment polymorphism (AFLP), Simple Sequence Repeats (SSR) and Expressed sequence tags (ESTs).
- 13. Mapping of quantitative trait loci (QTLs) and marker-assisted selection.
- 14. Applications of Biofertilizers, Biopesticides, Single cell protein and Biodiesel.
- 15. Microbial production of vitamins, organic acids and alcohols.

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Practical Lab- Common

- 1. Preparation of stock solutions and tissue culture medium (MS medium).
- 2. Plant tissue culture for callus induction, somatic embryogenesis, shoot regeneration and rooting.
- 3. Preparation of synthetic seeds with somatic embryos.
- 4. Enzymatic isolation of protoplasts from leaves.
- 5. Estimation of RNA by Orcinol method.
- 6. Scoring of RFLP maps.
- 7. Study of Biofertilizers and Biopesticides
- Problems on restriction mapping.
- Maintenance of Practical Record.

References

- 1. Y.P.S. Bajaj. Biotechnology in Agriculture and Forestry. Vol. 1 to 16. 1986-1990.
- 2. I. Vasil. Plant tissue culture. Vol. 1 to 4. Ed. I. Vasil. 1993.Ed.
- 3. Balasubramainan. Concepts in Biotechnology.. Universities Press. 1996. Ed.
- 4. Prathibha Devi. Principles and methods in Plant Molecular Biology, Genetics and Biochemistry. Agrobios Publ. 2000. Ed.
- 5. S.S. Purohit . Agricultural Biotechnology.. 1999.Ed.
- 6. H. D. Kumar . Biotechnology.. 1992. Ed.
- Trehan. Biotechnology. 1994.Ed.
- 8. K. K. De Plant tissue culture.. 1992.Ed.
- 9. Narayanaswamy. Plant tissue culture. 1994.Ed.
- 10. Smith, R.H. 2000 Plant Tissue Culture: Techniques & Experiments Acad PressN.Y.
- 11. Snustad and Simmons. 1997. Principles of Genetics. Wiley.
- 12. Watson, Hopkins, Roberts, Steitz & Weiner1987. Molecular Biology of the gene.
- 13. Watson, Gilman, Wittkowsky and Zoller. 1992. Recombinant DNA.
- 14. Benjamin Lewis. 1999. Genes VII.
- 15. Cooper, G.M. 1999. The Cell and Molecular approach. ASM Press.
- 16. G. M. Shaw.1988.Ed Plant Molecular Biology. A practical approach.
- 17. Sambrook, J., Fritsch, E. F., and Maniatis, T. 1989.&2000. Eds. Molecular Cloning: A lab manual. 2nd ed. 3 Vols. Cold Spring Harbor Lab, N.Y.
- 18. Davis, L, Kuehl and Battey. 1994. Basic methods in Molecular Biology.
- 19. Twyman, 2000. Advanced Molecular Biology.
- 20. Turner, Mclennon, Bates and White. 1999. Instant notes in Molecular Biology.
- 21. Friefelder. Molecular Biology. 1990. Ed.
- 22. M. A. Hughes Plant Molecular Genetics..
- 23. Primrose.Molecular Biotechnology. 2nd Ed. 1999.Ed.
- 24. P.K. Gupta. Biotechnology. 1996. Ed.
- 25. Glick, B.R. and Thompson, J.E. Methods in Plant Molecular Biology and Biotechnology. 1993. CRC Press, Boca Raton, Florida.

IV SEMESTER

Specialization: A:

Applied Mycology and Molecular Plant Pathology

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Specialization Applied Mycology and Molecular Plant Pathology

MBOT.EC.T.2.403/ A

4 Hrs/week 4 Credits

Paper III - Molecular Plant Pathology

UNIT- I

Introduction Techniques and Information Technology

- 1. Introduction to Molecular Plant Pathology
- Molecular techniques in plant pathology, RFLPs, RAPDs, polymerase chain reaction (PCR, RTPCR) - Analysis of PCR products and serological techniques based on immunofluorescence, chromosome karyotyping.
- 3. Fungal protoplasts and Vegetative compatibility groupings.
- 4. Information Technology in Plant Pathology: Plant disease clinics; use of database and application of Bioinformatics in plant pathology- a general account.

