

SEMESTER - II

Core Paper II - PLANT DIVERSITY - II

BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALAEOBOTANY

Instructional Hrs. : 90

Sub.Code : 16BOUC202

Max. Marks : CIA – 25; ESE - 75

Credits : 4

Objectives: To study the classification, morphology, anatomy and reproduction of some forms of Bryophytes, Pteridophytes and Gymnosperms.

To study the Geological time scale and some kinds of fossils.

UNIT – I

18 Hrs.

Bryophytes - Classification of Bryophytes (Reimer's ,1954- Outline only) Structure and Reproduction of *Marchantia*- Porella- Anthoceros and Funaria - **Economic Importance of Bryophytes.**

UNIT – II

18 Hrs.

Pteridophytes - Classification of Pteridophytes (Sporne, 1962 - Outline only) Stelar evolution- Structure and Reproduction of *Psilotum*- Lycopodium- Selaginella and Equisetum.

UNIT – III

18 Hrs.

Structure and Reproduction of *Ophioglossum*- Adiantum - Marsilea- Heterospory and Seed Habit.

UNIT - IV

18 Hrs.

Gymnosperms - Classification of Gymnosperms (Sporne, 1965- Outline only) Structure and Reproduction of Cycas- and Gnetum. Angiospermic characters in Gnetum, **Economic Importance of Gymnosperms.**

UNIT – V

18 Hrs.

Palaeobotany - Geological time scale- Radio carbon dating- Fossils and **kinds of fossils**- Study of the following: Lepidodendron (Stem) - Lepidophyllum (Leaf)- Lepidocarpon (Fruit)- Calamites (Stem) and Williamsonia.

Note : Bold and Italics denote self study topics

PRACTICALS :

Study of the types mentioned below

Bryophytes - Marchantia, Porella, Anthoceros and Funaria

Pteridophytes - Lycopodium, Selaginella, Equisetum, Ophioglossum, Adiantum, Marsilea.

Gymnosperms - Cycas and Gnetum

Palaeobotany - Lepidodendron, Lepidophyllum, Lepidocarpon, Calamites and Williamsonia.

TEXT BOOKS :

1. **Vashishta, B.R., Sinha, A.K. and Adarshkumar**, "*Botany for degree students – Bryophyta*", S. Chand & Company Ltd., New Delhi, Revised Edition, 2008.
2. **Vashishta, P.C., Sinha, A.K. and Anilkumar**, "*Botany for degree students - Pteridophyta*", S. Chand & Company Ltd., New Delhi, Revised Ninth Edition, 2005.
3. **Vasishta, P.C., Sinha, A.K. and Anilkumar**, "*Botany for Degree Students – Gymnosperms*". S.Chand & Co., New Delhi, 2006.

REFERENCE BOOKS :

1. **Peter George**, "*Introduction to Palaeobotany*", Rajat Publications, New Delhi, First Edition, 2008.
2. **Sporne, K.R.**, "*The Morphology of Pteridophytes*", B. I Publications, New Delhi, 1967.
3. **Foster, A. S. and Gifford, E. M.** Comparative Morphology of Vascular Plants. W.H. Freeman and Co., 1973.
4. **Watson, E.V.**, "*Structure and life of Bryophytes*," Hutchinson & Co Ltd, 2003.
5. **Frank Cavers**, "*The interrelationship of the Bryophyta*" S.R. Technico Book House, Patna. 2003.

SEMESTER - I

ALLIED BOTANY - PAPER - I

Instructional Hrs. : 60

Sub.Code : 16BOUA101

Max. Marks : CIA – 20; ESE - 55

Credits : 4

Objectives : To know the vegetative and reproductive structures of various types of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms. To identify the families of the plants, economically important plants, plant products and the bioprocess technology and their applications.

UNIT-I

12 Hrs.

Structure and Reproduction of Bacteria and *Bacteriophage* (T₄). Plant Disease: Tikka Disease (symptoms- causal organisms and control measures).

UNIT-II

12 Hrs.

Thallophyta - Structure- Reproduction and Life cycle of the following – Nostoc – *Chlorella* - Dictyota – Albugo, Saccharomyces, **Polyporus and Cercospora**.

