

HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)

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SCHEME OF EXAMINATION & SYLLABUS of M.Sc. (Botany) Semester Exam UNDER FACULTY OF LIFE SCIENCE Session 2021-23

**(Approved by Board of Studies)
Effective from July 2021**

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M.Sc. BOTANY

Semester	Paper	Title	External marks	Internal marks	Credit
First	I	Cytology	80	20	4
	II	Genetics	80	20	4
	III	Microbiology, Phycology and Mycology	80	20	4
	IV	Bryophyte, Pteridophyta and Gymnosperm	80	20	4
	LC - I	Lab Course-I (Based on paper I &III)	80	20	4
	LC - II	Lab Course-II (Based on paper II &IV)	80	20	4
Second	I	Taxonomy and diversity of plants	80	20	4
	II	Molecular Biology	80	20	4
	III	Plant physiology	80	20	4
	IV	Plant metabolism	80	20	4
	LC- I	Lab Course-I (Based on paper I &II)	80	20	4
	LC-II	Lab Course-II (Based on paper III &IV)	80	20	4
Third	I	Plant development and plant resources	80	20	4
	II	Plant Ecology– I (Ecosystem and vegetation ecology)	80	20	4
	III	Biotechnology I (Genetic engineering of plants & microbes)	80	20	4
	IV	Elective paper-1 Molecular plant pathology-I OR Elective paper-II Limnology-I OR Elective paper-III Ethno botany I	80	20	4
	LC-I	Lab Course-I (Based on paper I &II)	80	20	4
	LC-II	Lab Course-II (Based on paper III &IV)	80	20	4




Fourth	I	Plant reproduction and plant resources utilization	80	20	4
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	II	Plant Ecology II (Pollution and biodiversity conservation)	80	20	4
	III	Biotechnology II (Plant cell, tissue culture & organ culture)	80	20	4
	IV	Elective paper-I Molecular plant pathology-II OR Elective paper-II Limnology-II OR Elective paper-III Ethno botany II	80	20	4
	LC-I	Lab Course-I (Based on paper I &II)	80	20	4
	LC-II	Lab Course-II (Based on paper III &IV)	80	20	4

Choice Based Credit System: Semester II Course Forestry seed Technology.
Marks 100, Credit Points -03, Total Hours -50

Choice Based Credit System: Semester III Course Environmental Science.
Marks 100, Credit Points -03, Total Hours -50

- Each theory paper will have 5 questions of equal marks. First question will encompass all the five units without internal choice, whereas rest questions will be unit wise with internal choice.
- The respective teachers on each paper will ensure the internal evaluation by a class test and a seminar / poster presentation of 20 marks each and submit the foil and counter foil to the HOD by the end of the activity.



**PRACTICAL
SCHEME, LAB
COURSE-I
M.Sc. III SEMESTER (BOTANY)**

Time-5 Hours

Maximum Marks 100

1.	Practical based on Paper-I	30 Marks
2.	Practical based on Paper II	25 Marks
3.	Spotting	15 Marks
4.	Viva-voce	10 Marks
5.	Sessional (Internal Assessment)	20 Marks

Total- 100 Marks

**PRACTICAL SCHEME, LAB COURSE-II
M.Sc. III SEMESTER (BOTANY)**

Time-5 Hours

Maximum Marks 100

1.	Practical based on Paper-III	25 Marks
2.	Practical based on Paper-IV	30 Marks
3.	Spotting	15 Marks
4.	Viva-voce	10 Marks
5.	Sessional (Internal Assessment)	20 Marks

Total- 100 Marks



M.Sc. SEMESTER - III
PAPER - I
PLANT DEVELOPMENT AND PLANT RESOURCES

MAX.MARKS-80

UNIT-I

Introduction: Unique features of plant development. Metabolism of nucleic acids, proteins and mobilization of food reserves, tropisms; control of cell division, Programmed cell death in the life cycle of plants, Seed germination, Hormonal control of Seedling growth. Seed dormancy, Over coming of seed dormancy, Bud dormancy.

Root development : Organization of root apical meristem (RAM), Cell fates and lineages, Vascular tissue differentiation of root, Lateral roots, Root hairs, Root microbe interaction.

UNIT-II

Shoot development : Organization of shoot apical meristem (SAM), Cytological and molecular analysis of SAM. Control of tissue differentiation; especially Xylem and Phloem, Vascular cambium. Secretary ducts and laticifers, Wood development in relation to environmental factors.

