

## I. Department of BOTANY

- a) Enclose copy of curriculum **ENCLOSED**  
 b) List of the practical experiments in the curriculum actually done by the students and practical demonstrated.

Sl. No.	Name of the experiments - <b>B.Sc. I Botany Practicals</b>	
1	Algae	Temporary Slide Preparation of Volvox Oedogonium Chara, Ectocarpus, Batrachospermum/ Polysiphania.
2	Fungi	Temporary Slide Preparation of Aspergillus, and Peziza, Puccinia Study of permanent slides of Albugo, Agaricus and Alternaria
3	Bryophyta	Temporary Silde Preparation of Riccia Sporophyte and Marchantia Gemma Cups, Study of Permanent Sildes of Marchantia Sex Organs, Anthocerose Sporophyte, Sphagnum Sporophyte, Funaria L.S. Capsule.
4	Pteridophyta	Single Stained slide preparation of Lycopodium selaginella, equisetum stem and marselia petiole.
5	Pteridophyta	Study of permanent slides of cones of pteridophytes marselia sporocarp.
6	Gymnosperm	Single Stained slide preparation of Cycas leaflet, corolloid root, pinus needle study of permanent slides of cycas micro-sporophyll, cycas ovule, pinus stem TLS/RLS, Pinus Cones, Pinus ovule, Ephedra Ovule L.S. Ephedra Male and female reproductive structures.
7	Spotting	
a.	Volvox Coenobium (Model)	
b.	Riccia Sporophyte	
c.	Marchantia Gemma Cup (V.T.S.)	
d.	Marchantia Sporophyte	
e.	Pellia Sporophyte (V.S.)	
f.	Cystopus Asexual	
g.	Ephedra stem T.S.	
h.	Ephedra cone Male & Female	
i.	T.M.V.	
j.	Sargassum	
k.	Funaria Gametophyte with sporophyte	
l.	Anthocerose Sporophyte	
Sl. No.	Name of the experiments - <b>B.Sc. II Botany Practicals</b>	
1	Plant Taxonomy : Botanical Description of the following Plants along with classification & Identification upto the level of Family	
2	Hibiscus rosa - sinensis- malvaceae	

3	Apiaceae - Coriandrum sativum
4	Apocynaceae - Vinca, Thevetia
5	Asclepiadaceae - Calotropis
6	Solanaceae - Datura & Solanum xanthocarpum
7	Lamiaceae - Ocimum sanctum
8	Rubiaceae - Ixora SP.
9	Simple Experiments to show vegetative Propagation in Angiosperm
10	Gymnosperm -
11	Cycas - . Specimen/Photographs showing leaves, stem, old foliage leaves, scale leaves, bulbils, male cone, microsporophyll, mega sporophyll and mature seed.
12	Study through permanent - slides- normal root (T.S.) Stem (T.S.) by showing photographs ovule L.S.
13	Study through hand sections or dissections- corolloid root (T.S.) Rachis (T.S.) Leaflet (V.S.), Microsporophyll (V.S.), Pollen Grains (W.M.)
14	Pinus - . Habit, Long and dwarf shoot showing cataphylls and scale leaves, T.S. – Wood showing growth rings, male cone I year II year and III year female cones, winged seed.
15	Study through permanent slides root (T.S.), Female cone L.S. Ovule L.S. Embryo (W.M.)
16	Showing polycotyledonous condition.
17	Study through hand sections or dissections young stem, old stem (Wood) TLS and RLS T.S. Needle male cone (L.S.) Pollen Grains (W.M)
18	Habit and structure of whole male and female cones
19	Permanent slides - Female Cone (L.S.)
20	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 Embryology, Anatomy and vegetative propagation etc.
21	Study of commonly occurring dicotyledonous plants to understand the body plan.
22	Life forms exhibited by flowering plants by a visit to a garden
23	Mono podial/sympodial type of braching in stems (rhizomes)
24	Anatomy of primary and secondary growth in monocot (Dracena) and dicots (sunflower, Cucurbita, maize (monocot) Boerhaavia, Nyctanthes etc.
25	Field study of diversity in leaf shapes/size etc, structure and development of stomata.
26	Pollination mechanisms in locally available flowers
27	Microsporogenesis - structure of T.S. Anther
28	Structure of ovule/Embryo sac.
Sl. No.	Name of the experiments - <b>B.Sc. III Botany Practicals</b>
1	Plant Physiology :
a	Demonstration of osmosis by potato osmoscope.
b	To study the enzyme activity of protease & Amylase.