UNIT- II

Plant Pathogen Interactions

- 5. Recognition: Early events, Adhesion, spore eclosion, adhesion of germ tubes and hyphae factors affecting adhesion, hydrophobins.
- Elicitiors: Distribution, production and nature, fungal wall elicitors (carbohydrates and glycoprotein elicitors) elicitors from plant cell walls, microbial enzyme elicitors, mode of action and diverse plant defense mechanisms.
- 7. Signal Transduction: Intracellular signals, short distance intercellular signals and systemic signals.
- 8. Second Messengers: Calcium ion and Calcium dependent enzymes, cyclic AMP, Proteins, H2O2 and Ethylene.
- Systemic Signal Molecules: Oligogalacturonides, Salicylic acid, Systemin, Jasmonic acid and Lypoxygenases.

UNIT- III

Genetics of Plant Pathogen Interactions

- 1. Genetics of Plant Disease:
- Basic features of sexual reproduction; Fungal nucleus; Gene organization
- 3. Genes and disease; Variability of organisms (Mutation, Heterokaryosis and Parasexuality).
- 4. Physiological Specialization, origin of races, concept of biological forms.
- Molecular variability of fungal pathogens.
- 15. Genetics of virulence in pathogens: Genes involved in pathogenesis; Virulence by pathogens; brief account on plant pathogenic genes in fungi, bacteria and viruses.
- 16. Types of plant resistance to pathogens:
 - i) Non-host resistance, True resistance (Vertical and Horizontal resistance).
 - ii) Apparent resistance, Gene-for-gene concept, Flor's concept, Breeding resistant varieties.

UNIT- IV

Pathogen Ingress and Plant Resistance

- 17. Plant defense responses: Generation of signals Local and systemic responses, fungal resistance genes in plants, defense genes and fungal avirulence genes.
- 18. Plant Immunization: Systemically acquired resistance (SAR) Chemical inducers of plant resistance and Pathogenesis related proteins (PRPs).
- 19. Strategies for cloning plant resistance genes: Vector mediated transformation, Alternative

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transformation methods and Identification of transformants.

- 20. Engineering resistance against fungal and viral pathogens: Coat protein mediated resistance (CPMR) and antisense genes and gene silencing.
- Antifungal and antibacterial strategies: Candidate genes to combat microbial pathogens (Chitinase, Thionine, Permatins, Lysozymes and Lectins) and antifungal proteins (Ribosome inactivating proteins-RIPs).

MBOT.EC.P.2.407 /A

Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab- (Special)- A

- 1. Isolation and separation of fungal nucleic acids and proteins by gel electrophoresis.
- 2. RFLPs of fungal nucleic acids and RAPDs of fungal DNA.
- 3. Amplification of Fungal DNA by PCR.
- 4. Fungal Protoplast isolation.
- 5. Elaboration of phytoalexins by TLC methods.
- 6. Record and Herbarium of diseased plants.

Reference Books:

- 1) Agrios, G.N. 1999, Plant Pathology. Academic press.
- Alexander, N. Glazer & Hiroshi Nikaido, 1995. Microbial Biotechnology, W.H. Freeman and Company.
- Bau, A.N. & Giri, B.K. 1993. The essential of viruses, vectors and plant diseases. Wiley Eastern Limited.
- 4) Bernard R. Glick & Jack J. Pasternak. 1996, Molecular Biotechnology, Panima Publishing Company.
- 5) Bridge, P., Jeffriens, P. and Morse, D.R., 1998, Information technology, plant Pathology and Biodiversity, CAB international Publications.
- 6) Bridge, P.D. 1995, Molecular Variability of Fungal Pathogens, CABI Publ.
- 7) Bridge, P.D., Arora, D.K., Reddy, C.A. & Elander, R.P. 1998. Applications of PCR in Mycology,
- 8) Callow, J.A. 1983. John Wiley & Sons, Biochemical Plant pathology.
- 9) Chandanwala, K. 1986 Introduction of Plant pathology Anmol Publications Pvt. Ltd. New Delhi.
- 10) Dubey, R.C. 1995. A Text Book of Biotechnology, S. Chand & Company Ltd.
- Greg J. Boland & Kuykendall, L.D. 1998. Plant Microbe Interactions and Biological Control. Marcel Dekker Inc.
- 12) Gurr, S.J. & Mc. Pherson, M.J. & Bowles, D.J. 1992. Molecular Plant Pathology, Vol. I & II Oxford
- 13) Horst w. Doelle, 1994, Microbia Process Development, World Scientific
- 14) Marshall, G. & Walters, D. 1994 Molecular Biology in Crop Protection, Chapman & Hall.
- 15) Mehrotra, R.S. 1991 Plant pathology, Tata Megrew Hill Publishing Comp Ltd.
- 16) Natish, S. Chopra, V.L. & Ramachandran, S. 1994. Biotechnology in Agriculture Oxford and IBH Publishing Company.
- 17) Natish, S., Chopra, V.L. & Ramachandran, S. 1994 Biotechnology Agriculture Oxford and IBH Publishing Company.

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Specialization Applied Mycology and Molecular Plant Pathology

MBOT.EC.T.2.404 /A

4 Hrs/week 4 Credits

Paper IV - Plant Diseases

UNIT- I

- 1. Introduction and History of Plant Pathology
- 2. Classification of plant diseases: Symptomology of Fungal, Bacterial, Viral and Phytoplasmal
- 3. Plant diseases caused by Phanerogamic plant parasites- Loranthus, Orobanche, Striga and Cuscuta.
- 4. Nematode disease Root knot of tomato caused by Meloidogyne
- 5. General account of post-harvest fungal diseases of food crops, fruits and vegetables and their management.

UNIT- II

Plant diseases caused by Bacteria, Viruses, Viroids, Phytoplasma and Spiroplasmas

- 6. Plant diseases caused by Bacteria:
 - a) Wildfire of Tobacco
 - b) Angular leaf spot of Cotton
 - c) Leaf spot of Mango

- d) Wilt of Potato
- e) Wilt of Tomato

- f) Soft rot and Scab of Potato
- 7. Plant diseases caused by Viruses & Viroids:
 - a) Bhendi vein clearing
 - b) Papaya leaf curl
 - c) Bunchy top of Banana
 - d) Rice Tungro

- e) Bud necrosis of Groundnut
- f) Bean common mosaic
- g) Potato spindle tuber
- 8. Plant diseases caused by Phytoplasmas and Spiroplasmas:
 - a) Grassy shoot of Sugarcane
- c) Sandalwood spike

b) Little leaf of Brinjal

d) Sesamum phyllody

UNIT- IH

Fungal Diseases of Cereals, Plantation crops, Pulses and Oil Seeds

- Cereals:
 - Bakanae disease of Rice a)
 - Sheath blight disease of Rice b)
 - Loose smut of Wheat c)
 - Karnal bunt of Wheat d)

- Grain smut of Sorghum
- f) Loose smut of Sorghum
- g) Downy mildew of Bajra
- h) Common smut of Maize

- 10. Plantation crops:
 - a. Coffee Rust
 - Blister blight of Tea
 - Stem rot of Rubber
- Pulses and Oil Seeds:
 - a) Pigeon pea Wilt

b) Chick pea Blight

- c) Rust of Groundnut d) Sunflower Rust
 - e) Linseed Rust n Coconut Bud rot

UNIT- IV

Fungal Diseases of Fruits, Vegetables and Cash crops

- Fruits:
 - Downy mildew of Grapes
 - b) Powdery mildew of grapes
- Mango Anthracnose
- d) Citrus Gummosis

- Vegetables:
 - a) Powdery mildew of Cucurbits
 - b) Leaf spot of Tomato
- c) Leaf spot of Brinjal
- d) Club root of Crucifers
- e) Chilli Die-back

- 14. Cash crops:
 - a) Whip smut of Sugarcane
 - b) Cotton Wilt
 - c) Damping off of Tobacco
 - d) Black Shank of Tobacco
 - e) Turmeric Leaf spot

