1. QUALIFICATION FOR ADMISSION:

Candidates should have passed the Higher Secondary Examination conducted by the board of higher secondary education, Government of Tamil Nadu or any other examination accepted by syndicate, as equivalent thereto, with Botany or Biology as one of the subjects in Higher Secondary Education.

2. DURATION OF THE COURSE

The students shall undergo the prescribed course of study for a period of three academic years.

3. MEDIUM OF INSTRUCTION

English / Tamil

SUBJECT OF STUDY

| Part 1: | Tamil |
| Part 2: | English |
| Part 3: | Major 8 Papers |

Ancillary 4 Papers

Zoology 2 papers (1st year - 1; 2nd year – 1)

Chemistry 2 papers (1st year - 1; 2nd year – 1)

Scheme of the Examination

Duration: 3 Hrs
Max Marks: 100
Passing Min Mark: 35

Course Structure

<table>
<thead>
<tr>
<th>S No</th>
<th>Course</th>
<th>Medium</th>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>B.Sc. (Botany)</td>
<td>English</td>
<td>B.Sc. Botany (Non – Semester)</td>
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</tbody>
</table>
Structure of the Question Paper

Section – A

Write Short answer (10x 3 = 30)

Question No.
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Section – B

Answer the following not exceeding 3 pages each
(Choosing either (a) or (b)) (5 x 8 = 40)

Question No.
11. (a) or (b)
12. (a) or (b)
13. (a) or (b)
14. (a) or (b)
15. (a) or (b)

Section – C

Answer any three Questions not exceeding 5 pages each (3 x 10 = 30)

Question No.
16.
17.
18.
19.
20.
# Course Structure – Over all view

* Equal importance should be given to all the units

<table>
<thead>
<tr>
<th>Non-Semester</th>
<th>Parts</th>
<th>Subjects</th>
<th>Max Marks</th>
<th>Min Marks</th>
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<tr>
<td>B.Sc. Botany</td>
<td>1st Year</td>
<td>Plant Diversity I – Algae, Fungi, Bryophytes, Bacteria and Virus</td>
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<td>Plant Diversity II – Pteridophytes, Gymnosperms and Paleobotany</td>
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<td><strong>PRACTICAL PAPER – I</strong></td>
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<td><em>(Plant Diversity – I &amp; II)</em></td>
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<td>2nd Year</td>
<td>Plant anatomy and embryology</td>
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<td><strong>Cell Biology and Genetics</strong></td>
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<td><strong>PRACTICAL PAPER – II</strong></td>
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<td><em>(Plant Anatomy and Embryology &amp; Cell Biology and Genetics)</em></td>
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<tr>
<td></td>
<td>3rd year</td>
<td>Taxonomy and Economic botany</td>
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<td>Plant Physiology</td>
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<td><strong>PRACTICAL PAPER – III</strong></td>
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<td><em>(Taxonomy and Economic botany &amp; Plant Physiology)</em></td>
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<td>Ecology and Horticulture</td>
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<td></td>
<td><strong>Biochemistry and Biotechnology</strong></td>
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<td>35</td>
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<td><strong>PRACTICAL PAPER – IV</strong></td>
<td>100</td>
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<td><em>(Biochemistry and Biotechnology &amp; Ecology and Horticulture)</em></td>
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</table>

## PAPER – I

**Plant Diversity I – Algae, Fungi, Bryophytes, Bacteria and Virus**

**UNIT – I Viruses and Bacteria**

Structure, properties and transmission of viruses and brief account on mycoplasma - Bacteria – Structure – Nutrition, reproduction and economic importance