UNIT-III

Leaf development : Development, Phyllotaxy, Control of leaf form, Differentiation of epidermis (with special reference to Stomata and Trichome) and Mesophyll cell. Senescence, Influences of hormones and environmental factors on senescence.

Flower development : Floral characteristics, Flower development, Genetics of floral organ differentiation: Homeotic mutant in Arabidopsis and Antirrhinum, Sex determination.

UNIT-IV

Plant resources : Origin, Evolution, Cultivation and Uses of (i) Food, Forage and Fodder crops, (ii) Fiber crops, (iii) Medicinal and Aromatic plants, (iv) Vegetable Oil-yielding crops (v) fruits.
Important fire-wood, Timber-yielding plants and Non-wood forest products (NFPs) such as bamboos, gums, tannins, dyes and resins.

SUGGESTED LABORATORY / FIELD EXERCISES

- Effect of gravity, unilateral light and plant growth regulators on the growth of young seedling.
- Role of dark and red light / far-red light on the expansion of cotyledons and epicotylar hook opening in pea.



- Study of living shoot apices by dissections using aquatic plants such as *Ceratophyllum* and *Hydrilla*.
- Study of monocot and dicot stem.
- Study of cytohistological zonation in the shoot apical meristem (SAM) in sectioned and double-stained permanent slides of a suitable plant such *Coleus*, *Kalanchoe*, and *Tobacco*. Examinations of shoot apices in monocotyledons in both T.S. and L.S. to show the origin and arrangement of leaf primordial.
- Study of alternate and distichous, alternate and superposed, opposite and superposed, opposite and decussate leaf arrangement. Examination of rosette plants (*Launaea*, *Mollugo*, *Raphanus*, *Hyoscyamus* etc.) and induction of bolting under natural conditions as well as by GA treatment.
- Microscopic examination of vertical section of leaves such as *Cannabis*, *Tobacco*, *Nerium*, *Maize* and *wheat* to understand the internal structure of leaf tissues and trichomes, glands etc.
- Study the C3 and C4 leaf anatomy of plants.
- Study of epidermal peels of leaves such as *Coccinia*, *Gailardia*, *tradescantia*, *Notonea*, etc. To study the development and final structure of stomata and stomatal index. Demonstration of the effect of ABA on stomatal closure.
- Study of whole roots in monocots and dicots.
- Examination of L.S. of root from a permanent preparation to understand the organization of root apical meristem and its derivatives. (Use *Maize*, Aerial roots of *Banyan*, *Pistia*, *Jussieuia* etc.).
- Origin of lateral roots.
- Study of leguminous roots with different types of nodules.
- Food crops: Wheat, Rice, Maize, Chickpea, Potato, Tapioca, Sweet Potato, Sugar cane, Morphology, Anatomy, Micro chemical tests for stored food material.
- Forage/Fodder crops: Study of any five important crops of the locality (For example fodder sorghum, Bajra, Bersem, Clove, Guar bean, Gram, Ficus sp.)
- Plant fibers: (i) Textile fibers: Cotton, Jute, Linen, Sunn hemp, Cannabis. (ii) Cordage fibers; Coir (iii) Fibers for stuffing: Silk and Cotton.

SUGGESTED READINGS :

- Bewley, J.D. and Black. M. 1994 Seeds : Physiology of development and germination. Plenum Press, New Yor.
- Bendre, A. and Kumar, 2004 A. Rastogi pub. Meerut, India.
- Crocker, W. and Barton V. 1953 Physiology of seeds. Waltham, Mass, U.S.A
- Santra, S.C., Chatterjee. T.P. and Das, 2005. A.P. College Botany Practical Vol. Li New Central pub. India.
- Parihar, NS. 1964, Hormonal control of plant growth. Asia pub. House, London.
- Wareing P.F. and Phillips I.D.J. 1973, Pergamon press. Oxford.



M.Sc. SEMESTER - III

**PAPER - II
PLANT ECOLOGY- I**

(ECOSYSTEM AND VEGETATION ECOLOGY)

MAX.MARKS-80

UNIT-I

ECOSYSTEM ORGANISATION:- Structure and functions, primary production (Methods of measurement, global pattern, controlling factors), Energy dynamics (trophic organization, energy flow pathways, ecological efficiencies), Litter fall and decomposition, (mechanism, substrate quality, and climatic factors), global biogeochemical cycles of C, N, P, and S, mineral cycles (pathways, processes and budgets) in terrestrial and aquatic ecosystems.