MBOT.EC.P.2.408/A Practicals (Labs) 4 Hrs/ week 2 Credits

Practical Lab- (Special)- A

- 1. Plant disease diagnosis by studying symptoms in the field
- 2. Preparation of semi-permanent slides of diseased material, eg. Leaf spots, blights, mildews, rots, wilts, rusts and smuts.
- 3. Micrometry and standardization of microscope.
- 4. Measurement of fungal spores and mycelium and camera Iucida drawings
- 5. Herbarium of diseased plants
- 7. Record

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IV SEMESTER

Specialization: 2:

Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

Specialization: Specialization: Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

MBOT.EC.T.2.403 /B

4 Hrs/week

4 Credits

Paper-III: Taxonomy of Angiosperms and Ethnobotany

UNIT-I

- 1. Method to describe a new Taxon with reference to Genus and species
- 2 Contribution of the following to the growth of Taxonomy a) R.M.T. Dahlgren b)R.F. Thorne c) Kubtizki
- 1 Plant identification taxonomic keys

UNIT-II

- 4. Role of the following institutions in the growth of Taxonomy a)Botanical Survey of India, India
 - b) Kew Gardens, London, UK
 - c) Smithsonian, Institutions, Washington, D.C., USA
- 5 Floral diversity in a) Annonacease b)Malvaceae c)Apocynaceae
 - d) Asclepiadaceae e) Hydrocharitaceae f) Lemnaceae

UNIT-III

- 6. Taxonomy of the following significant families
 - a) Nymphaceae (Sensu stricto and Sensu lato)
 - b) Euphorbiaceae with emphasis on its role in modern economy
 - c) Podostemaceae
 - d) Musaceae
 - e) Arecacae
- 7 Seed Morphology: external features
 - a) Embryo, Endosperm, Seed coat anatomy
 - b) Corner's classification and its role in taxonomy

UNIT-IV

- H 1 thnobotany: Concept, scope and objectives
- 9 Ethnobotany as an inter-disciplinary science. The relevance of
- I thnobotany in the present context. Methodology of ethnobotanical studies
- a) Field work b) Herbarium c)Ancient literature d)Archaeological findings e)Temples and sacred groves
- 10 Plants Vs. Tribal Life: a)Food plants and Food cycles b)Intoxicants and Beverages c)Ropes and Bindings materials d)Resins and oils e)Poisons as baits
- 11 Role of ethnobotany in modern medicine with special examples

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Practical Lab- (Special)- B

- 1. Study of the following locally available taxa (living sand herbarium) belonging to:
 a) <u>Cleome</u> b) <u>Cassia</u> c) <u>Sida</u> d) <u>Indigofera</u> e) <u>Euphorbia</u> f) <u>Corchorus</u> g) <u>Tephrosia</u> h) <u>Phyllanthus</u> i) <u>Brachiaria</u> j) <u>Ipomoea</u>
- Identification of key characters of species of above genera and construction of keys

3. Study of the seed morphology of the following:

- a) <u>Cleome</u> b) <u>Gossypium</u> c) <u>Calotropis</u> d) <u>Annona</u> e) <u>Cyperus</u> f) <u>Oryza</u> g) <u>Castor</u> / Croton h) Portulaça i) <u>Tecoma</u> j) <u>Glinus / Mullugo</u> k) <u>Pulses</u>
- 4. Identification of selected families based on their Androecium and Gynoecium given in the mixture
 - a)Malyaceae b)Meliaceae c)Fabaceae d)Umbelliferae e)Cucurbiataceae f)Compositsae g)Euphorbaceae h)Lamiaceae\
- 5. Students are required to maintain field note book and record of the taxa occurring in the areas visited
- 6. Students are required to prepare herbarium of plants collected during field trips
- 7. Record.