**UNIT – II Algae**

General Characters, Classification - and economic importance - Cyanophyceae – Structure and Reproduction of Nostoc; Chlorophyceae – Structure and Reproduction of Volvox; Phaeophyceae – Structure and Reproduction of Sargassam; Rhodophyceae – Structure and Reproduction of Polysiphonia
UNIT – III Fungi
General Characters, Classification by Alexopolus and Mims and economic importance: Zygomycotina – Structure and Reproduction of Mucor; Ascomycotina – Structure and Reproduction of Saccromyces; Basidiomycotina – Structure and cultivation of Agaricus; Deuteromycotina – Structure and Reproduction of Cerospora; Salient features of lichens with special reference to Usnea

UNIT – IV Bryophyta
Classifications of Bryophyta (Rothmalar) - Structure and reproduction of the following: Hepaticopsida (Marchantia); Anthocerotiopsida (Anthoceros); Bryospida (Funaria)

UNIT – V Plant Pathology
Symptoms, causal organisms and control measures of the following diseases: Tikka disease; Citrus Canker; Bunchy top of Banana

PAPER - I

PAPER – I. Plant Diversity I – Algae, Fungi, Bryophytes, Bacteria and Virus

PRACTICALS
1. Micro preparation of types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identifying types from algae mixtures.
4. Study of pathological specimens included in the syllabus.

Books for study

8. Singh, R.S. Plant diseases, Oxford & IBH.
BOOKS FOR REFERENCE


PAPER – II

Plant Diversity II – Pteridophytes, Gymnosperms and Paleobotany

Unit – I: Pteridophytes: General Characters and Classification based on Smith; Structure and reproduction of the following: Psiloptopsida – Psilotum; Lycopsida – Selaginella

Unit – II: Sphenosida – Equisetum; Pteropsida – Marsillea

Unit–III: Gymnosperms: General Characters and Classification based on Smith; Structure and reproduction of the following: Cycas

Unit – IV: Structure and reproduction of the following: Pinus and Gnetum

Unit – V : Paleobotany: Brief account of Geological Time Scale; Formation of Fossils; Study of Rhynia and Lyginopteris

PAPER II

Plant Diversity II – Pteridophytes, Gymnosperms and Paleobotany

PRACTICALS

1. Making suitable micro preparations of types prescribed in Pteridophytes and Gymnosperms.
2. Observing and identifying the fossil slides included in the syllabus.
BOOKS FOR STUDY
3. Vashista, P.C., 1976, Botany for Degree Students Vol. V (Gymnosperms) S.Chand &
   Co. New Delhi.

BOOKS FOR REFERENCE
   Distributors

PAPER – III
Plant Anatomy and Embryology

Unit – I
Classification of meristems; theories of meristems Simple tissues - Parenchyma,
Collenchyma and Sclerenchyma Complex tissues - Xylem and Phloem

Unit – II
Primary structure of stem and root (monocot and dicot)
Secondary thickening of Dicot stem and root

Unit – III
Internal Structure of monocot and dicot leaf
Nodal anatomy – unilocular, bilocular and multilocular

Unit – IV
Microsporogenesis – Development of male gametophyte Structure and types of
Ovules
Megasporogenesis – Formation of female gametophyte with reference to
Polygonum type

Unit – V
Fertilization – Double Fertilization - Triple fusion
Endosperm – Types of endosperm
Development of dicot embryo (Capsella)
PAPER III
PLANT ANATOMY & EMBRYOLOGY
PRACTICALS

1. Study of primary structure of dicot stem, dicot root, monocot stem & monocot root.
3. Anomalous secondary growth of stems prescribed in the syllabus.
5. Nodal anatomy – types included in the syllabus.
6. T.S. of anther showing various stages.
7. Types of ovules (permanent slides)
8. Embryo mounting (Cucumis or Tridax)

Books for Study

Books for reference

Paper – IV
Cell biology and Genetics

UNIT –I : Ultra structure of plant cell, cell wall and plasma membrane

UNIT –II : Structure and Function of the following organelles
   a. Chloroplast
   b. Mitochondria
   c. Endoplasmic reticulum
   d. Ribosomes

UNIT – III : Structure and Function of Nucleus, - Cell division – mitosis and meiosis

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UNIT – IV: Mendel’s law of inheritance; monohybrid and dihybrid ratio – linkage and Crossing over

UNIT – V: Structure of DNA; DNA Replication, - Genetic variation – mutation – (Chromosomal and gene) – Brief account on RNA and its type

PAPER IV
CELL BIOLOGY AND GENETICS
PRACTICALS
1. Observation of Plant cells in the onion peeling and Rheo leaf
2. Photographs of cell organelles.
3. Root tip squash – Onion.
4. Non-living inclusions-raphides and cystolith
5. Problems in mono and Dihybrid ratios and gene interactions.