UNIT-II

ECOSYSTEM STABILITY AND MANAGEMENT

Concept (resistance and resilience), Ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystems, ecology of plant invasion, environment impact assessment, ecosystem restorations. Concept of Sustainable development, sustainability indicators.

UNIT-III

VEGETATION ORGANISATION:-

Concepts of community and continuum, analysis of communities (analytical and synthetic characters), Community coefficients, inter specific associations, ordination, and concept of ecological niche.

UNIT-IV

VEGETATION DEVELOPMENT :-

Temporal changes (cyclic and non cyclic), mechanism of ecological succession (relay floristic and initial floristic composition, facilitation, tolerance and inhibition models), change in ecosystem properties during succession.

REFERENCE BOOKS :

Smith, R.L. 1996. Ecology and field biology, Harper Collins, New York.

Odum, E.P. 1971. Fundamentals of Ecology, Saunders, Philadelphia.

Odum, E.P. 1983. Basic ecology, Saunders, Philadelphia.

Kormondy, E.J. 1996. Concepts of Ecology, Prentice Hall of India Pvt.Ltd. New Delhi.

Moldan, B. and Billharz, S. 1997 Sustainability indicators, John Wiley and Sons, New York.



Muller-Dombois, D and Ellenberg, H 1974 Aims and methods of vegetation ecology, Wiley, New York.

Begon M, Harper, J.L. Townsend, C.R. 1996. Ecology, Blackwell science, Cambridge, USA.

Ludwig, J. and Reynolds, J.F, 1988 Statistical ecology, John Wiley and Sons. Barbour, M.G. Burk, J.H. and Pitts, W.D. 1987. Terrestrial plant ecology, Benjamin Cummings Publication Company, California.

Chapman, J.L. and Reiss, M.J. 1988 Ecology principles and applications, Cambridge University press, Cambridge, U.K.

LIST OF PRACTICALS

1. To determine minimum size and number of quadrat required for reliable estimate of biomass in grassland.
2. To compare protected and unprotected grassland stands using community coefficients (similarity indices).
3. To analyze plant communities Bra Curtis ordination method.
4. To estimate IVI of the species in a woodland using point centered quarter method.
5. To calculate mean, variance, standard deviation, standard error, coefficient of variations and to use t test for comparing two means related to ecological data.
6. To find out the relationship between two ecological variables using correlation and regression analysis.
7. To find out important grassland species using chi square test.
8. Scientific visits to a protected area, a wet land, a mangrove, NBPGR, BSI, CSIR, ICAR labs and a recognized botanical gardens or a museum.

REFERENCE BOOKS :

Ludwig, J.A. and Reynolds, J.F. 1988, Stastical Ecology, Willey New York.

Krebs, C.J. Ecological methodology, Herper and Row, New York, USA

Pielou, E.C. 1984. The interpretation of ecological data, Wiley, New York.

Moore, P.W. and Chapman, S.B. 1986. Methods inplant Ecology, Blackwell scientific publications.

Misra, R. 1968. Ecology work book, Oxford & IBH, New Delhi.

Smith, R.L. 1996. Ecology and Field Biology, Harpercollins, New York.

Muller-Dombois, D and Ellenberg, H. 1974. Aims and methods of vegetation ecology, Wiley, New York.

Sokal, R.R. and Rohlf, F.J. 1995. Biometry, W.H. Freeman & Co. San Francisco.



M.Sc. SEMESTER - III
PAPER – III
BIOTECHNOLOGY AND GENETIC ENGINEERING OF PLANTS AND MICROBES
MAX.MARKS-80

UNIT-I

BIOTECHNOLOGY - Basic concepts, principles and scope.

RECOMBINANT D.N.A. TECHNOLOGY : Gene cloning principles, Tools - Restriction Endonucleases, DNA modifying enzymes, Choice of Vectors, Plasmid, Cosmid, Bacteriophage vectors, phagmids, Artificial chromosomes. Shuttle vectors, Yeast vectors, Expression vectors and techniques, construction of genomic / cDNA libraries.

UNIT-II

MICROBIAL GENETIC MANIPULATION: Bacterial transformation, selection of recombinants and transformants, genetic improvement of industrial microbes and nitrogen fixers, fermentation technology.