c	Evolution of oxygen during photosynthesis (practical demonstration).
d	To Compare the rate of photosynthesis under different conditions by wilmotts' Bubbler.
e	To study the rate of Transpiration by Ganong's potometer
f	Comparision of rate of respiration (RQ) of different - substances (Carbohydrates/proteins/Fats) by Ganong's Respirometer.
2	Plant Ecology :
a	To determine the minimum no. of Quadrats for ecological study.
b	Determination of percentage frequency by Quadrat method.
c	Determination of Density of plants species by Quadrat Method.
d	To prepare Raunkiar's Percentage frequency diagram.
e	To study the soil profile diagram.
f	Ecological Anatomy of some hydrophytes & Xerophytes.
3	Utilization of Plants :
a	Study of morphology structure and simple microchemical test of the food storing tissues in Rice, wheat, potato and microscopic examination of starch in these plants
4	Fibre Yielding Plants :
a	Cotton, microscopic study of cotton and test for cellulose.
5	Vegetable Oils :
a	Study of hand sections of groundnut and coconut and staining of oil droplets by sudan III
6	Field Visit :
a	To study sources of firewood (10 plants) timber yielding trees (10 plants) A list to be prepared mentioning special features.
7	Spices :
a	Black Pepper & Clove
b	Preparation of an illustrated inventory of 10 medicinal plants used in indigenous system of medicine or allopathy by writing their botanical names, common names parts used and diseases/disorders for which they are prescribed.

c) When was the last exercise for curriculum revision undertaken?

**As per the amendments made by affiliating University's Board of Studies.**

d)Specialization of the course - **NIL**

e)No. of SoP's created Kits for practicals – **NIL**

## B.Sc. I (BOTANY)

### PRACTICAL

Study of external (Morphological) and internal (microscopic/anatomical) features of representative genera given in the theory.

1. Algae: Gloeocapsa, Scytonema, Gloeotrichia, Volvox, Oedogonium, Vaucheria, Chara, Ectocarpus, Sargassum, Batrachospermum
2. Gram staining
3. Fungi: Albugo, Aspergillus, Peziza, Agaricus, Puccinia, Alternaria and Cereospora
4. Bryophyta: Riccia, Marchantia, Pellia, Anthoceros, Sphagnum, Funaria
5. Pteridophyta: Lycopodium, Selaginella, Equisetum, Marsilea.
6. Gymnosperm: Cycas, Pinus, Ephedra.

### PRACTICAL SCHEME

TIME: 4 Hrs.

M.M. : 50

1.	Algae/Fungi/Gram Staining	10
2.	Bryophyta/Pteridophyta	10
3.	Gymnosperm	10
4.	Spotting	10
5.	Viva-Voce	05
6.	Sessional	05

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**BOTANY (PRACTICAL)  
SUGGESTED LABORATORY EXERCISES**

**ANGIOSPERMS**

The following species are suitable for study. 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. Rutaceae : Murraya, Citrus
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. Asclepiadaceae : Calotropis
10. Solanaceae : Solanum, Withania, Datura
11. Euphorbiaceae : Euphorbia, Phyllanthus
12. Lamiaceae : Ocimum, Salvia
13. Chenopodiaceae : Chenopodium, Beta
14. Liliaceae : Asphodelus, Asparagus
15. Poaceae : Avena, Triticum, Hordeum, Poa, Sorghum

**GYMNOSPERMS**

**CYCAS**

- i. Habit, armour of leaf bases on the stem (if specimen is not available show photograph), very young leaf (circinate vernation) and old foliage leaves, scale leaf, 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), ovule (L.S.).
- iii. Study through hand sections or dissections - coralloid root (T.S.), rachis (T.S.), leaflet (V.S.), microsporophyll (V.S.), pollen grains (W.M.).