Reference

- 1. Wills, J.C. Dictionary of Flowering plants, 1971
- 2. Santapau, H and A.N. Henry. Dictionary of Flowering plants in India, CSIR, 1973
- 3. D.J. Mabberly, Plant Book (2nd Edi.) 1997. Cambridge Univ. Press
- 4. Hubbard, C.E. Grasses, 1954. Penguin Books, London
- 5. Henry and chandrabose. An Aid to International code of Botanical Nomenclature
- 6. Hutchinson, J. The families of Flowering plants (3rd Edi.) b1973.
- 7. Lawrence, G.H. Taxonomy of Vascular plants. 1951
- 8. Sivarajan, V.V. (Ed. Robson) Introduction to Principles of Plant Taxonomy
- 9. V.N. Naik. Taxonomy of angiosperms
- 10. Cronquist. A. The Evolution and classification of flowering plants. 1988
- 11. Takhtajan. A. Outline of classification of flowering plants. Botanical Rev. 1980.
- 12. Davis P.H. and Heywood, V.H. Principles of Angiosperm Taxonomy
- 13. Jain S.K. and Rao R.R. A Handbook of field and herbarium methods
- 14. International code of Botanical nomenclature 1998 (IAPT) Pub.)
- 15. Flowering plants / origin sand dispersal (Trans by C. Jeffrey). Takhtajan, 1969
- 16. Seed Anatomy Vol. I and II Cornner
- 17. Seed identification Manual by A. Martin and Willim Barkley 1961. Oxford and IBH publications. Calcutta.

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Specialization: Specialization: Biodiversity of Angiosperms and Pharmacognosy of Medicinal Plants

MBOT.EC.T.2.404 / 🖪

4 Hrs/week

4 Credits

Paper-IV: Pharmacognosy

UNIT -I

1. Introduction and Scope of Pharmacognosy: Pharmacognosy and modern medicine

2. Crude plant drugs

a) Sources: Geographical, Biological, Cell Culture and Sea

b) Classification: Morphological (Organized and unorganized), Taxonomical, Chemical, Pharmacological and alphabetical

3. Indigenous tradional drugs and their market adulteration of Punarnava, Shankhapuspi (Clitoria), Indian goose-berry, Tulasi, Commiphora, Kalmegh

UNIT-II

- 4. Types of Plant drug and their Pharmacognostic study
 - a)Root drugs; Glycyrrhiza and Ipecac, Raulvolfia, Satavari, Colcus, Withania
 - b)Rhizome drugs, Ginger
 - c)Leaf drugs, Andrographis, Clitoria, Senna
 - d)Bark drugs: Terminalia arjuna, Holorrhena
 - e)Flower drugs: Saffron
 - f)Seed drugs: Piper longum, Mucuna
 - g)Fruit drugs: Cumin, Amla, Senna pods
 - h)Whole plant drugs: Catheranthus roseus

UNIT-III

- 5. Evaluation of the drugs; Organoleptic, Microscopic, Physical Chemical and Biological methods of evaluation
- 6 A brief account of various drug constituents: Carbohydrates, Cardiac glycosides, alkaloids, volatile oils, resins quinines and steroids with particular reference to Accacia gum, amla, Coleus, Satavari, Rauvolfia

UNIT-IV

- 7. Medicinal Principles and powder analysis of Curcuma, Cloves, Senna, Fennel and Cinnamon
- 8. Large scale Industrial preparation of Crude Drugs
 - a) Types of reactors used and extraction methods
 - b) Active principles and non-active principle of drugs
 - c)Import and Export potentials of Crude Drugs
 - d)Preparation of crude drugs in indigenous system of medicine
 - c)Quality control test contamination, Adulteration

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Practicals (Labs) MBOT.EC.P.2.408 /65

4 Hrs/ week 2 Credits

Practical Lab- (Special)- B

1. Histochemical analysis of the following chemical compounds:

d) Resins e) Glucosides a) Alkaloids b) Steroids c) Quinones

f) Pigments g) Volatile oils

2. Organoleptic evaluation of the following:

a) Glycyrrhiza (Root) b) Ginger (Rhizome) c) Eucalyptus (leaf)

d) Terminalia arjuna (Bark) f) Strychnos muxvomica (seed)