GENETIC ENGINEERING OF PLANTS : Aims, strategies for development of transgenies (with suitable examples), Gene transfer methods - Vector mediated gene transfer-Agrobacterium the natural genetic engineer. t-DNA mediated DNA transformation. Virus mediated gene transfer, Vectorless or direct DNA transfer.

UNIT-III

DNA SYNTHESIS AND SEQUENCING : Chemical synthesis of gene, Polymerase chain reaction, its variation, application, advantages and limitations, DNA sequencing - Sanger and Coulson method, Maxam Gillbert method, High throughput DNA sequencing, DNA finger printing.

UNIT-IV

GENOMICS AND PROTEOMICS : Genetic and physical mapping of genes, molecular markers for intregation of useful traits, Transposon mediated gene tagging, genome projects, bioinformatics, functional genomics, microarrays, protein profiling and its significance.



Suggested Reading :

1. Brown, T.A. 1999. Genomes, John Wiley and Sons (Asia) Pvt.Ltd., Singapore.
2. Callow, J.A., Fort-Lloyd, B.V. and Newbury, H.J. 1997.
3. Biotechnology and Plant Genetic Resources : Conservation and Use, CAB International, Oxon, UK.
4. Chrispeels, M.J. and Sadava, 1994, Plants, Genes and Agriculture, Jones & Barlloy Publishers, Boston, USA.
5. Glazer, A.N. and Nikaido, 11, 1995 Microbial Biotechnology. W.H. Freeman & Company, New York, USA.
6. Gustafson, J.P. 2000, Genomes Kluwer Academic Plenum Publishers, New York, USA.
7. Henry, R.J. 1997, Practical Applications of Plant Molecular Biology, Chapman & Hall London, UK/
8. Jolles, O. and Jornvall, H. (eds) 2000. Proteomics in Functional Genomics. Birkhauser Verlag, Bsel, Switzerland.
9. Old, R.W. and Primrose, S.B. 1989, Principal of Gene Manipulation, Blackwell Scientific Publication, Oxford, UK, Primrose, S.B. 1995, Principles of Genome Analysis, Blackwell Science Ltd., Oxford, UK.
10. Raghavan, V. 1997, Molecular Biology of Flowering Plants, Cambridge University Press, New York, USA.
11. Shantharam, S. and Montgomery, J.F. 1999, Biosafety, and Biodiversity, Oxford and IBH Publishing Co. Pvt.Ltd., New Delhi.

Suggested Laboratory Exercises :

1. Growth characteristics of E. coli using plating and turbidimetric methods.
2. Isolation of plasmid from E. coli by alkaline lysis method and its quantitation spectrophotometrically.
3. Restriction digestion of the plasmid and estimation of the size of various DNA fragment.
4. Cloning of DNA fragment in a plasmid vector, transformation of the given bacteria population and selection of recombinants.
Demonstration of DNA sequencing by Sanger's dideoxy method.

Suggested Reading (for laboratory exercise)

1. Plant molecular biology Manual, 2nd edition, Kluwer Academic Publishers, Dordrecht, The Netherland.
2. Glick, B.R. and Thompson, J.E. 1993. Methods in Plant Molecular Biology and Biotechnology, CRS press, Boca Raton, Florida.
3. Glover, D.M. and Hames, B.D. (Eds), 1995, DNA Cloning 1: A Practical Approach; Core Techniques, 2nd edition, PAS, IRL Press at Oxford University Press, Oxford.
4. Hackett, P.B., Fuchs, J.W. 1988. An introduction to Recombinant DNA Techniques; Basic Experiments in Gene manipulation. The Benjamin Cummings/ Publishing Co.; Inc Menlo, Calio Park, Callifornin.
5. Shaw, C.H. (Ed.) 1988, Plant Molecule Biology: A Practical Approach, IRL Press, Oxford.



M.Sc. SEMESTER - III
PAPER - IV
ELECTIVE COURSE-- MOLECULAR PLANT PATHOLOGY-I

MAX.MARKS-80

UNIT-I

1. Introduction and history of plant pathology.
2. General Principles of plant pathology and classification of plant diseases.
3. **Diseases inciting organisms** - Animate Pathogens- fungi, Bacteria, Mycoplasma, Viruses, Nematodes, their general characteristics, heterotrophic behaviour with emphasis on parasitism ability and virulence.

