

DEPARTMENT OF BOTANY

COURSE CURRICULUM & MARKING SCHEME

M.Sc. BOTANY

Semester - IV

SESSION : 2024-25



ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

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SYLLABUS AND MARKING SCHEME FOR M.Sc. (BOTANY)

FOURTH SEMESTER

Session 2024-2025

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max	Min	Max.	Min.	
I CC- MBO401	Plant Reproduction & Utilization of Resources	80	16	20	04	05
II CC- MBO402	Plant Ecology – II (Pollution & Biodiversity Conservation)	80	16	20	04	05
III CC- MBO403	Genetic Engineering	80	16	20	04	05
IV CC- MBO404	Elective – I & II 1. Microbial Ecology 2. Ethnobotany	80	16	20	04	05
V	Lab Course I	100	33			04
VI	Lab Course II/Project work	100	33			04
	Total	520		80		28

CC- Course Code

04 Theory papers - 320

04 Internal Assessments - 80

02 Practical - 200

Total Marks - 600




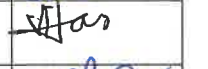




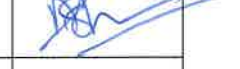
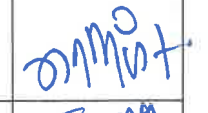


Note: 1. 20 marks = 01 credit in Theory Papers and 25 Marks = 01 Credit in practical/Project work

P. S. C.
W. S.
3.7.2024

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG (C.G.)
M.Sc. (BOTANY), SESSION-2024-2025
PRACTICAL SCHEME, SEMESTER – IV LAB COURSE

LAB COURSE - 1(6 Hrs)	Max. M. 100
Part – I Plant Reproduction	15
Part – II Plant Resource Utilization and Conservation	15
Part – III Exercise based on Genetic Engineering	15
Part – IV Exercise based on Microbial Ecology	15
Part – V Spotting/	10
Part – VI Field study	10
Part – VII Viva- Voce	10
Part – VIII Sessional	10
LAB COURSE - 2	100
Project (to be evaluated by external examiner)	

Name and Signatures of Members Board of Studies

S. No.	Category	Name of Nominated Members	Signature
1.	Chairperson	Dr. Ranjana Shrivastava	
2.	Members	1. Dr. G. S. Thakur	
		2. Dr. Shriram Kunjam	
		3. Dr. Satish Kumar Sen	
		4. Dr. Vijay Laxmi Naidu	
		5. Mr. Motiram Sahu	
		6. Dr. Rajeshwari Prabha Lahare	
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6.	Ex Meritorious Student PG	Tanu Verma	
7.	Subject expert from other Department	Dr. Divya Minz (Department of Zoology, Govt. V.Y.T. PG. Autonomous College Durg C.G.)	

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M.Sc. – BOTANY SEMESTER – IV

SESSION-2024-2025

PAPER – I (Course Code- MBO401)

PLANT REPRODUCTION AND UTILIZATION OF RESOURCES

Max. M. - 80

Min. M. - 16

UNIT-I

- **Reproduction:** Methods of Vegetative propagation.
- **Pollination** – pollination – Mechanism and vector
- **Pollen - pistil interaction and Self-incompatibility.**
- Structure of pistil, Pollen stigma interaction, Saprophytic and Gametophytic self incompatibility
- **Fertilization:** Double fertilization, *in-vitro fertilization*.

UNIT-II

- **Male gametophyte:** Structure of anther & development of microsporangium and microsporogenesis, Role of tapetum. Pollen germination, Development of male gametophyte. Pollen storage, Pollen allergy.
- **Female gametophyte:** Structure of Ovule & development of megasporangium, megasporogenesis, Organization of embryo sac and Structure of mature embryo sac cells.

UNIT-III

- **Seed and Fruit development:**
 - **Endosperm** – development and types of endosperm, Xenia and Metaxenia, Mosaic and ruminant endosperm, function and morphological nature of endosperm.
 - **Embryogenesis** – development of dicot and monocot embryo, nutrition of embryo.
 - **Polyembryony**–types and significance of polyembryony.
 - **Apomixes** – types and significance of apomixes.
 - Endospermic & non-endospermic seeds, Dynamics of fruit growth and fruit maturation.