UNIT –III

12 Hrs.

Bryophyta- Pteridophyta- Gymnosperm - Structure - reproduction and life cycle of *Riccia* – **Funaria**-Lycopodium- **Marsilea**- Cycas and **Pinus**.

UNIT-IV

12Hrs.

Plant Taxonomy - Study of the following families with their Systematic position- Description and *Economic importance* of Anonaceae – Rubiaceae – **Cucurbitaceae, Acanthaceae, Amarantaceae** and Poaceae.

UNIT –V

12 Hrs.

Applied Botany - Single cell protein - *Spirulina*. Mushroom Cultivation – Oyster - Biofertilizer – Rhizobium.

Note : Bold and *Italics* denote Self study Topics

PRACTICALS :

Study of the types mentioned above

TEXT BOOKS:

1. **Kumaresan, V.**, “*Biotechnology*”, Saras Publication, Nagercoil, Kanyakumari Dt., Revised Edition, 2009.
2. **Muneeswaran, A.**, “*Text book of Botany*”, Sun Publication, Madurai, 1990.
3. **Narayanaswami, R.V. & Rao, K.N.**, “*Outlines of Botany*”, S. Viswanathan Printers & Publishers, Madras, New Edition, 1979.
4. **Pandey, B.P.**, “*Economic Botany*”, S. Chand & Company, New Delhi, Revised Edition, 2004.
5. **Srivastava, H.N.**, “*Fungi*”, Pradeep publications, Jalandhar (India), New Millennium Edition, 2004.
6. **Vashishta, B.R.**, “*Botany for Degree Students – Algae*”, S. Chand & Co., New Delhi, Revised Edition, 2004.
7. **Vashishta, B.R., Sinha,A.K. and Adarshkumar**, “*Botany for Degree students – Bryophyta*”, S. Chand & Company Ltd., New Delhi, Revised Edition, 2008.
8. **Vasishta, P.C., Sinha,A.K. and Anilkumar**, “*Botany for Degree Students – Gymnosperms*”. S.Chand & Co., New Delhi. 2006
9. **Vashishta, P.C., Sinha,A.K. and Anilkumar**, “*Botany for Degree students - Pteridophyta*”, S. Chand & Company Ltd., New Delhi, Revised Ninth Edition, 2005.

REFERENCE BOOKS:

1. **Sporne, K.R.**, “*The Morphology of Pteridophytes*”, B. I Publications, NewDelhi, 1967.
2. **Foster,A. S. and Gifford, E. M.** Comparative Morphology of Vascular Plants. W.H. Freeman and Co.,1973.
3. **Frank Cavers**, “*The interrelationship of the Bryophyta*” S.R. Technico Book House, Patna.2003.

SEMESTER - II

ALLIED BOTANY - PAPER - II

Instructional Hrs. : 60

Sub.Code : 16BOUA202

Max. Marks : CIA – 20; ESE - 55

Credits : 4

Objectives : To study the histology, ecological adaptations and physiology of plants. To study the horticultural techniques. To gain the knowledge about medicinal plants.

UNIT-I

12 Hrs.

Anatomy - Meristem – Types. Simple and Complex tissues - Primary structure of Dicot and Monocot root, Dicot and *Monocot stem*, Dicot and Monocot leaf.

UNIT –II

12Hrs.

Ecology - Ecosystem – Structure (Biotic and Abiotic) and functions - Morphological and Anatomical adaptations of Hydrophytes and *Xerophytes*.

UNIT-III

12 Hrs.

Physiology - Photosynthesis- Photosynthetic apparatus- Light and Dark reactions (Calvin cycle) - Respiration- Glycolysis and *Kreb`s cycle* (outline only)

UNIT-IV

12 Hrs.

Horticulture - Scope and importance - Propagating methods of Horticultural Plants – *Layering*, Grafting, Kitchen garden, Terrace garden and flower arrangement- Cultivation methods of commercial flowers- Rose- Jasmine.

UNIT –V

12 Hrs.

Pharmacognosy - A brief account on the identifying features- medicinal properties and active principles of the following: Ginger – Vasaka – Curcuma – *Brahmi* - Cultivation and marketing of commercial medicinal plants – *Vinca* and *Aloe vera*.