3. Powder analysis. a) Curcuma b) Cloves c) Senna d) Fennel

e) Cinnamon : Market drugs: a) Turmeric b)Chillies c)Coriander

d) Wheat and Jowar

4. Qualitative and Quantitative tests for

a)Alkaloids b)Carbohydrates c) Anthroquinones d) Tannins

e) Steroids f) Terpenoids

5. Growing chosen Medicinal plants in an experimental plot and preparation of Crude Drug for commercial market - Project

6. Collection of crude drugs from the market and studying their characteristics

7. Preparation of exhibits

8. Record

- 24. General account of production and application of Industrial fungal enzymes (amylases, cellulases, pectinases and chitinases).
- 25. General account of production and application of primary metabolites (vitamins and proteins).
- 26. General account of production and application of secondary metabolites (antibiotics, mycotoxins, pigments and alkaloids).
- 27. Environmental and regulatory aspects of using genetically-modified microbes in the field.

MBOT.EC.P.2.308 / A

Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab- (Special)

- 1. Estimation of organic acids in fungal culture filtrates.
- 2. Estimation of enzymes: Cellulases, Pectinases, Chitinases and Amylases.
- 3. Estimation of sugars, proteins and amino acids in fungal mycelium and culture filtrate.
- 4. Record.

Reference Books:

- 1. Agrios, G.N. 1999. Plant Pathology. Academic Press
- 2 Annual Review of Phytopathology, 1999. Vol. 37, APS Press
- 1 Cairney, J.W.G. & Chambers, S.M. 1999. Ectomycorrhizal Fungi. Springer Publishers
- 4 Chandanwala, K. 1986. Introduction to Plant Pathology. Ammol Publishers and Distributors
- 6 Cheet, I. 1993. Biotechnology in Plant Disease Control. Wilen-Liss, Inc.
- 7. Dennis Allsopp and Seal, K.J. 1986. Introduction to Biodeterioration. E. Edward Arnold Ltd.
- 8, Frisvad, J.C. Bridge, P.D. Arora, D.K. 1998. Chemical fungal taxonomy Marcel and Dekker Inc.
- 9. Horsfall, J.G. & Cowelling. 1978. Plant Diseases An Advance Treatise Vol. II& IV Acad Press
- 10. Ignacimuthu, S.J. 1996. Applied Plant Biotechnology. Tata Megrew -Hill Publ Company Ltd.
- 11. Mahadevan, A. 1991. Post infectional defense mechanisms. Today and Tomorrow's Printers publ
- 12 Mehrotra, R.S. 1991. Plant Pathology. Tata Mcgraw Hill Publishing Company Ltd.
- 13 Miles, P.G. and Chang, S.T. 1997. Mushroom Biology. World Scientific Publ. Company
- 14 Natish, S. Chopra, V.L. & Ramachandra, S. 1994. Biotechnology in Agriculture. Oxford and IBH
- 15 Rajak, R. 2000. Microbial Biotechnology for sustainable development and productivity. Scientific pub
- 16 Roberts, S. Fritz & Elien. I. Simms. 1992. Plant Resistance to Herbivors and Pathogens (Ecology, Evolutin and Genetics), University of Chicago Press.
- 17 Rudra P. Singh, Uma S. Singh & Keiisuke Kohmoto (eds.) 1995. Pathogenesis and host specificity in plant diseases. Vol. III Pergamon Press.
- 18 Scheffer, R.P. 199. The nature of disease in plants. Cambridge University Press.
- 19 Tarr, S.A.J. 1987. Principles of Plant Pathology. Academic Press
- 20 Verma, A & Hock, B. 1999. Mycorrhizae. Springer Publishers

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e) Rust of Groundnut d) Sunflower Rust

- e) Linseed Rust
- n Coconut Bud rot

UNIT: IY

Fungal Diseases of Fruits, Vegetables and Cash crops

- 12. Fruits
 - a) Downy mildew of Grapes
 - b) Powdery mildew of grapes
- c) Mango Anthracnose
- d) Citrus Gummosis

- 13. Vegetables:
 - Powdery mildew of Cucurbits
 - b) Leaf spot of Tomato

- c) Leaf spot of Brinjal
- d) Club root of Crucifers
- e) Chilli Die-back

- 14. Cash crops.
 - a) Whip smut of Sugarcane
 - b) Cotton Wilt
 - c) Damping off of Tobacco
 - d) Black Shank of Tobacco
 - e) Turmeric Leaf spot
- MBOT.EC.P.2.408/A Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab- (Special)- A