UNIT-II

1. **Disease Syndrome and General Symptoms of plant diseases** : Pathogenic and nonpathogenic; Symptoms caused by fungi, Bacteria, Viruses, Mycoplasma and Nematodes.
2. **Sources of Infection** : Seeds, soil, water and airborne diseases of plants; Significance of phyllosphere and rhizosphere studies.
3. **Pathogenesis** - Dissemination of plant pathogens; Mode of infection; Inoculum potential.

UNIT-III

1. **Effect of environment on disease development**- Predisposing factors; Survival of fungi; Germination of spores; Disease initiation and Epidemics.
2. **Host Parasites relationship** - Mechanism and physiology of infection, Path of infection, Role of enzymes, growth regulators and toxins in pathogenesis.
3. **Physiological specialization** : General account; Physiological specialization with special reference to smuts and rusts.

UNIT-IV

1. **Recurrence of disease** with special reference of recurrence of rust disease in India.
2. **Methods of Studying Plant Diseases**: General account, Macroscopic study, Microscopic study, Koch postulates, Culture technique, Preparation of culture tubes, media preparation, Inoculation, Isolation, Pure culture, Parasitism of obligate parasites, Methods in bacteriology, Techniques required in introductory bacteriology



Suggested Laboratory Exercises:

Experiment based on theory syllabus.

SUGGESTED READINGS :

1. Plant Pathology - J.C. Walkar
2. Fungi and plant diseases - B.B. Mundkar
3. Plant Pathology – G.N. Agrios
4. Plant Pathology - Wheeler
5. Plant Pathology (Vol.1-3) – Horsfall & Dimon
6. A text book of Modern Plant Pathology – K.S. Bilgrami and H. S.Dubey
7. Plant Pathology – R.S.singh
8. An introduction to Principles of Plant pathology - R.S.singh
9. Plant Disease of Crop plants in India – N.G. Rangaswamy.
10. Plant Pathology problems and progress- Horsfall
11. Essentials of Plant Pathology- V.N. Pathak
12. Plant Pathology – Butter and Jones.
13. Plant Pathology- R.S. Malhotra
14. Crop plant Disease Colender- IARI-India.
15. Physiology of Fungus- – K.S. Bilgrami and H. S.Dubey
16. Micro-organisms in laboratory – G.P. Agarwal and S.K. Hasija.
17. Physiology of fungi – V.G.Lily and H.L.. Barnet.
18. Illustrated Genera of Imperfecti fungi- H.L.. Barnet and B.B. Hunter.
19. Microbiology and Plant Pathology- P.D.Sharma
20. Plant Pathology- P.D.Sharma
21. Microbiology – P.D.Sharma
22. The Fungi – G. Sumbali
23. Fungicides and crop protection- H.G.Mewitt
24. Fungal diseases of plants- B.M. Duggar
25. Plant Pathology – P.C. Trivedi
26. Plant Pathology – G.P. Gupta
27. Virus and Plant diseases S.R.Mishra
28. Bacterial Diseases- V. Kumar
29. Biotechnology and Plant Pathology- V.K.Jain
30. Laboratory manual of Plant Pathology- D.K.Jha.
31. Modern technology of Plant Pathology- V.Suri.



M.Sc. SEMESTER - III
PAPER - IV
ELECTIVE PAPER- MOLECULAR PLANT PATHOLOGY
Lab Course II

Suggested laboratory/Field Exercises

1. **Symptomatological Study:** Study of symptoms of plant diseases cause by infection of fungi/bacteria/Virus/mycoplasma.
2. Study of instruments used during plant pathological experiments.
3. **Sterilization Techniques:** Principles and methods of sterilization.
4. **Culture Techniques:**
 - Preparations of Media; Nutrient broth, Nutrient Agar, Potato Dextrose Agar.
 - Adjustment of pH of Media.
 - Preparation of stabs and slants.
 - Pouring of plates.
 - Inoculation Technique.
5. **Methods in Bacteriology:**
 - Methods of obtaining pure culture of Bacteria.
 - Methods of staining of Bacteria- gram staining for differentiation of Bacteria.
6. Study of fungal/bacteria/viral/mycoplasmal diseases of plants through field visit/museum specimens/photographs.

Suggested Reading (For Laboratory Exercises):

College Botany Practical Vol. II - SC Santra, TP Chatterjee, AP Das
Experiments in Microbiology/Plant Pathology, Tissue culture and Microbial
Biotechnology-Vth Edition by KR Aneja.