UNIT-IV

- **Utilization of resources:**
 - **Plants Used As Avenue Trees:** For Shade, Pollution control and aesthetics. {Banyan Tree, Neem, Karanj, Peepal, Siris, Saptparni, Amaltas, Gulmohar, Kadam, *Kachanar*.
 - General information about ethanobotanically important plants of Chhattisgarh.
 - Medicinally and aromatic important plants of Chhattisgarh
 - Aloe, Giloej, Gurmar, Satawari, Kirayat.
 - Tulsi, Dauna, Lemon grass, Mint, Sewanti.

Laboratory Exercise

- Study the structure of pollen grain {eg. *Brasica*, *Hibiscus*, *Datura*, *Tridex*, *Thevesia*, *Ipomea*, *Solanum xanthocarpum*}.
- Study the different types of placentation (Axile, Basal, Marginal Parietal, Free central){eg. Pea, Hibiscus, Brasica, Sunflower, Dianthus}.
- Isolation of mature embryo from Dicot and Monocot seed {Maize and Gram}.
- Study the types of pollination in saliva and Vallisneria, Calotropis.
- Study of Endospermic and nonendospermic seeds.
- Study of live or herbarium specimens or other visual materials to become familiar with these resources.
- Botanical characters and their chief constituent of medicinal and aromatic plants.
- Survey of avenue trees (Local) {Identification, Size, Canopy shape, Status and their other uses}.

Recommended Books

- Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperm. 4th Ed. vikas Pub. House. N. Delhi.
- Shivanna, K.R. and Johri, B.M. 1985. The Angiosperm Pollen: Structure and Function. Wiley Eastern Ltd. New York.
- Maheshwari P. An introduction to the Embryology of Angiosperm. Tata Mc. Graw Hill Pub. Company LTD. New Delhi.
- Dawara, G.P. and Sharma S.K., Introductory Embryology, Jaiprakash nath and Company, Meerut.
- Singh, Pandey and Jain, Structure and Development of Angiosperm, Rastogi Pub
- Proctor. And Yeo, P. 1973. The Pollination of Flowers, William Collins, London.
- Raghavan V. 1997. Molecular Embryology of Flowering Plants. Cambridge University, Press, Cambridge.
- Medicinal Plants S. C. Joshi.
- The spirit of beautiful trees Raju.

Outcome:-

- To understand various methods of vegetative reproduction such Air Layering, Budding, Grafting.
- Significance of double fertilization in Angiosperms.
- They know about allergies from pollen grains and pollen storage.
- Learn about endosperm, embryo, Polyembryony and seedless fruits.
- Analyze importance of Avenue trees and uses of medicinal plants.
- Learn about Biodiversity of Ethnobotanical Plants of Chhattisgarh.

Question Paper Format and Distribution of Marks for PG Semester Examination

Question paper format for the Post-Graduate Examination has been revised from the Session 2018-19. The revised format will be applicable for all the question papers of Semester I, II, III & IV. The following are the main points of the new format:










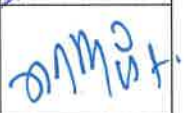


1. The question paper will be of **80 marks** (as before)
2. Questions will be asked Unit-wise in each question paper.
3. From each Unit, the questions will be asked as follows :
 - Q.1 Very short answer type question
(Answer in one or two sentences) **(02 Marks)**
 - Q.2 Very short answer type question
(Answer in one or two sentences) **(02 Marks)**
 - Q.3 Short answer type question (Answer in 200-250 words) **(04 Marks)**
 - Q.4 Long answer type questions (Answer in 400-450 words) **(12 Marks)**

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
Very Short (2 Questions) (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
Short (1 Question) 200- 250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
Long answer (1 Question) 400- 450 words	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.
Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.
4. Internal Assessment Examination will be as follows :
 - i. Internal Test in each paper (20 marks)
 - ii. Seminar (Power point presentation) in any one of the paper (20 marks)
 - iii. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)
 - iv. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

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M.Sc. – BOTANY SEMESTER – IV

