

BOTANY
(Semester-III)

(For examination to be held in the years 2015, 2016, 2017)

Course No: B0-301 (Theory) **Title: Seed Bearing Plants: Characteristics and Systematics**
Duration of Exam: 3hrs **Maximum Marks: 100**

Credits: 04 **Theory Examination: 80 Marks**
 Internal Assessment: 20 Marks

Objectives:

Gymnosperms and angiosperms represent the important botanical groups exhibiting great diversity. The course, therefore, is designed to study these groups for structural aspects and analyse these in a scientific manner for establishing their grouping.

UNIT-I: Seed Plants-Origin, Evolution and Characteristics

- 1.1 Fossilization –Processes and types, age of fossils and their importance.
- 1.2 Fossil gymnosperms - a general account; Bennettiales (Cycadeoidales)- history and distribution.
- 1.3 Characteristic features, morphology, anatomy and reproduction in *Williamsonia* and *Cycadeoidea*.
- 1.4 Fossil angiosperms – a general account.

UNIT-II Classification, Morphology and Reproduction in Gymnosperms

- 2.1 General characters of gymnosperms; classification of gymnosperms as proposed by Sporne (1965).
- 2.2 Morphology, anatomy, reproduction and life cycle of *Cycas*
- 2.3 Morphology, anatomy, reproduction and life cycle of *Pinus*.
- 2.4 Morphology, anatomy, reproduction and life cycle of *Ephedra*.

UNIT-III Angiosperm-Origin and Nomenclature

- 3.1 Origin of angiosperms, characteristics of some primitive angiosperms with special reference to *Magnolia*.
- 3.2 History of angiosperm taxonomy - classical and modern, species concept and speciation.
- 3.3 Taxonomic identification: taxonomic keys and literature (floras, monographs and reviews).

- 3.4 Botanical nomenclature- principles and rules, taxonomic ranks, type concept and principle of priority.

UNIT-IV Classification and Tools in Angiosperm Taxonomy

- 4.1 Salient features of the classification of Bentham and Hooker; merits and demerits.
4.2 Salient features of the classification of Engler and Prantl; merits and demerits.
4.3 Contribution of anatomy and embryology to taxonomy.
4.4 Contribution of cytology and phytochemistry to taxonomy.

UNIT-V Diversity of Angiosperms

- 5.1 Morphological diversity of families: Ranunculaceae, Brassicaceae, Malvaceae and Asteraceae.
5.2 Morphological diversity of families: Fabaceae, Rosaceae, Apiaceae and Acanthaceae.
5.3 Morphological diversity of families: Apocyanaceae, Solanaceae, Lamiaceae and Euphorbiaceae.
5.4 Morphological diversity of families: Liliaceae, Amaryllidaceae and Poaceae.

Note for paper setters

The question paper will have 2 sections. Section 'I' will be compulsory having ten questions of 2 marks each. The questions will be short answer type having answers not exceeding 20 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

Internal Assessment (Total Marks: 20)

20 marks for theory paper in a subject reserved for internal assessment shall be distributed as under:

| | | |
|------|---|-----------------|
| (i) | Class Test | 10 Marks |
| (ii) | Two Written Assignments/Project Reports | 10 Marks |
| | | (05 Marks each) |

Suggested readings:

1. Bhatnagar, S.P. and Moitra, A. 1996. Gymnosperms. New Age International Limited, New Delhi.
2. Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperm Taxonomy. Oliver and Boyd, London.

3. Gifford, E.M. and Foster, A.S. 1988. Morphology and Evolution of Vascular Plants. W.H. Freeman and company, New York.
4. Jeffery, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press , London.
5. Jones, S.B. and Luchsinger, A.E. 1986. Plant Systematics. 2nd Edn. Mc Graw Hill Book Co., New York.
6. Radford, A.E.1986. Fundamentals of Plant Systematics. Harper and Row, New York.
7. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH Pvt. Ltd., New Delhi.
8. Sporne, K.R. 1965. The Morphology of Gymnosperms. Hutchinson and Co. Ltd., London.
9. Stace, C.A. 1989. Plant Taxonomy and Biosystematics. 2nd Edn., Edward Arnold, London.
10. Stewart, W.M. 1983. Paleobotany and the Evolution of Plants. Cambridge University Press, Cambridge.