Practical Microbiology-DR RC Dubey and DR DK Maheshwari



M.Sc. SEMESTER – III (Botany)
PAPER – IV
ELECTIVE COURSE-- LIMNOLOGY-I
MAX. MARKS-80

UNIT-1

- 1.Limnology–Definition, historical development and scope of Limnology.
- 2.The characteristics of water, Hydrological cycle, Global water balance.
- 3.Types of fresh water habitats and their ecosystem-
(a) Ponds, Streams and rivers. (b) Lakes– General characteristics of lakes and classification of lakes. Definition depth of lakes. Retention and replacement of water in lakes, origin of lakes.

UNIT-II

- 1.Morphometry–Use of various morphometric parameters and Zonation. Food Chains, Food webs, Trophic levels and Energy flow in freshwater ecosystems. Eutrophication: Causes, mechanism and significance, Management of freshwater bodies.

UNIT-III

Physical Characteristics of Lake water and their role.

1. Light and Temperature-
(a) Transmission and absorption of Light, Colour and Transparency of light
(b) Distribution of heat in lakes, Temperature Radiation, Stratification and Heat Budget.
Comparative analysis of river, reservoir and lakes.
2. Water movements: Flow of water, surface and internal water movements. Turbidity, Salinity and Total Dissolved Solids.

UNIT-IV

3. Chemical characteristics of fresh water with special reference to different parameters-Dissolved gases (Oxygen, Carbon di oxide, Hydrogen Sulphide), Seasonal changes in dissolved gases and pH, Hardness, Alkalinity, Sulphates, Nitrogen, Phosphorus, Iron, Sulphur and Silica cycle, Arsenic, and Fluoride.



Suggested Readings:

1. Anathakrishnan : Bioresources Ecology
2. Goldman : Limnology
3. Odum : Ecology
4. Pawlosuske : Physico-chemical methods for water LimnologyWetzel : Chemical and biological methods for water pollution studies
5. Trivedi&Goyal : Chemical and biological methods for water pollution studies
6. Welch : Limnology Vols.I-II
7. Perkins : Ecology
8. Arora : Fundamentals of environmental biology
9. Ghoshe : Toxicology
- 10.Sood : Toxicology

Suggested Laboratory Exercises

1. Construction of morphometric maps of aquatic systems.
2. Measurement of transparency and temperature.
3. Analysis of different dissolved gases: Dissolved oxygen and Carbon dioxide.
4. Analysis of lake water for bicarbonates, carbonates, total alkalinity, chlorides etc.



M.Sc.(Botany) III SEMESTER

PAPER-IV

Elective Course –Ethno botany

MAX. MARKS: 80

Unit I

- **Ethno botany** : History, general account and its sub disciplines.
- Interdisciplinary approaches & aim of ethno botany.
- Main world centers of Ethno botanical studies, workers & literature of Ethno botany
- Ethno botany with special reference to Chhattisgarh.
- Ethno botanical Research done in India:
- Ethno botany in relation to national priorities and health care programme.
- Practical application of ethno botany for tribal development programme.

Unit II

- Methods and techniques in ethno botany.
- General account of major and minor tribes of Chhattisgarh with special reference to Gond ,Kamar ,Baiga , Abujhmara .
- Ethno botanical aspect of Art & literature.
- Abstract ethno botany with special reference to folklore, Taboos, Majico-religious beliefs.

Unit –III

- Ethno botanical importance of Bacteria, Algae, Fungi, Bryophyte, Pteridophyta and Gymnosperm.
- Ethnoveterinary medicines from plants.
- Major & Minor Forest Products (NWFPs) of Chhattisgarh.
- Ethno botany in relation to livelihood security reference to tribes.

Unit- IV

- Ethnobotanical study of following plants with special reference to their medicinal importance
1. *Azadirachta indica* (Neem) 2. *Emblica officinalis* (Amla) 3. *Ricinus communis* (Andi) 4. *Madhuca indica* (Mahuaa) 5. *Cassia fistula* (Amaltash) 6. *Ficus religiosa* (Pipal) 7. *Oscimumsanctum* (Tulsi) 8. *Asparagus racemosus* (Satavar) 9. *Aloe vera* (Ghrit kumari) 10. *Andographis paniculata* (Bhui neem).