SESSION-2024-2025

PAPER – II (Course Code- MBO402)

PLANT ECOLOGY – II (POLLUTION & BIODIVERSITY CONSERVATION)

Max. M. – 80

Min. M.- 16

UNIT-I

- **Climate, Soil and Vegetation Patterns of the India:**
 - Climate of India. Life zones (Fresh & marine water),
 - World Major Biomes – Terrestrial and Aquatic biomes (Fresh & Marine water).
 - World Major Vegetation types – forest and grassland vegetation.
 - Soil, Soil genesis, Classification, Texture, Structure, Profiles and types of the India.
 - Biogeography :- Theory of island biogeography, Biogeographical zones of India.

UNIT-II

- **Pollution, climate change and ecosystems:**
 - Air, water and soil Pollution: - kinds, sources, Air quality parameters – C, S, Nitrogen compounds, Acid rain, Ozone, Fluorides, Hydrocarbons, Metals, Particulate Matter (PM), Aerosols & Toxicants. Water quality parameters – DO, BOD, COD, Turbidity, Nitrate, Chlorides & Phosphates, effects on plants & ecosystem.
 - Green house gases (Carbon dioxide, methane, nitrous oxide, Chloro-fluorocarbons: sources, trends and role).
 - Ozone layer, ozone hole, consequences of climate change, (global warming, sea level, UV radiation).

UNIT-III

- **Biological diversity:**
 - Concepts and levels, status, monitoring and documentation in India, Utilization and concerns, major drivers of biodiversity change, biodiversity management approaches. Role of biodiversity in ecosystem functions & stability. Diversity index (Shannon Weavers, Margalf, & Pilou's Methods).
 - IUCN categories of threat, distribution and global patterns, Hot Spots in India and world.
 - World centers of primary diversity of domesticated plants: The Indo Burmese center, plant introductions and secondary centers, Diversity index (Shannon Weavers, Margalf; & Pilou's Methods)
 - **Statistical Methods:** Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); Sampling distribution; Difference between parametric and non-parametric statistics; Confidence Interval; Errors; Levels of significance; Regression and Correlation; t-test; Analysis of variance; X^2 test;; Basic introduction to Muetrovariate statistics, etc.



UNIT-IV

- **Conservation strategies:**
 - **Conservation Biology:** Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).
 - In situ conservation, International efforts and Indian initiatives, protected areas in India - sanctuaries national parks, biosphere reserves, Wetlands, Mangroves and coral reefs for conservation of wild biodiversity.
 - Ex situ conservation: Principles and practices, botanical gardens, field, general account of the activities of **Botanical Survey of India (BSI)**, **National Bureau of Plant Genetic Resources (NBPGR)**, **Indian Council of Agriculture Research (ICAR)**, **Council of Scientific and Industrial Research (CSIR)** for conservation and non-formal conservation efforts.

Laboratory Exercise

- **Visit NBPGR, BSI, CSIR & ICAR, Recognized Botanical Gardens and Museum.**
- To determine soil moisture content, porosity and bulk density of soil collected from varying depths at different locations.
- To determine the water holding capacity of soils collected from different locations.
- To determine percent organic carbon and organic matter in the soils of cropland, grassland and forest.
- To estimate rate of carbon dioxide evolution from different soils using soda lime or alkali absorption method.
- To estimate the dissolved oxygen content in eutrophic and oligotrophic water samples by azide modification method.
- To estimate chlorophyll content in sulphur dioxide fumigated and unfumigated plant leaves.
- Field survey of a part of town or city to make the students aware of the diversity of plants in urban ecosystems.
- Scientific Visit
- A protected area, A wetland, A Mangrove.

Recommended books:

- Magurran, A.E. 1988. Ecological diversity and its measurement, Chapman and Hall. London.
- APHA-AWWA-WPCF Standard methods for the examination of water and waste water, American public health association, Washington, D.C.
- Moore, P.W. and Chapman, S.B. 1986. Methods in plant Ecology, Blackwell scientific

publications.

