JYOTI NIVAS COLLEGE AUTONOMOUS BANGALORE – 560 095
DEPARTMENT OF BOTANY
B.Sc. III SEMESTER BOTANY PAPER III SYLLABUS (2024 SEP BATCH)
GYMNOSPERMS AND REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

COURSE TITLE	**GYMNOSPERMS AND REPRODUCTIVE BIOLOGY OF ANGIOSPERMS**
COURSE CODE	**24IIIBO3T**
COURSE CREDITS	**3**
TOTAL CONTACT HOURS	**56 HOURS**
DURATION OF ESA	**3 HOURS**
FORMATIVE ASSESSMENT MARKS	**20 MARKS**
SUMMATIVE ASSESSMENT MARKS	**80 MARKS**

Course Objectives:

1. Study Gymnosperm classification, structure, and life cycles.
2. Understand male and female reproductive structures in angiosperms.
3. Learn fundamentals and applications of palynology.
4. Explore fertilization, embryo, and endosperm development.
5. Introduce plant tissue culture and biotechnology techniques.

Course Outcomes:

1. Describe key features of Gymnosperms and their importance.
2. Explain reproductive development in angiosperms.
3. Analyze pollen structure and apply palynological knowledge.
4. Interpret processes of fertilization and embryogenesis.

5. Apply in vitro techniques in plant reproduction and breeding.

UNIT1: Gymnosperms **12 Hrs**

General characteristics. Distribution and classification of Gymnosperms. Study of the habitat, distribution, habit, anatomy, reproduction and life-cycles in Pinus and Gnetum, Cycas (developmental stages not required) . Brief account of fossil gymnosperm – Glossopteris.

Affinities and evolutionary significance of Gymnosperms. Economic importance of Gymnosperms (Including *Ephedra*) - food, timber, industrial uses and medicines.

UNIT 2 **12 Hrs**

Microsporangium : Contributions of P. Maheshwari, B.G.L Swami,(a brief account), Development of anther, Microsporogenesis , structure of a mature anther and anthesis. Male gametophyte: Development of male gametophyte, role of Tapetum during pollen development, concept of male germ unit (MGU), abberrant development of male gametophyte (pollen embryo sacs and androphytes)

Palynology: Introduction and branches (A brief account of Mellitopalynology, aeropalynology, Copropalynolgy , paleopalynology and Forensic Palynology), pollen morphology NPC system (a brief account of size, shapes, apertures and pollen wall architecture, pollenkit) and applications of palynology.

UNIT 3: Megasporangium (Ovules) **12 Hrs**

Types (orthotropous, anatropous, campylotropous, amphitropous and Circinotropous). Structural details of an Anatropous ovule(LS).

Megasporogenesis (Female gametophyt**e** development) :– Ultra structure of embryo sac, concept of female germ unit, study of types of embryo sacs - Monosporic (Polygonum Bisporic (Allium type) & Tetrasporic(Fritillaria type). Variations in ovule structure- Aril, integumentary tapetum, caruncle, hypostase and obturator

Fertilization: Types of stigmas and styles, pollen-pistil interaction, entry of pollen tube into the stigma, styles and into the female gametophyte, post fertilization changes in the embryo sac.

Double fertilization & its significance, preferential fertilization and polyspermy**,** control of fertilization.

UNIT 4: Endosperm **08 Hrs**

Types (Nuclear, Cellular, Helobial), endosperm haustoria (Grevillea, Cucumis), Ruminate endosperm (a brief account).

Embryo: classification (Schnarf's system), development of dicot embryo in *Capsella bursa pastoris* (Crucifer type) and monocot embryo (Grass). Apomixis and polyembryony- a brief account of parthenocarpy.

UNIT 5: *In vitro* morphogenesis **12 Hrs**

Concepts of totipotency, explants, Nutrient medium (MS Medium) aseptic culture, callus, differentiation, dedifferentiation, redifferentiation and morphogenesis. Organ culture (ovary, anther, endosperm and embryo culture). A brief account on haploid production

Concept of Somatic Hybridization. and its applications. A brief concept of synthetic seeds, somaclonal variation and its applications

BOTANY PAPER III (SEP) PRACTICAL SYLLABUS

COURSE TITLE	**GYMNOSPERMS AND REPRODUCTIVE BIOLOGY OF ANGIOSPERMS**
COURSE CODE	**24IIIBO3P**
COURSE CREDITS	**2**
TOTAL CONTACT HOURS	**48 HOURS**
DURATION OF ESA	**3 HOURS**
FORMATIVE ASSESSMENT MARKS	**10 MARKS**
SUMMATIVE ASSESSMENT MARKS	**40 MARKS**

1. Study of gymnosperm materials included in the theory
2. Study of microsporogenesis and male gametophyte
3. Pollen embryology-Grass, Hibiscus, Tridax, Mimosa and Pollinia of Calotropis.
4. Germination of pollen grain-Eg. Vinca by Hanging drop method
5. Types of ovules, types of placentation, development of female gametophyte,
6. Mounting of endosperm of Cucumis .
7. Mounting of embryo of Tridax/Crotalaria/Cyamopsis.
8. Synthetic seeds
9. Media preparation and inoculation

STUDENT ACTIVITY: Visit to Tissue culture lab. / Study of pollen flora of college campus/ collection of pollen by air samples/ study of honey samples.