BOTANY
(Semester-III)

(For examinations to be held in the years 2015, 2016, 2017)

Course No: B0-301 (Practical) Title: Seed Bearing Plants: Characteristics and Systematics
Duration of Exam: 3hrs Maximum Marks: 50

Credits: 02 External Examination: 25 Marks
Internal Assessment: 25 Marks

ANGIOSPERMS

Locally available genera/species of following families should be included. This list is only indicative. Teachers may select plants available in their locality.

1. Ranunculaceae: *Ranunculus, Delphinium*
2. Brassicaceae: *Brassica, Alyssum, Iberis, Coronopus*
3. Malvaceae: *Hibiscus, Abutilon*
4. Asteraceae: *Tagetes, Ageratum*
5. Fabaceae:
Faboideae: *Lathyrus, Cajanus, Melilotus, Trigonella,*
Caesalpinioideae: *Cassia, Caesalpinia,*
Mimosoideae: *Prosopis, Mimosa, Acacia.*
6. Apiaceae: *Coriandrum, Foeniculum, Anethum*
7. Acanthaceae: *Adhatoda, Peristrophe*
8. Apocynaceae: *Vinca, Thevetia, Nerium*
9. Asclepiadiaceae: *Calotropis*
10. Solanaceae: *Solanum, Withania, Datura, Petunia*
11. Euphorbiaceae: *Euphorbia, Phyllanthus*
12. Lamiaceae: *Ocimum, Salvia*
13. Chenopodiaceae: *Chenopodium, Beta*
14. Liliaceae: *Asphodelus, Asparagus, Allium*
15. Poaceae: *Zea mays, Triticum aestivum, Oryza sativa*

GYMNOSPERMS

CYCAS

- i. Habit, armour of leaf bases on the stem (if specimen is not available show photograph), very young (circinate venation) and old foliage leaves, scale leaves, bulbils, male cone (specimen), microsporophyll, megasporophyll, mature seed.
- ii. Study through permanent slides-normal root (T.S), stem (T.S) (if sections are not available show photographs) and ovule (L.S.)
- iii. Study through hand sections or dissections- coralloid root (T.S), rachis (T.S), leaflet (V. S.) and Pollen grains (W.M).

PINUS

1. Habit, long and dwarf shoots showing cataphylls and scale leaves, T.S. Wood showing growth rings, male cones of 1st year, 2nd year and 3rd year, female cones, winged seeds.
2. Study through permanent slides-root (T.S), female cone (L.S), ovule (L.S) and embryo (WM) showing polycotyledonous conditions.
3. Study through hand sections or dissections-young stem (T.S), old stem (Wood) (T.L.S and R.L.S), needle (T.S), male cone (L.S and T.S) and Pollen grains (W.M.).

EPHEDRA

1. Habit and structure of whole male and female cones
2. Permanent slides-female cone (L.S)
3. Hand sections, dissections-node (L.S), internode (T.S), macerated stem to see vessel structure, epidermal peel mount of vegetative parts to study stomata; male cone (T.S and L.S) and pollen grains (W.M.)

In addition to laboratory exercises, study of plant diversity in nature is required, for which a field trip should be organized.

Note for distribution of 25 Marks in internal assessment in Practical Examination:

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|--|----------|
| 1. Day to Day performance in the laboratory: | 12 Marks |
| 2. Class Test: | 08 Marks |
| 3. Regularity of Attendance: | 05 Marks |

BOTANY
(Semester-IV)

(For examinations to be held in the years 2016, 2017, 2018)

| | |
|-----------------------------------|--|
| Course No: B0-401 (Theory) | Title: Seed Bearing Plants-Diversity, Structure, Development and Reproduction |
| Duration of Exam: 3hrs | Maximum Marks: 100 |
| Credits: 04 | Theory Examination: 80 Marks Internal Assessment: 20 Marks |

Objectives:

Seed bearing plants represent the most advanced groups of plant kingdom. Proper knowledge about their structure, mode of development and mechanisms of multiplication will assist in manipulating these for better human utility. This course will create awareness among students about proper utilization of important plant parts.

UNIT-I: Diversity and Structure

- 1.1 Basic architecture of flowering plants; structural diversity in annual, biennial and perennial plants.
- 1.2 Branching pattern in seed plants; monopodial and sympodial growth pattern and canopy architecture.
- 1.3 Structural modifications of roots and shoots –a detailed account; interaction of microbes with roots (a basic concept).
- 1.4 Dwindling plant diversity – factors responsible for it; strategies adopted for its conservation.