- Treshow, M. 1985. Air pollution and plant life, Wiley interscience.
- Mason C.F. 1991. Biology of fresh water pollution, Longman.
- Hill, M.K. 1997. Understanding Environmental pollution, Cambridge university press.
- Kothari, A. 1997. Understanding Biodiversity: Life sustainability and Equity, Orient Longman.
- Paroda, R.S. and Arora R.K. 1991. Plant resources conservation and management, IPGRIP USA Campus, New Delhi.
- Heywood, V.H. and Watson, R.T. 1995. Global biodiversity assessment, Cambridge University press, Cambridge, U.K.

Outcome:-

With the Study the pollution & pollution control students understand two specific concepts served as the basis for the control approach:-

- The assimilative capacity concept, which asserts the existence of a specified level of emissions into the environment which does not lead to unacceptable environmental or human health effects.
- Principle of control concept, which assumes that environmental damage can be avoided by controlling the manner, time and rate at which pollutants enter the environment.
- Application of appropriate technologies is based on a systematic analysis of the source and nature of the emission or discharge in question, of its interaction with the ecosystem and the ambient pollution problem to be addressed, and the development of appropriate technologies to mitigate and monitor pollution impacts.
- Students will help understand the conservation of plant biodiversity. It is important issue concerning the human population worldwide. The anthropogenic pressure, the introduction of alien species, as well as domesticated species and chronic weed infestation have dramatic effects on plant diversity, which is reflected in an increase in the number of threatened species.
- Students understand Plant biodiversity is a natural source of products to the medical and food industries & their significant value for breeding programs and for developing more productive crops and more resistant plants to biological and environmental stresses



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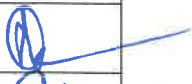

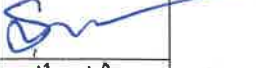






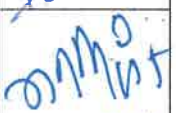


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M.Sc. – BOTANY SEMESTER – IV

SESSION-2024-2025

PAPER – III (Course Code- MBO403)

GENETIC ENGINEERING

Max. M. - 80

Min. M. - 16

UNIT I

- **Nucleic Acid Purification:** Technique applied for isolation of Total Bacterial cell DNA, Plasmid DNA, Bacteriophage DNA, and Plants Genomic DNA. Electrophoresis for Analysis of bands.
- **Molecular Tools:** Template dependent DNA polymerase, Nucleases, Restriction Endonuclease (Nomenclature, Types, Mechanism of action with examples), End modification enzymes, DNA ligases. Primers, linkers and adaptors, Chemical synthesis of Gene, their importance in genetic engineering.
- **Vectors:** Properties, Types (Plasmid, Cosmid, Phagemid, M13 vector, Shuttle vector, YAC, BAC, Bacteriophage vector), Cloning vs Expression vectors, Methods for development of competent host for vectors.
- **Transformation Techniques:** General consideration for DNA Transformation, Introduction of DNA into host cells (in Plant and Bacterial cell), Natural gene Transfer method, Vector Mediated Method, Vectorless method Chemical and physical method.

UNIT II

- **Screening and Selection of Recombinant Clone:** Selectable and screenable marker. Selection of transformed bacterial cells, beta galactosidase gene complementation, Blue-white screening, Recombinant screening; Insertional inactivation, Red-white selection.
- **cDNA Library and Genomic Library:** General concept and components, construction and screening of libraries; colony and plaque hybridization, Application.
- **Polymerase Chain Reaction:** Requirements, General process, Types and applications.
- **DNA Sequencing:** Chain termination method, Automated sequencing, Sequencing enzyme, Chemical degradation method, Pyrosequencing method. Next generation sequencing technology.

UNIT III

- **Site Directed Mutagenesis:** Non-PCR based; Cassette mutagenesis, Primer extension mutagenesis, PCR Based; Overlap extension method, Megaprimer PCR, Inverse PCR, Application.
- **Genome Mapping & DNA Profiling:** Genetic marker, Types of DNA Marker; RFLP, RAPD, AFLP, SSLP, SNPs, Physical mapping; Restriction mapping, STS mapping. DNA

fingerprinting.