Submission : Gymnosperms specimens.

References

1. Bhatnagar, S.P. and Moitre, A. Gymnosperms. New Age Publications, New Delhi
2. Bhojawani, S.S. & Bhatnagar, S. P. (1979). The Emryology of Angiosperms, Vikas Pub, New Delhi.
3. Coulter, J. M. & Chamberline, C. J.(1978). Morphology of Gymnosperms. Central Book Depot.Allahabad.
4. Johri, B.M. (1984). Embryology of Angiosperms. Springer-verlag, Berlin.
5. Maheshwari, P.(1950). An Introduction to Embryology of Angiosperms.Tata McGraw Hill, New York.
6. Shukla, A.K. (1999). Biology of Pollen. Atlas books & Periodicals.
7. Sporne, K.R. (1974). The Morphology of Gymnosperms, Hutchinson & Co.London.
8. Sundarajan, S.(1997) College Botany Vol. II. Himalaya Publication.
9. Vashista, P. C.(1990).Gymnosperms.5th ed., S Chand & Co.Ltd., New Delhi.

JYOTI NIVAS COLLEGE AUTONOMOUS, BENGALURU
B.SC BOTANY SEMESTER III (SEP)
SUBJECT DISCIPLINE ELECTIVE PAPER - NURSERY

Course title	**NURSERY**
Course Code	**24**
Course credits	**2**
Total contact hours	**30 Hours**
Duration of ESA	**1.5 Hours**
Formative assessment marks	**10 Marks**
Summative assessment marks	**40 Marks**

Learning Objectives:

- Understand the importance of a plant nursery and basic infrastructure to establish it.
- Explain the basic material, tools and techniques required for nursery.
- Demonstrate expertise related to various practices in a nursery.
- Comprehend knowledge and skills to get an employment or to become an entrepreneur in plant nursery sector.

Unit-1: Introduction to plant nursery **10 Hrs.**

1. Plant nursery: Definition, importance.
2. Different types of nurseries –on the basis of duration, plants produced, structure used.
3. Basic facilities for a nursery; layout and components of a good nursery.
4. Plant propagation structures in brief.
5. Bureau of Indian Standards (BIS-2008) related to nursery, Registration and Govt schemes for nursery.
6. Business plan to introduce a nursery.

Unit- 2 : Necessities for nursery 10 Hrs.

1. Nursery beds – types and precautions to be taken during preparation.
2. Growing media, nursery tools and implements, and containers for plant nursery.
3. Seeds and other vegetative material used to raise nursery.in brief.
4. Outlines of vegetative propagation techniques to produce planting material.
5. Sowing methods of seeds and planting material.

Unit-3 :Management of nursery 10 Hrs.

1. Seasonal activities and routine operations in a nursery.
2. Nursery management – Irrigation and fertigation, weeding and nutrients; pests and diseases. Role pf bioagents.
3. Common possible errors in nursery activities.
4. Economics of nursery development, pricing and record maintenance.
5. Online nursery information and sales systems.
6. Data management

Suggested Activities

Plant Nursery – seed germination – sale (Business plan)

Visit to an agriculture/horticulture /forest nursery.

Case study on establishment and success of a plant nursery.

Suggested text books/reference books :

1. Ratha Krishnan, M., et.al. (2014) *Plant nursery management : Principles and practices*, Central Arid Zone Research Institute (ICAR), Jodhpur, Rjasthan
2. Kumar, N., (1997) *Introduction to Horticulture*, Rajalakshmi Publications, Nagercoil.
3. KumarMishra, K., N.K. Mishra and Satish Chand (1994) *Plant Propagation*, John Wiley & Sons, New Jersey.

MODEL QUESTION PAPER

Max. Marks: 50 *Time: 1½ hrs (90 Minutes)*

SECTION- A (4x5M=20 Marks)

Answer any four questions. Each answer carries 5 marks
(At least 1 question should be given from each Unit)

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SECTION B (3x10M = 30 Marks)

Answer any three questions. Each answer carries 10 marks
(At least 1 question should be given from each Unit)

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