UNIT-II: Root and Shoot

- 2.1 Apical meristem of root, its position, structure and derivatives.
- 2.2 Apical meristem of shoot, its organization and role.
- 2.3 Vascularisation of primary shoot in monocotyledons and dicotyledons, leaf traces and leaf gaps, branch traces and branch gaps.
- 2.4 Epidermal modifications in monocots and dicots (trichomes and stomata), their structural organization and systematic value.

UNIT-III: Primary and Secondary Structure

- 3.1 Vascular cambium and its derivatives; their role in translocation of water, minerals and food.
- 3.2 Secondary growth – a general account; growth rings; heartwood, sapwood; periderm.

- 3.3 Leaf-origin, development and vascularisation; phyllotaxy, senescence and abscission of leaves.
- 3.4 Internal structure of monocot and dicot leaf; adaptations to water stress.

UNIT-IV Flower

- 4.1 Flower: structure, development and functions.
- 4.2 Structure of anther, male gametophyte and microsporogenesis; structure of pistil, ovule, female gametophyte and megasporogenesis.
- 4.3 Pollination: Types, attractants and rewards for pollinators; pollen-pistil interaction; self-incompatibility.
- 4.4 Double fertilization, embryo and endosperm development, cytology and functions of endosperm; formation of fruit.

UNIT-V Units and Mechanisms of Multiplication

- 5.1 Seed formation and its significance.
- 5.2 Seed dormancy; types and importance.
- 5.3 Seed dispersal strategies.
- 5.4 Vegetative propagation: grafting, layering, budding; economic aspects and as means of maintaining genetic constancy.

Note for paper setters

The question paper will have 2 sections. Section 'I' will be compulsory having ten questions of 2 marks each. The questions will be short answer type having answers not exceeding 20 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

Internal Assessment (Total Marks: 20)

20 marks for theory paper in a subject reserved for internal assessment shall be distributed as under:

- | | | |
|------|---|-----------------------------|
| (i) | Class Test | 10 Marks |
| (ii) | Two Written Assignments/Project Reports | 10 Marks (05 Marks each) |

SUGGESTED READING

1. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms. 4th Edn. Vikas Publishing House, Delhi.
2. Cutter, E.G. 1969. Plant Anatomy: Experiment and Interpretation. Part-I: Cells and Tissues. Edward Arnold, London
3. Cutter, E.G. 1970. Plant Anatomy: Experiment and Interpretation. Part-II: Organs. Edward Arnold London.
4. Esau, K. 1977. Anatomy of Seed Plants. 2nd Edn. John Wiley and Sons, New York.
5. Faegri, K and Vander Pijl. 1979. The Principles of Pollination Ecology. 2nd Edn. Pergamon Press, Oxford.
6. Fahn, A. 1974. Plant Anatomy. 2nd Edn. Pergamon Press.
7. Hartmann, H.T. and Kestler, D.E. 1976. Plant Propagation: Principles and Practices. 3rd Edn., Prentice Hall of India Pvt. Ltd. New Delhi.
8. Kind, J. 1997. Reaching for the sun: How Plants work. Cambridge University Press, Cambridge, U.K.
9. Mauseth, J.D. 1988. Plant Anatomy. The Benjamin Cummings Publishing Company, Menio Park, California, USA.
10. Proctor, M and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.
11. Raven, P.H., Evert, R.F. and Eichhorn, S.E. 1999. Biology of Plants, 5th Edn. W.H. Freeman and Co. Worth Publishers, New York.
12. Thomas, P. 2000. Trees: Their Natural History. Cambridge University Press, Cambridge.

