

B.Sc., BOTANY
II Year, III -Semester
Paper- III. Plant Taxonomy, Ecology and Medicinal Botany
DSC - 1C (4 hrs./week) Credits- 4

Theory Syllabus
UNIT-I

(60 hours)
(15 h)

1. Introduction: History, Principles, objectives and opportunities in plant taxonomy/ plant systematics.
2. Systems of classification: Salient features and comparative account of Linnaeus, Bentham & Hooker and Engler & Prantl classification systems. An introduction to Angiosperm Phylogeny Group (APG).
3. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy and Chemotaxonomy.
4. Nomenclature and Taxonomic resources: An introduction to ICN. Herbarium: Concept, techniques and applications. Role of botanical gardens in Taxonomic research.

UNIT-II

(15h)

5. Systematic study and economic importance of plants belonging to the following families:
Polypetalae: Annonaceae, Rutaceae, Cucurbitaceae
Gamopetalae: Asteraceae, Asclepiadaceae, Lamiaceae.
Monochalmydeae: Euphorbiaceae
Monocotyledons: Orchidaceae and Poaceae.

UNIT III.

(15h)

6. Component of Ecosystem, energy flow, food chain and food webs.
7. Plant population studies- Abundance, density and Frequency of vegetation by Quadrat Method.
8. Plants and environment: Ecological adaptations of plants, Hydrophytes and Xerophytes.
9. Plant Succession: Serial stages, climax formation with reference to Hydrosere and Xerosere.

Unit IV

(15h)

10. Introduction: History, scope and interdisciplinary nature of medicinal botany. Ethnomedicine and folklore medicine. Traditional medicinal systems- basic principles, methods of preparation of medicines in Ayurveda, Siddha, Unani and Homeopathy.
11. Plants used in primary health care: Study of morphology and traditional uses of following: Black pepper (*Piper nigrum*), Garlic (*Allium sativum*), Ginger (*Zingiber officinale*) Turmeric (*Curcuma longa*).
12. Plants used in traditional medicine: Study of morphology, active principles, medicinal uses of following: Amla (*Phyllanthus emblica*), Ashwagandha (*Withania somnifera*), Podapatri (*Gymnema sylvestre*), Sarpagandha (*Rauvolfia serpentina*), Tippa teega – (*Tinospora cordifolia*).

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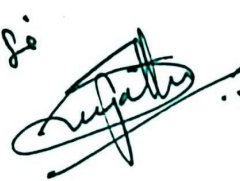


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Suggested Readings:

1. Stace, C. A. 1989. Plant Taxonomy and Biostatistics (2nd Ed.). Edward Arnold, London.
2. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH, New Delhi.
3. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
4. Davis, P. H. and V. H. Heywood. 1963. Principles of Angiosperm Taxonomy. Oliver and Boyd, London.
5. Heywood, V. H. 1965. Plant Taxonomy. ELBS, London.
6. Heywood, V. H. and D. M. Moore (Eds). 1984. Current Concepts in Plant Taxonomy. Academic Press, London.
7. Jeffrey, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge. London
8. Singh, G. (2012). Plant Systematics: Theory and Practice Oxford & IBH Pvt. Ltd., New Delhi. 2. 3rd edition.
9. Jeffrey, C. (1982). An Introduction to Plant Taxonomy. Cambridge University Press, Cambridge.
10. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematics-A Phylogenetic Approach. Sinauer Associates Inc., U.S.A. 2nd edition.
11. Radford, A.E. (1986). Fundamentals of Plant Systematics. Harper and Row, New York
12. Simpson, M. G. (2006). Plant Systematics. Elsevier. 7. Cooke, T. (1903). The Flora of Presidency of Bombay, I, London, (B.S.I. Repr. ed., 1958.) Botanical Survey of India, Calcutta
13. Kormondy, E.J. (1996). Concepts of Ecology. Prentice Hall, U.S.A. 4th edition.
14. Sharma, P.D. (2010) Ecology and Environment. Rastogi Publications, Meerut, India. 8th edition.
15. Odum, E.P. (2005). Fundamentals of ecology. Cengage Learning India Pvt. Ltd., New Delhi. 5th edition.
16. Singh, J.S., Singh, S.P., Gupta, S. (2006). Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi, India
17. Wilkinson, D.M. (2007). Fundamental Processes in Ecology: An Earth Systems Approach. Oxford University Press. U.S.A
18. Michael, S. 1996, Ecology, Oxford University Press, London 14