Note : Bold and *Italics* denote self study topics

PRACTICALS :

Study of the types mentioned above

TEXT BOOKS:

1. **Kumaresan, V.**, “ *Horticulture*”, Saras Publication, Nagercoil, Kanyakumari Dt., First Edition, 2008.
2. **Muneeswaran, A.**, “*Text book of Botany*”, Sun Publication, Madurai, 1990.
3. **Pandey, B.P.**, “ *Plant Anatomy*”, S. Chand & Company Ltd., New Delhi, Revised Edition, 2004.

REFERENCE BOOKS:

1. **Kokate, C.K, Purohit, A and Gokhal, S.R.**, “*Pharmacognosy*”, Nirali Prakashan, Pune, 43rd Edition, 2009.
2. **Handa, S.S and Kapoor, V.K.**, “*Pharmacognosy*”, Vallabh Prakashan, Delhi, Revised Edition, 1993.

SEMESTER - III

Core Paper III - ANATOMY AND EMBRYOLOGY

Instructional Hrs. : 60

Sub. Code: 15BOUC303

Max. Marks: CIA – 25; ESE - 75

Credits: 4

Objectives: To study types of tissues and primary, secondary structures & anomaly of stem and root. To study the types and development of male and female gametophyte and embryo.

UNIT – I

12 Hrs.

Anatomy - Meristem –Types – Theories of Shoot and root apex organizations - General account of simple and complex tissues - Vascular cambium- Types of stomata and *trichomes*.

UNIT – II

12 Hrs.

Primary structure - Dicot root and stem - *monocot root* and stem- Structure of dicot leaf and monocot leaf.

UNIT – III

12 Hrs.

Secondary structure- Secondary thickening- Dicot root and stem - Anomalous secondary thickening - *Cortical vascular bundles (Nyctanthes)*- Medullary vascular bundles (*Piper*) and secondary thickening in arborescent monocots (*Dracaena*).

UNIT – IV

12 Hrs.

Embryology - Structure and development of anther- development of male gametophyte - structure and types of ovules, development of female gametophytes (Monosporic – Polygonum- Bisporic – Allium and Tetrasporic – Peperomia)- Fertilization - *Double fertilization*

UNIT – V

12 Hrs.

Endosperm – Nuclear, Cellular, Helobial, Ruminant and Endosperm haustoria - Embryo - Structure and development of dicot embryo (*Capsella*) - Structure and development of *monocot embryo* (*Najas*).

Note : *Italics* denotes Self Study Topics

PRACTICALS :

Anatomy :

Study of tissues mentioned in the theory. Stem - Primary structure – Tridax – Sorghum, Root - Primary structure – Bean – Canna, Leaf – Polyalthia and Maize, Secondary thickening-Stem- Thespesia, Root - Ficus . Anomalous secondary thickening – Piper - Nyctanthes and Dracaena.

Embryology:

T.S of anther - types of ovules- - Embryo mounting – Tridax/ Crotalaria. Endosperm – Cellular Endosperm with haustoria

TEXT BOOKS:

1. **Pandey, B.P.**, “ Plant Anatomy”, S. Chand & Company Ltd., New Delhi, Revised Edition, 2005.
2. **Bhojwani, S.S.** and **Bhatnagar, S.P.**, “ *The Embryology of Angiosperms*”, Vikas Publishing House Pvt Ltd., New Delhi, Revised Edition, 2007.

REFERENCE BOOKS:

1. **Fahn, A.**, “ *Plant Anatomy*”, Robert Maxwell, M.C., New York, Revised Edition, 1982.
2. **Katherine Esau**, “ *Plant Anatomy*”, Wiley Eastern Private Ltd., New Delhi, Second Edition, 1974.
3. **Maheswari . P.**, “*An Introduction to the embryology of Angiosperms*”, Mc Graw-Hill Book Company, Inc. New York, Revised Edition, 1994.

SEMESTER - IV

Core Paper IV - CELL BIOLOGY AND TISSUE CULTURE

Instructional Hrs: 60

Sub. Code: 15BOUC404

Max. Marks: CIA – 25; ESE - 75

Credits: 4

Objectives: To study the structure and functions of Cell organelles. To know the mechanism of Gene expression and Protein synthesis. To know the techniques related to tissue culture.