- **Gene Silencing:** Mechanisms of Gene Silencing, Transcriptional Gene Silencing (TGS), Post-Transcriptional Gene Silencing (PTGS), RNA Interference (RNAi), siRNA and miRNA, Gene Silencing in Plants, Gene Silencing Technologies, Applications of Gene Silencing.
- **DNA Microarray:** Types of DNA Microarrays, Mechanisms and Applications of DNA Microarrays.

UNIT IV

- **Assays:** Electrophoretic mobility Shift Assay, Footprinting assay, Phage Display, Yeast two-hybrid assay, Transcript analysis and their applications.
- **CRISPR/Cas System:** General Mechanism. Types of CRISPR/Cas9 System, CRISPR/Cas9 and targeted genome editing, Regulation for CRISPR/cas-9 technology, Applications of CRISPR/Cas System.
- **Bioinformatics:** NCBI Data Model, Biological Database, Information retrieval from biological database, Submitting DNA sequence to the database, Sequence alignment, Genbank.

Recommended Books

- Old, R. N., & Primrose, S. B. (1994). Principles of gene manipulation.
- Winnaeker, E. L. (1987). From genes to clones.
- Watson, J. D., Witreowski, J., Gilman, M., & Zoller, M. (1992). Recombinant DNA.
- Nicholl, D. S. T. (n.d.). An introduction to genetic engineering.
- Pasternak, J. J. (1996). Molecular biotechnology.
- Adams, R. L. P., Knowler, J. T., & Leader, D. P. (1996). The biochemistry of nucleic acids.
- Janke, K. S. (1998). Genetic engineering.
- Baxevanis, A. D., & Ouellette, B. F. F. (Eds.). (n.d.). Informatics: A practical guide to the analysis of genes and proteins (2nd ed.).
- Lesk, A. M. (n.d.). Introduction to bioinformatics. University of Cambridge. Bioinformatics and Drug Discovery; Richard S. Larson.

Laboratory Exercise

- Isolation of plasmid DNA.
- Restriction map of plasmid DNA.
- Restriction mapping of Bacterial genomic DNA
- DNA finger printing.
- PCR based experiment.(AFLP. RAPD)
- Ligation of DNA.



- Gene expression in *E. coli* and analysis of gene product.
- DNA end labeling
- Random primer labeling
- Gene amplification and Cloning of amplified product
- Literature mining using pubmed central
- Literature mining using Medline
- Retrieving Protein and DNA Sequences using Entrez at NCBI
- Retrieving Protein and DNA Sequences using SRS at EBI
- Nucleotide BLAST – Search nucleotide database using nucleotide query
- Protein BLAST – Search Protein database using protein query
- Multiple Sequence Alignment – CLUSTALW.

Course Objectives:

This course equips students with essential skills in nucleic acid purification, molecular tools, and genetic engineering. It covers DNA/RNA isolation, vector properties, transformation methods, recombinant clone screening, cDNA/genomic library construction, PCR, DNA sequencing, gene silencing, mutagenesis, genome mapping, DNA profiling, and DNA microarrays. Advanced topics like CRISPR/Cas genome editing and bioinformatics are included, preparing students for practical applications in molecular biology research.

Course Outcomes:

- Proficiency in Nucleic Acid Purification: Students will be able to perform DNA and RNA isolation techniques and analyze electrophoresis results.
- Application of Molecular Tools: Students will demonstrate the use of molecular tools in genetic engineering, understanding their mechanisms and applications.
- Vector Utilization and Transformation Techniques: Students will understand the properties and types of vectors and apply various transformation techniques in genetic engineering.
- Competency in Screening and Selection: Students will be proficient in screening and selecting recombinant clones using various markers and screening methods.
- Library Construction and Application: Students will be capable of constructing and screening cDNA and genomic libraries and applying these techniques in molecular biology research.
- PCR and Sequencing Techniques: Students will have a thorough understanding of PCR processes and DNA sequencing methods, including their applications in research and diagnostics.
- Gene Silencing and Mutagenesis Applications: Students will comprehend the mechanisms of gene silencing and apply site-directed mutagenesis techniques in

genetic studies.