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### **PINUS**

- i. Habit, long and dwarf shoot showing cataphylls and scale leaves, T.S. wood showing growth rings, male cone, 1<sup>st</sup> year, 2<sup>nd</sup> year female cones, winged seed.
- ii. Study through permanent slides - root (T.S.), female cone (L.S.), ovule (L.S.), embryo (W.M.) showing polycotyledonous condition.  
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.), male cone (T.S.), pollen grains (W.M.).

### **EPHEDRA**

- i. Habit and structure of whole male and female cones.
- ii. Permanent slides - female cone (L.S.)
- iii. 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.), pollen grains.

### **SUGGESTED LABORATORY EXERCISES :**

Embryology, Anatomy and Vegetative Propagation etc.

1. Study of commonly occurring dicotyledonous plant (for example Solanum nigrum or Kalanchoe) to understand the body plan and modular type of growth.
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. shoot tip to study the cytohistological 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 (or 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. Field study of diversity in leaf shape, size, thickness, surface properties, internal structure of leaf, structure and development of stomata (using epidermal peels of leaf).
7. Anatomy of the root, Primary and secondary structure.
8. Examination of a 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 suitable available material) using field pollinations.
12. Nuclear and cellular endosperm, embryo development in monocots and dicots (using slides/dissections).
13. Simple experiments to show vegetative propagation (leaf cuttings in Bryophyllum, Sansevieria, Begonia, stem cuttings in rose, salix, money plant, sugarcane and Bougainvillea).
14. Germination of non-dormant and dormant seeds.

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**Suggested Laboratory Exercises (Ecology)**

1. To determine minimum number of quadrats 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 Raunkair'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 (richness, Simpson, Shannon-Wiener) in grazed and protected grassland.
8. To estimate bulk density and porosity of grassland and woodland soils.
9. To determine moisture content and water holding capacity of grassland and woodland soil.
10. To study the vegetation structure through profile diagram.
11. To estimate transparency, pH and temperature of different water bodies.
12. To measure dissolved oxygen content in 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.

**PRACTICAL** ✓

**Suggested Laboratory Exercises (for Utilization of Plants)**

1. Food Plants : 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 (excepting sugarcane)
2. Fibres : 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. Test for lignocellulose.
3. Vegetable oils : Study of hand sections of groundnut, mustard and coconut and staining of oil droplets by Sudan III and Sudan Black.

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### **Suggested Laboratory Exercises**

1. To study the permeability of plasma membrane using different concentrations of organicsolvents.
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 pigment by solvents method.
7. Determining the osmotic potential of vacuolar sap by plsmolytic method.
8. Determining the water potential of any tuber.
9. Separation of amino acids in a mixtue by paper chromatography and their identification by comparison with standards.
10. Bioassay of auxin, cytokinin, GA, 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.

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4. Field visits : To study sources of firewood (10 plants), timber-yielding trees (10 trees) and bamboos. A list to be prepared mentioning special features.
5. Spices : Examine black pepper, cloves, cinnamon (hand sections) and opened fruits of cardamom and describe them briefly.
6. 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 disease/disorders for which they are prescribed.
7. Beverages : Cut Sections of boiled coffee beans and tea leaves to study the characteristic structural features.
8. Rubber : Collect illustrative materials of *Hevea brasillensis* ; morphology of the plant and tapping practices, history of rubber. List the many uses of rubber.

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