Books for Study

Books for Reference
5. Victor A.McKusick, Human Genetics, Prentice Hall of India.

III year
Paper – V

Taxonomy and Economic Botany

UNIT – I: Classification of Angiosperms - Natural – Bentham and Hooker Phylogentic – Engler and Prantal plant Nomenclature – Binomial preparation of Herbarium

UNIT–II: Study of the following Dicot Families - Annonaceae, Ructaceae, Cucurbitaceae, Asclepiadaceae, Lamiaceae and Euphorbiaceae

UNIT–III: Study of the following monocot families – Orchidaceae, Liliaceae, Arecaceae and Poaceae
UNIT – IV: Study of the following cereals with their cultural practice and economic importance - oryza, wheat  
Study of the following millets with their cultural practice and economic importance – Ragi, Sorghum  

UNIT – V: Medicinal Plant  
a. Neem  
b. Ocimum  
c. Coriander  
d. Ginger  

PAPER – V  
TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY  
PRACTICALS  
1. Identification, observation and sketching the floral parts of plants belonging to the families included in the syllabus.  
2. Key preparation  
3. Spotters may be given for economic botany.  
4. Submission of record notebook.  

BOOKS FOR STUDY  
2. Vasishtha, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company  

BOOKS FOR REFERENCE  

Paper – VI  
Plant Physiology  

UNIT – I Plant and Water Relation  
- Imbibition, Diffusion and Osmosis  
- Mechanism of water absorption  
- Transpiration – Stomatal Types – Brief account on Guttation  
- Ascent of Sap – Dixon and Jolly Theory  

UNIT – II Metabolism – I  
- Photosynthesis  
- Light reaction  
- Dark reaction – C3 and C4 plants  

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- Respiration - Glycolysis, Kerb’s cycle, Electron Transport
- Photorespiration

UNIT – III Nitrogen Metabolism
- Reduction of nitrates – formation of Amino Acids
- Mechanism of protein synthesis
- Lipid Metabolism – B - Oxidation of Fatty Acids

UNIT – IV Growth and Growth Hormones
Physiological role of Auxin, Gibberrellin, Cytokinins and Ethylene
Seed Dormancy – Causes and breaking

UNIT – V Physiology and Flowering
- Photoperiodism and Vernalization
- Brief account of Fruit ripening

PAPER VI
PLANT PHYSIOLOGY
PRACTICALS
1. Measurement of O.P. by Chardakor’s method
2. Measurement of O.P. by gravimetric method
4. Transpiration equals absorption experiment.
5. Effect of light on photosynthesis
8. Measuring R.Q.of the given material.
9. Imbibitional pressure using dilatometer
EXPERIMENTS (Demonstration only)
1. Ganong’s light screen experiment
2. Ganong’s Respiroscope
3. Mohl’s half leaf experiment.
5. Arc auxanometer
6. Phototropism
7. Kuhen’s fermentation vessel

BOOKS FOR STUDY

BOOKS FOR REFERENCE

**Paper VII**

**Ecology and Horticulture**

**Unit I:** Ecosystem - Concept, components - food chain Food web, Types of ecosystem, ecological pyramids

**Unit II:** Ecological groups and its adaptations - Hydrophytes, Xerophytes and Halophytes - Methods of studying vegetation - Quadrat and Transect

**Unit III:** Pollution - causes and effect and control measures of air, water, land and noise

**Unit IV:** Vegetative propagation - Cuttage, Layerage and Graftage

**Unit V:** Meaning and Layout of Kitchen garden – Indoor gardening – Hanging pot Miniature; Rockery; Storage of fruits

**PAPER – VII**

**ECOLOGY & HORTICULTURE**

**PRACTICALS**

1. Study of xerophytes, hydrophytes and halophytes.
2. Internal structure of *Casuarina* stem, *Nerium* leaf, *Hydrilla* stem and *Nymphaea* petiole
4. Practicals on layering, grafting, budding, potting & terrarium.