BOTANY
(Semester-IV)

(For examinations to be held in the years 2016, 2017, 2018)

| | |
|--------------------------------------|--|
| Course No: B0-401 (Practical) | Title: Seed Bearing Plants-Diversity, Structure, Development and Reproduction |
| Duration of Exam: 3hrs | Maximum Marks: 50 |
| Credits: 02 | External Examination: 25 Marks |
| | Internal Assessment: 25 Marks |

1. Study of any commonly occurring dicotyledonous plant (for example *Solanum nigrum* or Kalanchoe) to understand the body plan.
2. Life forms exhibited by flowering plants (by a visit to a forest or a garden). Study of tree like habit in cycads, bamboos, banana, traveller's tree (*Ravenala madagascariensis*) or *Yucca* and comparison with true trees as exemplified by conifers and dicotyledons.
3. L.S. of shoot tip to study the cyto-histological zonation and origin of leaf primordia.
4. Monopodial and sympodial types of branching in stems (especially rhizomes).
5. Anatomy of primary and secondary growth in monocots and dicots using hand sections and prepared slides. Structure of secondary phloem and xylem. Growth rings in wood, Microscopic study of wood in T.S., T.L.S., and R.L.S.
6. Study of diversity in leaf shape, size, thickness, surface properties; internal structure of leaf, structure and type of stomata (using epidermal peels of leaf).
7. Anatomy of the root; primary and secondary structure.
8. Examination of wide range of flowers available in the locality and methods of their pollination.
9. Structure of anther, microsporogenesis (using slides) and pollen grains (using whole mounts). Pollen viability using *in vitro* pollen germination.
10. Structure of ovule and embryo sac development (using serial sections).
11. Test of self-incompatibility (using *Petunia axillaris*, *Brassica campestris*, *B. oleracea* or other suitable available material) using field pollinations.
12. Nuclear and cellular endosperm, embryo development in monocots and dicots (using slides and dissections).
13. Simple experiments to show vegetative propagation (leaf cuttings in *Bryophyllum*, *Sansevieria*, *Begonia*; stem cuttings in *Rosa*, *Salix*, *Pothos*, *Saccharum* and *Bougainvillea*).
14. Germination of non dormant seeds.

Note for distribution of 25 Marks in internal assessment in Practical Examination:

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|----|---|----------|
| 1. | Day to Day performance in the laboratory: | 12 Marks |
| 2. | Class Test: | 08 Marks |
| 3. | Regularity of Attendance: | 05 Marks |

BOTANY
(Semester-V)

(For examinations to be held in the years 2016, 2017, 2018)

Course No: B0-501 (Theory)
Duration of Exam: 3hrs

Title: Physiology, Biochemistry and Biotechnology
Maximum Marks: 100

Credits: 04

Theory Examination: 80 Marks
Internal Assessment: 20 Marks

Objectives:

The course is designed to make students appreciate the various mechanisms underlying the important activities of plants as absorption of water and minerals, solute transport, transpiration, flowering, nitrogen metabolism etc. Another aim is to impart students knowledge regarding the biotechnological techniques and their utility in crop improvement.

Unit-I

- 1.1 Discovery and nomenclature of enzymes, characteristics of enzymes, concept of holoenzyme, apoenzyme, co-enzyme and co-factors.
- 1.2 Regulation of enzyme activity; mechanism of enzyme action.
- 1.3 Diffusion of water, osmosis, water potential, absorption and transport of water through xylem.
- 1.4 Types and mechanism of transpiration and mechanism of opening and closing of stomata.

Unit-II

- 2.1 Concept of macro- and micro elements and mineral uptake. Importance of Ca, N, P, K, Mg to the plants and their deficiency symptoms.
- 2.2 Mechanism of transport of organic substances in phloem, source-sink relationship and factors affecting translocation.
- 2.3 Photosynthesis – a general account of photosynthetic pigments, red drop and enhancement effect; concept of photosystems, PSI and PSII; cyclic and non-cyclic photophosphorylation.
- 2.4 Carbon fixation- Calvin cycle, C₄, Crassulacean Acid Metabolism and photorespiratory pathways and their significance.

Unit-III

- 3.1 Respiration- Glycolytic pathway, Kreb's cycle, Pentose Phosphate pathway.
- 3.2 Electron transport mechanism and oxidative phosphorylation, mechanism of synthesis of ATP (Chemi-osmotic theory).
- 3.3 Biological nitrogen fixation, importance of nitrate and nitrite reductases and ammonium assimilation.
- 3.4 Biosynthesis and functions of phospholipids and β -oxidation pathway.

Unit-IV

- 4.1 Plant growth and development - phases and kinetics of growth; seed germination - general account, factors affecting seed germination.
- 4.2 Physiology of flowering - florigen concept, photoperiodism, biological clocks.
- 4.3 Phytochromes - their discovery, physiological role and mechanism of action.
- 4.4 Plant hormones - auxins, gibberellins, cytokinins, abscisic acid and ethylene, their biosynthesis and importance.