- Genome Mapping and DNA Profiling Skills: Students will be able to perform genome mapping and DNA profiling, understanding their significance in genetic research.
- Utilization of DNA Microarrays: Students will be skilled in using DNA microarrays for various applications, including gene expression analysis.
- Advanced Assays and CRISPR Technology: Students will be familiar with advanced assays and the CRISPR/Cas system, applying these techniques in genome editing and bioinformatics analysis.
- Students will be proficient in utilizing bioinformatics tools, including understanding the NCBI data model, navigating biological databases, retrieving information, submitting DNA sequences, performing sequence alignment, and effectively using GenBank for genetic research and data analysis.

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- Q.4 Long answer type questions (Answer in 400-450 words) (12 Marks)

Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
Very Short (2 Questions) (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
Short (1 Question) 200-250 words	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks	1 x 4 = 4 Marks
Long answer (1 Question) 400-450 words	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks	1 x 12 = 12 Marks

Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.










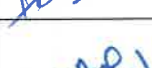


3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.

Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.

4. Internal Assessment Examination will be as follows:

- ix. Internal Test in each paper (20 marks)
- x. Seminar (Power point presentation) in any one of the paper (20 marks)
- xi. Assignment in each of the remaining papers (excluding the paper of Seminar. (20 marks)
- xii. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (C.G.)

M.Sc. – BOTANY SEMESTER – IV

SESSION-2024-2025

PAPER-IV {Elective - I} (Course Code- MBO404)

MICROBIAL ECOLOGY

M. M. - 80

Min. - 16

UNIT - I

[Water Microbiology]

- **Types of water:** Atmospheric water, Surface water; Stored water (sedimentation, interaction of other microbes, light rays, temperature, food supply), Ground Water.
- **Water microorganisms,** Marine microbiology (estuaries, mangroves, deep sea, hydrothermal vent, saltpans, coral reefs), Fresh water microbiology (ponds, lakes, streams).
- **Microbial analysis of water:** Sanitary test for coliforms. Purification of water: Sedimentation, Filtration, Disinfection.

UNIT – II

[Air Microbiology]

- General introduction to air microflora, droplet nuclei, bioaerosol,
- **Indoor and outdoor aeromicrobiology:** aeromicroflora of pharmacy, aeromicroflora of hospitals and other houses, aeromicroflora of storage materials (library, wall paintings);
- **Aeroallergens and aero allergy;** House dust allergens; Pollen grains; Cosmetics;
- **Assessment of air quality** – Air sampling devices and equipments (impaction, liquid impingement, filtration, electrostatic precipitation and gravity sampling).
- **Phylloplanemicroflora,** Phylloplane pathogens (morphological characters, physiological characters; nutrition. Radiation. pH, temprature), microbial interaction on leaf surfaces.

UNIT – III

[Environmental Microbiology]

- **Waste as a resource:** Organic compost (definition, process of composting, factors affecting composting, microorganisms, soil and organic matter, role of compost).
- **Biogas production:** solubilization, acetogenesis and methanogenesis, mechanism of methane formation.
- **Sewage (wastewater) treatment:** Sewage microorganisms, BOD and COD, Small-scale sewage treatment (Cesspools, septic tanks), large-scale sewage treatment (primary, secondary).
- **Biodegradation:** microbial degradation of petroleum & xenobiotics, common process of insecticidal metabolism (hydrolytic process, reductive and oxidation).

- **Biodeterioration** of materials (cellulose, food stuffs, paints, rubbers, plastics, fuels, lubricants, metals, stone, cosmetics, toiletries structures). Microbial plastics.

UNIT - IV

- **[Plant Diseases - Pathogen and symptoms]**
 - **Bacterial disease** {Citrus canker, Bacterial blight of rice, Scab of potato, Angular leaf spot of cotton, Leaf spot of mango}
 - **Viral diseases** {Leaf curl of papaya, Mosaic of bhindi, Mosaic of Tobacco, Bunchy top of banana}
 - **Fungal diseases** (Downy mildew of peas and Crucifers, Powdery mildews of Sisam, rusts diseases of Wheat and Gram, smuts diseases of Wheat and Barly, wilt diseases of Arhar}.
- **Medical Microbiology- Pathogen and symptoms:**
 - **Bacterial disease:** {Diphtheria, Pertussis, Tuberculosis, Pneumonia, Meningitis}
 - **Viral disease:** {Small pox, Chicken pox, Measles, Mumps, Influenza};
 - **Fungal disease:** {Aspergillosis, Blastomycosis, Candidiasis, Cryptococcosis, Histoplasmosis}.

