

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust

BGS Science Academy and Research Center

(Affiliated to Bengaluru North University)
Jnanagangothri Campus, Agalagurki, Chikkaballapura-562103.



DEPARTMENT OF BOTANY

SYLLABUS

B.Sc., BOTANY

**QUESTION PAPER FORMAT
THEORY EXAMINATION**

Marks for each question	Number of question to be		Total Marks
	Answered	Out of	
A. 2	10	12	20
B. 5	4	6	20
C. 10	3	5	30
	Total		70

BENGALURU NORTH UNIVERSITY

**B.Sc., Degree Examination
(Undergraduate Credit Based Semester Scheme)**

**BOTANY
ALL PAPER**

Time: 3 hours

Max. Marks: 70

- A. Explain / Define any ten of the following in **two** or **three** sentences: (10x2=20)
- B. Write critical notes on any **four** of the following (4x5=20)
- C. Give a comprehensive account on any **three** of the following (3x10=30)

INTERNAL ASSESSMENT

1. THEORY- 30 MARKS –

- Class Attendance = 5** (>51%-1, >61%- 2, >71%-3, >81%-4 >90%-5, Long Absent- 0)
- Assignment= 5** (Certificate, content sheet-0.5, Introduction 0.5, description-0.5, pictures or diagrams-1, summary-0.5, references-0.5, correct writing without plagiarism-1 and in time submission -0.5, Absent- 0)
- Seminar = 5** (Presentation: Excellent-5, Good-4, Average-3, Satisfactory-2, Absent-0)
- Project = 5** (Correct and in time submission-5, Good-4, Average-3, Satisfactory-2, Absent- 0)
- Test = 2** (5 marks each= >85%-5, >70%-4, >55%-3, >35%2, <35%-1, Absent- 0)

2. PRACTICAL- 15 MARKS –

- Continues Assessment = 5** (Attendance- 2.5, performance in lab- 2.5)
- Submissions or Maintainance of Plants in the college for lab purpose** (2.5) and Regular Record submission (2.5)= **5**,
- Test = 5** (>85%-5, >70%-4, >55%-3, >35%2, <35%-1, Absent- 0)

IV SEMESTER

PAPER-IV: GYMNOSPERMS AND EMBRYOLOGY OF ANGIOSPERMS **52 hrs**

UNIT I GYMNOSPERMS **13 hrs**

General characters and classification. Economic importance of Gymnosperms with reference to wood, essential oils, resins and drugs.

Morphology and Anatomy of vegetative structures- Root, stem and leaf (primary and secondary growth), Reproductive structures (Developmental Stages not required) and life cycles of *Cycas*, *Pinus* and *Gnetum* (Evolutionary significance of *Gnetum*)

UNIT II EMBRYOLOGY OF ANGIOSPERMS - I **13 hrs**

Indian botanists and their contributions to Embryology- P. Maheshwari, BGL Swamy.

Structure - Typical Angiosperm flower, Androecium and Gynoecium
Microsporangium-Development & structure of mature anther, Anther wall layers, Tapetum-types, structure and functions. Sporogenous tissue.

Microsporogenesis - Microspore mother cells (mmc), cytokinesis, microspore tetrads

Abnormalities-Pollinia, compound pollen grains.

Micro gametogenesis- Formation of vegetative and generative cells, structure of male gametophyte.

Abnormalities - Nemece phenomenon.

UNIT III EMBRYOLOGY OF ANGIOSPERMS - II **13 hrs**

Structure of Pistil - Placentation- definition and types.

Megasporangium - Structure of ovule -Integuments (endothelium), Micropyle (Obturator), Nucellus (crassinucellate and tenuinucellate conditions).

Types of ovule- Anatropous, Orthotropous, Amphitropous, Circinotropous. Megasporogenesis.

Mega gametogenesis - Types of development of Female gametophyte/embryo sac- monosporic- *Polygonum* type, bisporic-*Allium* type, tetrasporic- *Fritillaria* type.

Structure of mature embryo sac- Structure and functions of synergids, egg, central cell and antipodals.