Unit-V

- 5.1 Concept of Biotechnology, recombinant DNA technology and gene cloning; restriction endonucleases, Agarose gel electrophoresis, Southern blotting; genomic and cDNA libraries.
- 5.2 Salient features of cloning vectors- plasmids, bacteriophages and cosmids; Biology of *Agrobacterium* vectors for gene delivery.
- 5.3 Basic concepts of plant tissue culture, cellular totipotency, differentiation and morphogenesis, protoplast fusion, anther culture.
- 5.4 Salient achievements in crop biotechnology; Transgenic plants – a general account.

Note for paper setters

The question paper will have 2 sections. Section 'I' will be compulsory having ten questions of 2 marks each. The questions will be short answer type having answers not exceeding 20 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

Internal Assessment (Total Marks: 20)

20 marks for theory paper in a subject reserved for internal assessment shall be distributed as under:

- | | | |
|------|---|-----------------------------|
| (i) | Class Test | 10 Marks |
| (ii) | Two Written Assignments/Project Reports | 10 Marks (05 Marks each) |

Suggested Reading

1. Bhojwani, S.S. 1990. Plant Tissue Culture: Applications and Limitations. Elsevier Science Publishers, New York, USA.
2. Bhojwani, S.S. and Razdan, M.K. 2005. Plant Tissue Culture: Theory and Practice. Revised Edn. Elsevier Science Publication, The Netherlands.
3. Brown, T.A. 2010. Genomes. John Wiley and Sons (Asia) Pvt. Ltd.
4. Buchanan, B.B., Gruissen, W. and James, R.L. 2000. Biochemistry and Molecular Biology of Plants. I.K. International Pvt. Ltd. New Delhi.
5. Collin H.A. and Edwards, S. 1998. Plant Cell Culture: Introduction to Biotechniques. BIOS Scientific Publishers Ltd. UK.
6. Das, H.K. 2007. Textbook of Biotechnology. 3rd Edn. Wiley India Pvt. Ltd. U.P., India.
7. Galston, A.W. 1989. Life Process in Plants. Scientific American Library, Springer-verlag, New York, USA.
8. Glick, B.R., Pasternak J.J. and Patten, C.L. 2010. Molecular Biotechnology: Principles and Applications of Recombinant DNA. 4th Edn. ASM Press Washington, DC.
9. Hopkins, W.G. 2008. Introduction to Plant Physiology. John Wiley and Sons, Inc. New York, USA.
10. Old, R.W. and Primrose, S.B. 1989. Principles of Gene Manipulation. Blackwell Scientific Publications, Oxford, UK.
11. Primrose, S. B. 1995. Principles of Genome Analysis. Blackwell Scientific Publishers, Oxford UK.
12. Raghvan, V. 1986. Embryogenesis in Angiosperms: A Developmental and Experimental Study. Cambridge University Press, New York, USA.
13. Raghvan, V. 1997. Molecular Biology of Flowering Plants. Cambridge University Press, New York, USA.
14. Razdan, M.K. 2000. An Introduction to Plant Tissue Culture. Oxford and IBH Publications, Delhi.
15. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology. Wadsworth Publication Co. California, USA.
16. Taiz, L and Zeiger, E. 2006. Plant Physiology. 4th Edn., Sinauer Associates, Inc Publishers, Massachusetts, USA.
17. Vasil, I.K. and Thorpe, T.A. 1994. Plant Cell and Tissue Culture. Kluwer Academic Publishers. The Netherlands.

BOTANY
(Semester-V)

(For examinations to be held in the years 2016, 2017, 2018)