Laboratory Exercise

- Water analysis by SPC method.
- Coliform test for water quality.
- Isolation of aquatic fungi by baiting technique.
- Isolation of aeromicroflora by slide exposure method.
- Isolation of aeromicroflora by petriplate exposure method.
- Isolation of Phylloplanemicroflora by serial dilution method or Impression method.
- Physical analysis of sewage/industrial effluent by measuring Total Solids, Total Dissolved Solids and Total Suspended Solids.
- Determination of indices of pollution by measuring BOD/COD of different effluents.
- Identify and comments upon the plant diseases as per prescribed syllabus {Bacterial/Viral/Fungal}.

Recommended Books

- Dubey, R.C. and D.K., Maheshwari, A Text Book of Microbiology.
- Sharma, P.D., Microbiology and Plant Pathology.
- Pelczar M. and Chan, Microbiology.
- Johri, R.M. and Snehlata, A Text Book of Microbiology.
- Aneja, K.R., Experiments in Microbiology, Plant pathology and Biotechnology.
- Atlas, Microbial Ecology.

Outcome:-

- Appreciate the diversity of microbes and microbial communities.
- Comprehend the various methods to determine the quality of water.
- Understand the methods employed in waste water treatment.
- Learn the basic principles of infectious disease in plant and human.
- Students will acquire a thorough knowledge about the disease caused by bacteria, virus and fungi.
- Students will be able to know about water portability microbial, bioremediation, waste management, biogeochemical cycling.

Question Paper Format and Distribution of Marks for PG Semester Examination

Question paper format for the Post-Graduate Examination has been revised from the Session 2018-19. The revised format will be applicable for all the question papers of Semester I, II, III & IV. The following are the main points of the new format:

1. The question paper will be of **80 marks** (as before)

2. Questions will be asked Unit-wise in each question paper.

3. From each Unit, the questions will be asked as follows:

- Q.1 Very short answer type question
(Answer in one or two sentences) (02 Marks)
- Q.2 Very short answer type question
(Answer in one or two sentences) (02 Marks)
- Q.3 Short answer type question (Answer in 200-250 words) (04 Marks)
- Q.4 Long answer type questions (Answer in 400-450 words) (12 Marks)



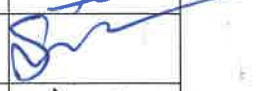
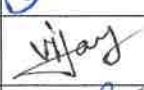








Type of Question	Unit-I	Unit-II	Unit-III	Unit-IV
Very Short (2 Questions) (Maximum two sentences)	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks	2 x 2 = 4 Marks
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Note:

1. Question no. 1 and Question 2 will be compulsory.
2. Question no. 3 and 4 will consist of 2 optional questions of which one has to be attempted.
3. As mentioned above, two compulsory very short answer type questions (2+2 marks), one short answer type question with internal choice (4 marks) and one long answer type question with internal choice (12 marks) will be asked from each unit.
Thus there will be questions of 20 marks from each unit and of total 80 marks from all the four units of the syllabus/syllabi.
4. Internal Assessment Examination will be as follows:
 - xiii. Internal Test in each paper (20 marks)
 - xiv. Seminar (Power point presentation) in any one of the paper (20 marks)
 - xv. Assignment in each of the remaining papers (excluding the paper of Seminar: (20 marks)

- xvi. Average of marks obtained in internal test + seminar in any one paper and marks obtained in internal test + assignment in rest of the papers will be calculated and taken into consideration.

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE, DURG (C.G.)