**BOOKS FOR STUDY**


**BOOKS FOR REFERENCE**

3. Barucha, Plant Geography of India, Oxford University Press.
6. Percy Lancaster, 1979, Gardening in India, Mohan Makhijani and Rekha Printers, N.Delhi

**Paper VIII**

**Biochemistry and Biotechnology**

**Unit I**
Basic Concept of atom - Types of Bonding - Types of Isomerism
- Carbohydrates - Classification and Properties

**Unit II**
Amino Acids - Classification, Structure and Properties
- Proteins - Classification primary, secondary and Tertiary structures
- Classification of Lipids - Simple, Compounds and derived Lipids (with an example each)

**Unit III**
Enzymes - Nomenclature, properties and classification - Mechanism of enzyme – Action (Lock and key, Induced – Fit Models) - Factors – Affecting Enzyme’s Action

**Unit IV**
Genetic Engineering – Tools and Techniques of Recombinant DNA technology – Enzyme Involved - Cloning Vectors (plasmids, cosmids, T4 Bacteriophages) - steps in Gene Cloning Technology - Application of Genetic Engineering

**Unit V**
Plant Biotechnology - Tissue Culture - Concept, Explant and callus formation
Organogenesis and Somatic embryogenesis - Protoplasmic Fusion - Application of Plant Tissue culture in Crop improvement

**PAPER – VIII**

**BIOCHEMISTRY & BIOTECHNOLOGY**

**PRACTICALS**

**BIOCHEMISTRY**

1. Determination of complementary colours
2. Verification of Beer’s Law
3. Measurement of pH
4. Preparation of buffers.
5. Titration curve of weak acid
6. Titration curve of strong acid
7. Preparation of standard graph for starch
8. Estimation of starch in a given material
9. Circular paper chromatography - dyes
10. Ascending paper chromatography

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BIOTECNOLOGY

Sterilization techniques
Preparation of culture medium
Development of callus – demonstration only

BOOKS FOR STUDY
1. Salil Bose, Elementary Biophysics, Jyoti Books
2. Jogdand, S.N., Advances in Biotechnology, Oxford University Press

BOOKS FOR REFERENCE

BOTANY MAJOR PRACTICAL EXAMINATION

Practical Paper – I

Plant Diversity – I & II (Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms, Paleobotany and Plant Pathology)

Time: Three Hours
Total Marks: 100

1. Make suitable temporary micro preparation of A, B, C and D. (4 x 10 = 40)
   Submit the slides for valuation. Draw diagram and give reasons
2. Identify, draw diagrams and write critical notes on E, F, G, H and I. (5 x 4 = 20)
3. Comment on etiology of J (1 x 10 = 10)
4. Identify and write the geological era, notes and draw diagrams of K (1 x 10 = 10)
5. Spot at sight (Genus and group only) L & M (1 x 10 = 10)
6. Observation note book (1 x 10 = 10)

Key and scheme of valuation
1. A, B, C and D Algae, Bryophytes, Pteridophytes and Gymnosperms, materials to be given. (Slide-5 marks, Diagram – 2 marks, Reasons – 2 marks, identification – 1 mark)
2. E, F, G, H and I Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms and Lichens. (Diagram – 2 marks, reasons – 2 marks, identification – 1 mark)