Course No: B0-501 (Practical)
Duration of Exam: 3hrs

Title: Physiology, Biochemistry and Biotechnology
Maximum Marks: 50

Credits: 02

External Examination: 25 Marks
Internal Assessment: 25 Marks

1. To study the permeability of plasma membrane using different concentrations of organic solvents.
2. To study the effect of temperature on permeability of plasma membrane.
3. To prepare the standard curve of protein and determine the protein content in unknown samples.
4. To study the enzyme activity of catalase and peroxidase as influenced by pH and temperature.
5. Comparison of the rate of respiration of various plant parts.
6. Separation of chloroplast pigments by solvent partitioning method.
7. Determining the osmotic potential of vacuolar sap by plasmolytic method.
8. Determining the water potential of potato tubers.
9. Separation of amino acids in a mixture by paper chromatography and their identification by comparison with standards.
10. Bioassay of auxin, cytokinin, ABA and ethylene using appropriate plant material.
11. Demonstration of the technique of micropropagation by using different explants e.g. axillary buds, shoot meristems.
12. Demonstration of the technique of anther culture.
13. Isolation of protoplasts from different tissues using commercially available enzymes.
14. Demonstration of root and shoot formation from the apical and basal portion of stem segments in liquid medium containing different hormones.

Note for distribution of 25 Marks in internal assessment in Practical Examination:

- | | |
|--|----------|
| 1. Day to Day performance in the laboratory: | 12 Marks |
| 2. Class Test: | 08 Marks |
| 3. Regularity of Attendance: | 05 Marks |

BOTANY
(Semester-VI)

(For examinations to be held in the years 2017, 2018, 2019)

Course No: B0-601 (Theory)

Title: Plant Ecology

Duration of Exam: 3hrs

Maximum Marks: 100

Credits: 04

Theory Examination: 80 Marks

Internal Assessment: 20 Marks

Objectives:

The course is designed to make students understand abiotic and biotic components of the ecosystems, ecological processes, biogeography, use of biological diversity and conservation approaches commonly used.

Unit-I Plants and Environment

- 1.1 Atmosphere- Stratification and gaseous composition; Carbon and Hydrogen cycle and their significance, green house gases and climate change.
- 1.2 Soil structure, soil profiles and development; soil types in India.
- 1.3 Morphological, anatomical and physiological responses of plants to water (hydrophytes and xerophytes) and salinity.
- 1.4 Morphological, anatomical and physiological responses of plants to light and temperature (heliophytes, sciophytes).

Unit-II Population, Community and Ecosystems

- 2.1 Concept of ecology, ecosystem: structure, abiotic and biotic components, food chain, food web, ecological pyramids and energy flow.
- 2.2 Community ecology: Community characteristics, frequency, density cover, life forms, biological spectrum.
- 2.3 Ecological succession: Concept, process and its types; climax communities.
- 2.4 Population ecology, growth curves; Ecotypes and ecads.

Unit- III Natural Resources and Management

- 3.1 Biogeographical regions of India.
- 3.2 Vegetation types of India; Forests and grasslands.
- 3.3 Role of remote sensing and GIS in environmental management.
- 3.4 *Ex-situ* and *in-situ* conservation of plant resources. Concept of rare, endangered and threatened (RET) plants.

Unit-IV Utilization of Plants

- 4.1 Food plants: Origin of wheat, maize and rice and their cultivation in India.
- 4.2 Fibres: Cultivation and processing of cotton and jute.
- 4.3 Non-alcoholic beverages: Botany and processing of tea and coffee.
- 4.4 Spices and condiments: Botany and utility of asafoetida, cumin, fennel, coriander, cloves, cinnamon, ginger, turmeric and cardamom.

Unit- V Utilization of Plants

- 5.1 Vegetable Oils: Botany, cultivation and utilization of groundnut, mustard and coconut.
- 5.2 Major firewood and timber yielding plants of J&K state and their utilization.
- 5.3 Medicinal plants of J&K state: a general account.
- 5.4 Sources, extraction and processing of commercial rubber.

Note for paper setters

The question paper will have 2 sections. Section 'I' will be compulsory having ten questions of 2 marks each. The questions will be short answer type having answers not exceeding 20 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

Internal Assessment (Total Marks: 20)

20 marks for theory paper in a subject reserved for internal assessment shall be distributed as under:

| | | |
|------|---|-----------------------------|
| (i) | Class Test | 10 Marks |
| (ii) | Two Written Assignments/Project Reports | 10 Marks (05 Marks each) |

Suggested Readings

1. Chapman, J.L. and Reiss, M.J. 2000. Ecology: Principles and Applications. 2nd Edn., Cambridge University Press, U.K.
2. Kebs, C.J. 1989. Ecological Methodology. Harper and Row, New York, USA.
3. Kochar, S. L. 1998. Economic Botany in Tropics. 2nd edition. Macmillan India Ltd. New Delhi.