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II Year, III -Semester
Paper- III. Plant Taxonomy, Ecology and Medicinal Botany
DSC - 1C (Credits- 1)

Practical Syllabus

(45 hours)

1. Systematic study of locally available plants belonging to the families prescribed in theory Syllabus (Minimum of one plant representative for each family)
2. Demonstration of herbarium techniques.
3. Study of morphological and anatomical characteristics of locally available plant species (*Eichhornia*, *Hydrilla*, *Pistia*, *Nymphaea*, *Asparagus*, *Opuntia*, *Euphorbia melii*).
4. Calculation of density, abundance and frequency of vegetation in the campus/ nearby areas by Quadrate method.
5. Study of morphology and traditional uses of plant used in primary health care (prescribed in the theory Syllabus)
6. Study of the plants used in traditional medicine (prescribed in the theory syllabus)
7. Candidate has to submit at least 30 herbarium sheets

Practical Model Paper

Time : 3 hrs

Max. Marks: 50

- | | |
|---|----------|
| 1. Identify and give a technical description of the plant twig 'A' | 10 Marks |
| 2. Identify and give a technical description of the plant twig 'B' | 10 Marks |
| 3. Prepare a mount of the given material 'C' (Hydrophytes /Xerophytes)
Draw diagram & give reasons for identification. | 8 Marks |
| 4. Identify and write about the morphology and medicinal uses of plant "D" (2x3=6)
used in primary health care | 6 Marks |
| 5. Identify and write about the morphology, active principles, uses of plant "E" (2x3=6)
used in primary health care traditional medicine. | 6 Marks |
| 6. Herbarium | 4 Marks |
| 7. Record and Viva | 6 Marks |

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B.Sc. BOTANY
II YEAR: Semester-IV
Paper IV: Cell Biology, Genetics and Plant Physiology
DSC-1D (4 hrs./week) Credits- 4

Theory Syllabus

(60 hours)

UNIT I:

(15h)

1. Plant cell envelopes: Ultra structure and function of cell wall. Cell membrane and various models of cell membrane.
2. Cell Organelles: Structure and function of Nucleus, Mitochondria and Chloroplast.
3. Structure and function of DNA and RNA. Types of DNA and RNA.
4. Cell division: Mitosis and Meiosis and significance.

UNIT II.

(15h)

5. Chromosomes: Morphology, organization of DNA in a chromosome (Nucleosome model). Euchromatin and Heterochromatin.
6. Mendel's Laws of inheritance, Incomplete dominance and Codominance. Test cross and Back cross.
7. Linkage- definition, type. Linkage maps: Two point and three point test cross. Crossing over- mechanism and significance.
8. Mutations: Definition. Chromosomal aberrations (structural and numerical). Gene mutations (Frame Shift and Substitution mutations).

UNIT-III

(15h)

9. Plant -Water Relations: Physical properties of water, diffusion, Osmosis; Osmotic potential. Absorption of water (Active and Passive)
10. Mineral Nutrition: Essential macro and micro mineral nutrients and their deficiency symptoms.
11. Transpiration; Structure of Stomata, Mechanism of transpiration.
12. Translocation: Mechanism of Phloem transport (Source and Sink relationship)
13. Photosynthesis: Photosynthetic pigments, Photosystems (I and II), Photophosphorylation. (Cyclic and Noncyclic)

UNIT- IV

(15h)