- 1. Diagnosis of plant diseases and proof of pathogenicity according to Koch's postulates.
- 2. Measurement of plant diseases- Disease scoring.
- 3. Plant disease diagnosis by studying symptoms in the field.
- 4. Preparation of semi-permanent slides of diseased material, eg. Leaf spots, blights, mildews, rots, wilts, rusts and smuts.
- 5. Micrometry and standardization of microscope.
- 6. Measurement of fungal spores and mycelium and camera Iucida drawings
- 7. Record and Herbarium of diseased plants.

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e) Rust of Groundnut d) Sunflower Rust

- e) Linseed Rust
- n Coconut Bud rot

UNIT: IY

Fungal Diseases of Fruits, Vegetables and Cash crops

- 12. Fruits
 - a) Downy mildew of Grapes
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- 14. Cash crops.
 - a) Whip smut of Sugarcane
 - b) Cotton Wilt
 - c) Damping off of Tobacco
 - d) Black Shank of Tobacco
 - e) Turmeric Leaf spot
- MBOT.EC.P.2.408/A Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab- (Special)- A

- 1. Diagnosis of plant diseases and proof of pathogenicity according to Koch's postulates.
- 2. Measurement of plant diseases- Disease scoring.
- 3. Plant disease diagnosis by studying symptoms in the field.
- 4. Preparation of semi-permanent slides of diseased material, eg. Leaf spots, blights, mildews, rots, wilts, rusts and smuts.
- 5. Micrometry and standardization of microscope.
- 6. Measurement of fungal spores and mycelium and camera Iucida drawings
- 7. Record and Herbarium of diseased plants.

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MBOT.CC.T.2.401

(CORE)

4 Hrs/week 4 Credits

Paper-I: Ecology and Phytogeography (common paper)

UNIT I

The Environment: Physical environment; biotic and abiotic interactions.

2. Habitat and Niche: Concept of habitat and niche; Niche width and overlap; Fundamental and realized niche; Resource partitioning; Character displacement- Allopatric and Sympatric.

3. Ecosystem Ecology: Ecosystem structure and function; Food Chain, Food Web, Energy flow and Mineral cycling (C,N); Primary production and Methods of measurement of primary productivity:

UNIT II

4. Population Ecology: Characteristics of a population (Density ,Natality, Mortality ,Dispersion Population size, Age structure, Life tables); Population growth curves; Population regulation; life history strategies (r and K selection);

5. Species Interactions: Types of Interactions, Positive interactions- Mutualism, Symbiosis,

commensalism, Protocooperation.

6. Negative interactions - Exploitation, Herbivors, Carnivors, antibiosis, competition.

UNIT III

- 7. CommUNIT y Ecology: Characteristics of commUNIT ies Analytical Quantitative Frequency, density, Abundance, Cover and Basal area. Qualitative - Physiognomy, Phenology, Stratification, sociability, vitality and Life form and Synthetic - Prensence and constance, Fidelity Dominance.); Raunkiaer concept; Levels of species diversity and its measurement; Ecotones. Biodiversity: Monitoring; Hotspots (with reference to India), Major drivers of biodiversity change;
- 8. Ecological Succession: Types; mechanisms; Changes involved in succession;

9. Concept of climax- Monoclimax and Polyclimax theories.

UNIT IV

10. Biogeography: Plant distribution, Theory on plant distribution (Age and area theory, Theory of tolerance), Major terrestrial biomes; Biogeographical zones of India. Classification of climate -Koppens and Thornthwaites classification.

11. Applied Ecology: Pollution -Global environmental change -Atmosphere composition and structure

,Green house gases, Global warming, Ozone depletion.

12. Conservation Biology: Principles of conservation In situ - Protected areas, National parks, Wildlife sanctuaries, Biosphere reserves and Project tiger. Ex situ - Botanical gardens, Zoological parks and cryopreservation.