UNIT – I

12 Hrs.

Cell Organelles - Structure and function of cell wall, Plasma membrane (Fluid mosaic model only) - Endoplasmic reticulum- Mitochondria and *Ribosome*.

UNIT – II

12 Hrs.

Cell Organelles - Chloroplast- Nucleus- Chromosome - *Dictyosomes* (Structure and functions only).

UNIT – III

12 Hrs.

Nucleic acids and Cell division - Structure and Replication of DNA. Structure and types of RNA- Protein synthesis - *Mitosis* and *Meiosis*.

UNIT – IV

12 Hrs.

Tissue culture Techniques - Basic requirements- Sterilization techniques- Media preparation – M.S. Medium. Cellular totipotency- Explants preparation and *Aseptic Manipulation*. Callus culture- Suspension culture- Organogenesis.

UNIT – V

12 Hrs.

Tissue culture Techniques - Protoplast isolation and culture- Meristem culture - Anther culture – Production of artificial seeds and its application.

Note: *Italics* denote Self Study Topics

PRACTICALS:

1. Study of mitosis using Onion root
2. Study of cell organelles through slides and photographs
3. Sterilization techniques
4. Preparation of M.S medium.
5. Callus culture

TEXT BOOKS:

1. **Arumugam, N.**, "*Cell Biology*", Saras Publication, Kanyakumari Dt., Revised Edition, 2003.
2. **Verma, P.S. and Agarwal, V.K.**, "*Cytology*", S. Chand & Company Ltd., New Delhi, Revised Edition, 1983.

REFERENCE BOOKS :

1. **Dubey, R.C.**, "*A text book of Biotechnology*", S. Chand & Company Ltd., New Delhi, Revised Edition, 2009.
2. **Kumaresan, V.**, "*Biotechnology*", Saras publication, Nagercoil, Kanyakumari Dt., Revised Edition 2009.
3. **Power, C.B.**, "*Cell biology*", Himalaya Publishing House, Nagpur, Second Edition, 1977.

SEMESTER - III

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Instructional Hrs. : 60

Sub. Code: 15BOUC303

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Objectives: To study types of tissues and primary, secondary structures & anomaly of stem and root. To study the types and development of male and female gametophyte and embryo.

UNIT – I

12 Hrs.

Anatomy - Meristem –Types – Theories of Shoot and root apex organizations - General account of simple and complex tissues - Vascular cambium- Types of stomata and *trichomes*.

UNIT – II

12 Hrs.

Primary structure - Dicot root and stem - *monocot root* and stem- Structure of dicot leaf and monocot leaf.

UNIT – III

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Secondary structure- Secondary thickening- Dicot root and stem - Anomalous secondary thickening - *Cortical vascular bundles (Nyctanthes)*- Medullary vascular bundles (*Piper*) and secondary thickening in arborescent monocots (*Dracaena*).

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Endosperm – Nuclear, Cellular, Helobial, Ruminant and Endosperm haustoria - Embryo - Structure and development of dicot embryo (*Capsella*) - Structure and development of *monocot embryo* (*Najas*).

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PRACTICALS :

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2. **Katherine Esau**, “ *Plant Anatomy*”, Wiley Eastern Private Ltd., New Delhi, Second Edition, 1974.
3. **Maheswari . P.**, “*An Introduction to the embryology of Angiosperms*”, Mc Graw-Hill Book Company, Inc. New York, Revised Edition, 1994.

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Core Paper IV - CELL BIOLOGY AND TISSUE CULTURE

Instructional Hrs: 60

Sub. Code: 15BOUC404

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Credits: 4

Objectives: To study the structure and functions of Cell organelles. To know the mechanism of Gene expression and Protein synthesis. To know the techniques related to tissue culture.

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12 Hrs.

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UNIT – II

12 Hrs.

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Nucleic acids and Cell division - Structure and Replication of DNA. Structure and types of RNA- Protein synthesis - *Mitosis* and *Meiosis*.

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3. **Power, C.B.**, "*Cell biology*", Himalaya Publishing House, Nagpur, Second Edition, 1977.