14. Carbon assimilation pathways: Calvin cycle (C3), Hatch and Slack cycle (C4) Crassulacean Acid Metabolism (CAM) .
15. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle and electron transport system.
16. Enzymes: Nomenclature and Characteristics. Coenzymes and Co-factors.
17. Nitrogen Metabolism: Biological nitrogen fixation. Biochemistry of nitrogen fixation.
18. Physiological effects of Phytohormones: Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

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Suggested Readings:

1. Sharma, A. K. and A. Sharma. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harward Academic Publishers, Australia.
2. Shukla, R. S. and P. S. Chandel. 2007. Cytogenetics, Evolution, Biostatistics and Plant Breeding. S.Chand & Company Ltd., New Delhi.
3. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
1. Hopkins, W. G. 1995. Introduction to Plant Physiology. John Wiley & Sons Inc., New York, USA
5. Jain, J.L., S. Jain and Nitin Jain. 2008. Fundamentals of Biochemistry. S. Chand & Company Ltd., New Delhi.
6. Pandey, B. P. 2007. Botany for Degree Students: Plant Physiology, Biochemistry, Biotechnology, Ecology and Utilization of Plants. S. Chand & Company Ltd., New Delhi.
7. Salisbury, F. B. and C. W. Ross. 1992. Plant Physiology. 4th edn. (India Edition), Wordsworth, Thomson Learning Inc., USA.
8. Taiz, L. and E. Zeiger. 1998. Plant Physiology (2nd Ed.). Sinauer Associates, Inc., Publishers, Massachusetts, USA.
9. Dutta A.C. 2016. Botany for Degree Students. Oxford University Press.
10. P.S. Bajaj. 1986 to 1990. Biotechnology in Agriculture and Forestry. Vol. 1 to 16. Ed
11. Richard N. Artca. 1996. Plant Growth Substances Principles and application. Chapman and Hall Inc. NY (Ind Ed. Cbs. Publ and Dist, New Delhi 1997)
12. H. N. Krishnamurty, 1993, Physiology of plant growth and development Atmaram and Sons, New Delhi
13. V. Verma. Text Book of Plant Physiology. Emkay Publications., B-19, East Krishna Nagar, Delhi-1100051.
14. Jain, V.K. (2000): Fundamentals of Plant Physiology ,S.Chand and Co, New Delhi. 12 Pandey, S.N. (1991): Plant Physiology, Vikas Publishing House (P) Ltd., New Delhi, India.
15. Verma, V. (2007): Text Book of Plant Physiology. Ane Books India, New Delhi. 17

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II YEAR: Semester-IV
Paper IV: Cell Biology, Genetics and Plant Physiology
DSC-1D Credits-1

Practical Syllabus

(45 hours)

1. Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparation of Onion root tips.
3. Study of various stages of meiosis using cytological preparation of Onion flower buds.
4. Study of ultra structure of cell organelles using photographs Chloroplast, Mitochondria, Nucleus,
5. Study of structure of cell membrane fluid mosaic model.
6. Study of structure of DNA and types of DNA.
7. Solving the problems on Mendel's Laws, Incomplete dominance, two point and three point test cross.
8. Study of various Chromosomal aberrations and gene mutations.
9. Determination of osmotic potential of vacuolar sap by Plasmolytic method using leaves of *Rheodiscolor* / *Tradescantia*.
10. Determination of rate of transpiration using Cobalt chloride method
11. Determination of stomatal frequency using leaf epidermal peelings / impressions
12. Separation of chloroplast pigments using paper chromatography technique
13. Estimation of protein by Biurette method
14. Mineral deficiency- Detail study of Micronutrients and Macro nutrients
15. Identification of C3, C4 and CAM plants

Practical Model Question Paper :

Time: 3 hrs

Max. marks: 50

1. Prepare a cytological slide of given material and identify and describe any two stages A and B with well labeled diagrams.
2. Genetic problems (C)
3. Physiological Experiment D.
3. Physiological experiment E.
4. Slides from cytology and genetics (F and G)
- 5.. Identify and Comment (H Physiology)
6. Record and Viva ;

12 Marks

10 Marks

8 Marks

6 Marks

4 Marks

4 Marks

6 Marks

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