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4. K – (Fossil slide identification – 3 marks, geological era – 2 mark, sketch and diagram – 2 marks, reasoning 2 marks)
5. L & M Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms. (Diagram – 2 marks reasons – 2 marks, identification – 1 marks)
6. Observation note book - 10 marks

**Major Practical- Paper II**

**Plant anatomy, embryology, Cell Biology and Genetics**

**Time : 3 hours**

**Max. Marks: 100**

- Make suitable temporary micro preparations of A and B mount it in glycerine and submit the slides for valuation. Draw diagrams, identify and give reasons.
  
  \[(2 \times 15) = 30\]

- Dissect and display any one stages any one stages of embryo from the material given in C. Submit the slide for valuation.
  
  \[(1 \times 15)=15\]

- Make suitable temporary micro preparations of D and identify any one stage. Submit slide for valuation
  
  \[(1 \times 15)=15\]

- Write critical notes on E, F, G, H and I
  
  \[(5 \times 6) = 30\]

- Submission of Record Note Book
  
  \[(10)\]

**Key and Scheme of valuation:**

- Plant Anatomy (A and B), Identification : 2 Marks; Diagram: 5Marks; Reasons: 7Marks
- Embryology – (embryo stages) –C: Submission of slides: 5 Marks; Diagram: 3 marks; Reasons: 7 Marks
- Cell biology- (onion root tip for mitosis cell division)-D : Submission of slides: 5 Marks; Diagram: 3 marks; Reasons: 7 Marks
- E and F- Genetic -2 (Problem-1; Spoter-1);
  
  G, H and I (Anatomy, Cell Biology and Embryology) Identification : 2
  
  Diagram : 2
  
  Reasons : 2

**Practical Paper III**

**Taxonomy, Economic Botany and Plant Physiology**

**Time: 3hrs**

**Maximum Marks: 100**

- Refer specimen the specimen A and B to its respective families with reasons
  
  \[(15 \times 2)=30\text{ marks}\]

- Describe specimen C in technical terms, draw sketches and LS of the flower
  
  \[(15 \times 1)=15\text{ marks}\]
- Take a lot write the procedure and conduct the experiment interpret the data (15x1=15 marks)
- Comment on the physiology set up D (10x1=10 marks)
- Write family, genus, and the part used for the specimen E, F, G, H (05x4=20 marks)
- Record note (10x1=10 marks)

**Key and Scheme**

- specimen A and B from families studied (family identification 3m, reasons 7m, sketches 5m)
- specimen C (technical terms 7m; LS of the flower 3m; sketches 5m)
- Physiology experiment (procedure 5m; demonstration 5m; data interpretation 5m)
- Physiology set up (comment 5m; diagram 5m)
- Family 1m; genus 1m; and economic importance of the part used 3m
- Record note (10m)

**Practical Paper IV**

**Ecology, Horticulture, Biochemistry and Biotechnology**

Time: 3hrs  
Maximum Marks: 100m

- Take a lot write the procedure and conduct the experiment interpret the data (20x1=20 marks)
- Construct the quadrat and find out the density of vegetation in the selected site (20x1=20 marks)
- Spot at site write notes A, B, C, D (10x4=40 marks)
- Comment on the set up H (10x1=10 marks)
- Record note (10x1=10 marks)

**Key and Scheme**

- experiment (procedure 5m; demonstration 5m; data interpretation 5m; inference 5m;)
- Construction of quadrat 10 m; data collection 5m; interpretation 5m
- specimen A B Horticulture; C, D Plant tissue culture/ Biotechnology (diagram 5m; description 5m)
- Comment on the set up H (diagram 5m; description 5m)
- Record note (10m)
REGULATIONS AND SYLLABUS
(This will come into effect from the academic year 2013 - 2014 onwards)
B.Sc. Botany Ancillary
(Non - Semester)
Course Structure – Over all view