M.Sc. – BOTANY SEMESTER – IV

SESSION-2024-2025

PAPER-IV {Elective -II} (Course Code- MBO404)

ETHNOBOTANY

M. M. - 80

Min. - 16

UNIT I

Traditional system of medicine – Brief history of use of medicinal herbs, introduction to indigenous systems of medicine Ayurveda, Unani and Siddha system of medicine. Ethnobotany in relation to national priorities and health care programmes.

UNIT II

Ethnobotanical importance of Bacteria and Fungi, Ethnoveterinary medicines from plants. Major and minor forest products of Chhattisgarh and WFP non-wood forest products, Role of ethnobotany in sustainable development. Ethnobotanical research method - qualitative and quantitative research method.

UNIT III

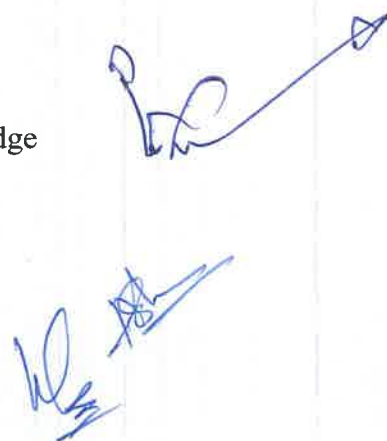
Ethnobotany in relation to livelihood security, Reference to tribes. Ethnobotanical research done in India. Intellectual Property Rights with particular reference to Traditional knowledge and bio wealth.

UNIT IV

Role of ethnobotany in modern medicine, medico ethnobotanical sources in India – Significance of the following plants in ethnobotanical practices. (along with their habitat and morphology). a. *Terminalia arjuna*, b. *Vitex negundo*, c. *Pongamia pinnata*, d. *Cassia auriculata*, e. *Indigofera tinctoria*, Role of ethnobotany in modern medicine with special example of *Rauwolfia serpentina*, *Withania somnifera*, *Tinospora cordifolia*, *Vinca rosea*, *Moringa oleifera*.

Laboratory Exercises –

- Documentation techniques of Ethnobotanical knowledge
- Field study of forest area or Tribal area.
- Herbal Preparation –
 - a. Preparation of Triphala.



- b. Kwath of Triphala
- c. Preparation of diabetes controlled powder
- d. Preparation of herbal shampoo
- e. Giloy Churn
- To separate active principals from the extract of medicinal plants

Suggested readings:-

- Jain S.K. and Rao R.R. (1971) A handbook of field and herbarium methods. New Delhi, Today and Tomorrow's Printers and publishers.
- Jain S.K. (1989) Methods and approaches in Ethnobotany. Society of Ethnobotanist, Lucknow.
- Vaishnaw T.K. (2004) Chhattisgarh ki Anusuchit Janjatiyan , Adim Jati Anushandhan Avam Prashikshan Sansthan Raipur Prakashankramank 2 pp.1-120.
- Joshi S.G.(2000) Medicinal plants, Oxford & IBH Publishing Co. Pvt.Ltd., New Delhi ,India.
- Kirtikar, K.R.& Basu B.D. (1933-1935), Indian Medicinal plants , Vol.I to VIII (4 Vols text & 4 Vols. Plates) Reprint 1994, Dehradun U.P.
- Maheshwari, J.K.Ed. (2000) Ethnobotany and Medicinal Plants of Indian Subcontinent Scientific Publishers, Jodhpur.
- Martin G.J. (1995) Ethnobotany Chapman and Hall. London.

Outcome :-


- Ethnobotanical research can provide a wealth of information regarding both past and present relationships between plants and the traditional societies.
- Ethnobotany may also prove an important tool in the search of new pharmaceuticals. In addition to its traditional roles in economic botany and exploration of human cognition, ethnobotanical research may be applied to current areas of study such as biodiversity prospecting and vegetation management.
- It is hoped that, in the future, ethnobotany may play an increasingly important role in sustainable development and biodiversity conservation.

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(Answer in one or two sentences)

 (02 Marks)
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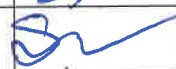



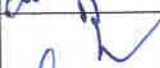

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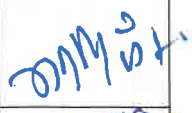

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