MBOT.CC.P.2.405 Practicals (Labs)

4 Hrs/ week 2 Credits

Practical Lab-I (Common)

1. Determination of quantitative characters by random quadrat method -Abundance, Density ,Frequency ,IVI and Dominance : Similarity And Dissimilarity Index

2. Estimation of Carbonates , Bicarbonates , Chlorides and Dissolved Oxygen

3. Morphology And Anatomy of Hydrophytes and Xerophytes And their Adaptations

4. Maintenance of Practical records

Reference books

with our of the site of the second products of the second products.

- 1. E.P. Odum 1996 Fundamentals of ecology
- 2. E.J Koromondy .1996 Concept of Ecology
- 3. P.D Sharma . 1996 Ecology and environment 4. S.P. Misra .S.N. 2010 Pandey Essentail Environmental studies
- 5. N.S Subrahmanyam and Sambamurty 2000 Ecology

M.Sc. BOTANY IV Semester Common paper

MBOT.CC.T.2.402:

Core

4 Hrs/week 4 Credits

Paper-II: Horticulture and Plant breeding

Unit-I

- 1. Importance and propagation of horticultural plants:
 - a. Propagation through seeds.
 - b. Propagation through cuttings i.e., leaf, stem and roots.
 - c. Grafting- normal and special grafting procedures.
- 2. Nutrient management: General account of chemical fertilizers and biofertilizers. Symptoms of deficiencies of macro and micro nutrients.

Unit-II

- 3. Disease and pest management of horticultural plants:
 - a. Identification/Symptoms
 - b. Remedies/Control measures
 - c. IPM (Integrated Pest Management)
- Mass production of horticultural plants and plantation crop plants through tissue culture and micropropagation.

Unit-III

- Plant breeding objectives. Traits of interest for field crops, fruits and vegetable crops (yield, duration, adaptability and tolerance / Resistance to Biotic and Abiotic stresses.
- 6. Selection. Back cross breeding and usefulness of marker-assisted selection.
- Development of inbred cultivars and commercial hybrids. Heterosis, Combining ability and Heritability.

Unit-IV

- 8. Mutation breeding. Induced polyploidy in plant breeding. Importance of haploids and dihaploids.
- Transgenic technology and its acceptance. Bt-cotton and Bt-brinjal, Herbicide resistant crops and Golden rice.
- 10. PCR based zygosity analysis and ELISA.

MBOT.CC.P.2.406 Practicals (Labs)

4 Hrs/ week 2 Credits

Practicals (common)

- 1. Identification of Horticultural tools & implements and their use.
- 2. Study of containers, preparation of potting mixture, potting, de-potting and repotting.
- 3. Estimation of moisture content in soils. Determination of pH, electrical conductivity, sodium adsorption ratio and exchangeable sodium percentage of soils.
- Propagation through seeds, methods to overcome the seed dormancy a) Mechanical scarification
 Soaking the seeds in water c) Acid scarification d) Startification
- Rapid tissue test, seed dormancy, seed viability by tetrazolium test.
- Vegetative propagation by corms, bulbs, rhizomes etc.

- Propagation methods like cutting, layering, budding and grafting.
- 8. Micropropagation.
- 9. Identification and description of important fruit varieties: Mango, Guava and Citrus, Grape, Sapota, Banana and Papaya; Commercial flower varieties: Roses, Chrysanthemums, Dahlias, Orchids etc.
- 10. Study of plant breeding techniques.
- 11. Estimation of leaf area index, growth analysis parameters including harvest index.
- 12. Identification of synthetic plant hormones and growth retardants, preparations of hormonal solution and induction of rooting in cuttings, ripening of fruits and control of flower and fruit drop.

References:

- Plant propagation (Principles and practices) Hortman, Kester, Fred T Davies, Robert Genene 1.
- Floriculture in India T.K. Bose 2.
- 3. Principles of horticultural science Janick
- 4. Beautiful shrubs Prathibha P. Trivedi
- 5. Commercial flowers Vol. I & II- T.K. Bose, Yadav, P. Pal, P.Das, V.A. Parthasarathy.
- 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.V
- 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.