4. Kormondy, E.J. 1996. Concepts of Ecology. Prentice- Hall of India Pvt. Ltd. New Delhi.
5. Ludwist. J.A. and Reynolds, J.F. 1988. Statistical Ecology. Wiley, New York.
6. Misra, R. 1988. Ecology Work Book. Oxford and IBH, New Delhi.
7. Moore. P.W. and Chapman, S.B. 1986. Methods in Plant Ecology. Blackwell Scientific Publications.
8. Odum, E.P. 1983. Basic Ecology. Saunders, Philadelphia.
9. Sambamurthy, A.V. S.S. and Subramanyam, N.S. 1989. A textbook of Economic Botany. Wiley Eastern Ltd. New Delhi.
10. Sharma, O.P. 1996. Hills Economic Botany. (Late Dr. A.F. Hill, Adapted by Dr. O.P.Sharma), Tata McGraw Hill Co. Ltd. New Delhi.
11. Sharma, P. D. 2010. Ecology and Environment. 10th Edn. Rastogi Publications, Merut. India
12. Simpson, B.B. and Conner Ogorzaly, M. 1986. Economic Botany- Plants in Our World, McGraw Hill, New York.
13. Townsend, C.R., Begon, M. and Harper, J.L. 2008. Essentials of Ecology. 3rd Edn. Blackwell publishing. U.K.
14. Underwood, A.J. 1977. Experiments in Ecology: Their logical design and interpretation using analysis of variance. Cambridge University Press.
15. APHA-Standard methods for the examination of water and waste water, American Public Health Association, Washington.

BOTANY
(Semester-VI)

(For examinations to be held in the years 2017, 2018, 2019)

Course No: B0-601 (Practical)
Duration of Exam: 3hrs

Title: Plant Ecology
Maximum Marks: 50

Credits: 02

External Examination: 25 Marks
Internal Assessment: 25 Marks

1. To determine size of the quartet required for reliable estimate of biomass in grasslands.
2. To study the frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkaier's Standard Frequency Diagram.
3. To estimate importance value index for grassland species on the basis of relative frequency, relative density and relative biomass in protected and grazed grassland.
4. To measure the vegetation cover of grassland through point frame method.
5. To measure the aboveground plant biomass in a grassland.
6. To determine Kemp's constant for dicot and monocot leaves and to estimate the leaf area index of a grassland community.
7. To determine diversity indices for richness, Simpson index, Shannon-Weaver index in grazed and protected grassland.
8. To estimate bulk density and porosity of grassland and woodland soils.
9. To determine the moisture content and water holding capacity of grassland and woodland soil.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency and temperature of different water bodies.
12. To measure dissolved oxygen content of polluted and unpolluted water samples.
13. To estimate salinity of different water samples.
14. To determine the percent leaf area injury of different leaf samples collected around polluted sites.
15. To estimate dust holding capacity of the leaves of different plant species.
16. Study of the morphology, structure and simple microchemical tests of the food storing tissues in rice, wheat, maize, potato and sugarcane. Microscopic examination of starch in these plants (except sugarcane).
17. Study of cotton flowers, sectioning of the cotton ovules/developing seeds to trace the origin and development of cotton fibres. Microscopic study of cotton and test for cellulose. Sectioning and staining of Jute stem to show the location and development of fibres, Microscopic structure. Tests for ligno-cellulose.

18. Study of hand sections of groundnut, mustard and coconut and staining of oil droplets by Sudan III and Sudan Black.
19. To study sources of firewood yielding trees (10) and bamboos. A list to be prepared mentioning special features.
20. Examine black pepper, cloves, cinnamon (hand sections) and opened fruits of cardamom and describe them briefly.
21. Preparation of an illustrated Inventory of 10 medicinal plants used in indigenous systems of medicine or allopathy. Write their botanical and common names, parts used and diseases/disorders for which they are prescribed.
22. Section boiled coffee beans and tea leaves to study the characteristics and structural features.
23. Collect illustrative materials of *Hevea brasiliensis*: Morphology of the plant and tapping practices, history of rubber, list the uses of rubber.

Note for distribution of 25 Marks in internal assessment in Practical Examination:

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|----|---|----------|
| 1. | Day to Day performance in the laboratory: | 12 Marks |
| 2. | Class Test: | 08 Marks |
| 3. | Regularity of Attendance: | 05 Marks |