Suggested Readings:-

- Baker, H.G. 1978. Plants and Civilization (3rd edition). C.A. Wadsworth, Belmont.
- Chandel, K.P.S., Shukla, G. & Sharma, N. 1996. Biodiversity in medicinal and Aromatic Plants in India: Conservation & Utilization. National Bureau of Plant Genetic Resources, New Delhi.
- Chrispeels, M.J. & Sadava, D. 1977. Plants, Food & People. W.H Freeman and Co., San Francisco.
- Ambasta S.P. (ed.) (1986). The Useful Plants of India. Publications & Information Directorate, CSIR, New Delhi India.
- Anon. (1978). The tribes of Madhya Pradesh. Dept. of Tribal Welfare, Govt. of M.P. Bhopal.
- Arnold. J. E. M. & Ruiz Perez, M, (1998). The role of non-timber forest products in conservation and development. In: Wallenberg, Eva. & Andrew Ingles (Eds.) Income from the Forest, CIFOR 1998, Indonesia, pp-17 to 41.
- Asolkar, L.V. (1992). Second Supplement to Glossary of Medicinal Plants, (CSIR) NISCOM, New Delhi, India.
- Bal, S.N. (1984). Catalogue of Medicinal Plant Exhibits. BSI. Bishne Singh Mahendra Pal Singh, Cannaught Place, Dehra Dun, India.
- Buch, M.N. (1991). Forest of Madhya Pradesh, Madhya Pradesh Madhyam Bhopal.
- Chopra, R.N.; Badhwar, R.L. & Ghosh, S. (1965). Poisonous Plants of India. Vol. I. 2nd Ed. ICAR, New Delhi, India.
- Cotton C.M, (1996). Ethnobotany: Principals and Applications, John Willey & Sons, Chichester. New York.
- Faulks. P.J. (1958) An Introduction to Ethnobotany: Moredale Publications Ltd. London, England.
- Harshberger, J.W. (1896). Purposes of Ethnobotany Bot. Gaz. 21: 146-154.
- Jain S.K. and Phuipps, R.D. (1991). Medicinal Plants of India Rec. Pub. Algonac USA 2 Vols. 1-849.
- Jain, S. K. (1991). Dictionary of India folk medicine and Ethnobotany. Deep publications. NEW DELHI, pp. 1-311.
- Jain, S. K. (1995). In Manual of Ethnobotany (edt. S.K. Jain,) Scientific Pubisher, Jodhpur. 128-134.
- Jain, S.K. & Rao, R.R. (1977). A handbook off field and herbarium methods. New Delhi: Today & Tomorrow's Printers and Publishers.
- Jain, S.K. (1981). Glimpses of Indian Ethnobotany. Oxford & IBH New Delhi, India.
- Jain, S.K. (1989). Methods and Approaches in Ethnobotany. Society of Ethnobotanist. Lucknow.
- Jain, S.K. and Mudgal, Hand Book of Ethanobotany. Bisen pal Singhm Mahendra Pal Singh Publication.
- Vaishnaw T.K. (2004). Chhattisgarh ki Anusuchit Janjatiyan, Adim Jati Anusandhan Avam Prshikshan Sansthan Raipur. Prakashan kramank 2, pp. 1-120



- Varghese, E. S. V D. (1996). Applied Ethnobotany - A case study among the Kharias of Central India. New Delhi. Deep Publications
- Jajoria, E, V.K. (1998); "The Kamar [A way of life.] Vanya Prakashan., Tribal Research and Development Institute. 35, Shamla Hills, Bhopal., ethnobot. Res.2:303-3 15.
- 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.

Suggested Laboratory Exercises:-

1. Description and identification of medicinal plants and its medical properties.
2. Preparation of medicinal plants herbarium and photographs.
3. Herbal preparation:-
 - a. Extract of Tulsi leaves.
 - b. Ointment from Neem Leaves.
 - c. Ayurvedic tooth powder.
 - d. Face pack preparation from various herbs.
 - e. Preparation of Triphla.
 - f. Kwath of Triphla.
 - g. Preparation of diabetes controlled powder.
 - h. Preparation of herbal shampoo.
4. To cultivate at least two medicinal plant in earthen pot.
5. Field Study of Forest area or Tribal area.
6. Documentation technique of Ethnobotanical knowledge.
7. To separate active principles from the extract of Medicinal plant.