Double fertilization - pollen germination, growth of pollen tube through style (solid and hollow styles), entry of pollen tube into ovule (porogamy, mesogamy, chalazogamy), entry of pollen tube into the embryo sac, pollen tube discharge, syngamy, triple fusion. Significance of double fertilization, post fertilization changes.

Endosperm - Types and its biological importance. Free nuclear (*Areca catechu*, *Cocos nucifera*), cellular (*Cucumis*), helobial types. Ruminant endosperm.

UNIT IV EMBRYOLOGY OF ANGIOSPERMS-III **13 hrs**

Embryogenesis- Dicot (*Capsella bursa-pastoris*) and Monocot (*Najas*).

Parthenocarpy. Polyembryony- definition and types.

Seed - Structure of Dicot and Monocot seed.

PALYNOLOGY- pollen morphology - pollen wall, aperture, shape, size and architecture, NPC system, pollen wall stratification. Applied Palynology - Aeropalynology, Mellissopalynology.

EXPERIMENTAL EMBRYOLOGY - Definition, Totipotency, basic steps in plant tissue culture technique. Nutrient media- basic components, composition of MS & White's media. Tissue culture techniques and their practical applications - Anther culture, Embryo culture, protoplast culture.

Embryology in relation to Taxonomy- e.g., *Trapa*, *Exocarpus*

PRACTICAL – IV

GYMNOSPERMS AND EMBRYOLOGY OF ANGIOSPERMS Total Units – 13

- 1) Study of materials and permanent slides of Gymnosperms included in Theory **5 units**
- 2) Permanent slides of microsporogenesis and male gametophyte **1 unit**
- 3) Mounting of Pollen grains –*Grass, Mimosa*, Pollinia of *Calotropis* and Pollen germination (hanging drop method) **1 unit**
- 4) Permanent slides of types of ovules, Megasporogenesis & embryo sac development **1 unit**
- 5) Permanent slides of types of placentation—Axile, Marginal, Parietal, basal types. Sectioning of ovary, for any two types of placentation. **1 unit**
- 6) Mounting of embryo- *Tridax* and *Cyamopsis*. **1 unit**
- 7) Mounting of endosperm - *Cucumis*. **1 unit**
- 8) Mini project work in groups of 3-5 students, from the following list. **2 units**

a) Study of pollen morphology of different flowers with respect to shape, colour, pores etc.
b) pores etc.
c) Pollen germination of different pollen grains and calculate percentage of germination.
d) Calculating percentage of germination of one particular type of pollen grain collected from different localities/ under different conditions.
e) Study of placentation of different flowers.
f) Any other relevant study related to Gymnosperms / Embryology.

Mini project work may be carried out in groups of 3-5 students, supervised by the batch in charge. The mini project report, about 5-6 pages (type written), to be prepared in following format and certified by the teacher in charge and HOD to be submitted in practical examination.

1.Introduction
2.Aim of study
3.Materials& methodology
4.Observation
5.Conclusion,
Copies to be submitted separately by individual members of the group.

PRACTICAL QUESTION

PAPER-IV GYMNASPERMS AND EMBRYOLOGY OF ANGIOSPERMS

Time: 3 hours.

Max Marks: 35

1. Identify and classify specimens **A, B** and **C** giving reasons - **3X3= 9**
2. Identify the slides **D, E** & **F** with reasons and labeled diagrams **3X3=9**
3. Mount the embryo/Endosperm of specimen **G** & comment. **5**
4. Mount the pollinia/perform pollen germination of specimen **H** & comment **4**
5. Record & submission **5+3=8**

SCHEME OF VALUATION

1. Gymnosperm materials- *Cycas, Pinus, Gnetum* (Identification & classification- **1** mark, reasons-**2** marks).
2. One Gymnosperm slide, one from T.S. of young anther/ mature anther, one from megasporogenesis/ stages of embryo sac development, /placentation/ types of ovules included in theory. (Identification – **1** mark, Diagram-**1** mark, reasons- **1** mark).
3. Endosperm /Embryo mounting (preparation- **3** marks, comment with diagram- **2** marks).
4. Pollinia / pollen germination (preparation-**2** marks, comment with diagram- **2** marks)
5. Record & submission of mini project report (**5 + 3** marks)

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