* Equal importance should be given to all the units

<table>
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<th>Non Semester</th>
<th>Parts</th>
<th>Subjects</th>
<th>Max Marks</th>
<th>Min Marks</th>
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<td>B.Sc. Botany Ancillary</td>
<td>1st or 2nd Year</td>
<td>Plant Diversity – Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Plant anatomy and embryology</td>
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<td>2nd or 3rd Year</td>
<td>Taxonomy, Plant Physiology, Ecology and Biotechnology</td>
<td>100</td>
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<td><strong>PRACTICAL PAPER – I</strong> (Covering above syllabus of 2 papers)</td>
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**PAPER – I**

Plant Diversity – Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Plant Anatomy and Embryology

**UNIT – I**
General Characters, Classification - and economic importance - Cyanophyceae – Nostoc; Chlorophyceae – Volvox; Phaeophyceae Sargassam, General Characters, Classification by Alexopolus and Mims and economic importance: Zygomycotina – Mucor; Ascomycotina – Saccromycses; Basidiomycotina – Puccinia,

**UNIT – II**
Classifications of Bryophyta (Rothmalar) - Bryospida (Funaria) General Characters and Classification of Pteridophytes - Lycopsida – Selaginella

**UNIT – III**
General Characters and Classification of Gymnosperms based on Smith; Structure and reproduction of the following: Pinus

**UNIT – IV**
Classification of meristems; theories of meristems; Simple tissues - Parenchyma, Collenchyma and Sclerenchyma; Complex tissues - Xylem and Phloem

**UNIT – V**
Microsprogenesis – Development of male gametophyte Structure and types of Ovules

Megasprogenesis – Formation of female gametophyte with reference to Polygonum type
**Books for study**


**PAPER – II**

**Taxonomy, Physiology, Ecology, Horticulture and Biotechnology**

**UNIT – I**
Classification of Angiosperms - Natural – Bentham and Hooker - Nomenclature – Binomial; Study of the following Families – Annonaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae and Poaceae

**UNIT – II**
Transpiration; Photosynthesis; Respiration; Physiological role of Auxin, Gibberiellin

**UNIT – III**
Ecosystem - Concept, components - food chain Food web, Types of ecosystem, ecological pyramids; Pollution - causes and effect and control measures of air, water, land and noise

**UNIT – IV**
Vegetative propagation - Cuttage, Layerage and Graftage; Meaning and Layout of Kitchen garden – Indoor gardening –Hanging pot Miniature; Rockery; Storage of fruit

**UNIT – V**
Tissue Culture - Concept, Explant and callus formation Organogenesis and Somatic embryogenesis - Protoplasmic Fusion - Application of Plant Tissue culture in Crop improvement

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**BOOKS FOR STUDY**

2. Vasisha, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company

**PRACTICALS**

1. Micro preparation of types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identification, observation and sketching the floral parts of plants belonging to the families included in the syllabus.

4. **EXPERIMENTS (Demonstration only)**
   - Ganong’s light screen experiment
   - Mohl’s half leaf experiment
   - Evolution of O during photosynthesis
   - Arc auxanometer
   - Phototropism
   - Kuhen’s fermentation vessel
Practical Paper – I

Time: Three Hours
Total Marks: 100

7. Refer specimen A and B to its respective families (2 x 10 = 20)
8. Make suitable temporary micro preparation of C, and D (2 x 10 = 20)
   Submit the slides for valuation. Draw diagram and give reasons
9. Identify, draw diagrams and write critical notes on E, F, G, H. (4 x 10 = 40)
10. Comment on set up (1x10 = 10)
11. Observation note book (1x10 = 10)

**Key and scheme of valuation**

7. specimen A and B from families studied (family identification 2m, reasons 5m, sketches 3m)
8. C, D Algae, Pteridophytes or Gymnosperms. Materials to be given. (Slide-5 marks
   Diagram – 2 marks Reasons – 2 marks, identification – 1 marks)
9. E, F, G, H (Diagram – 5 m; reasons – 4 m; identification – 1m)
   a. E – Anatomy
   b. F – Embryology
   c. G – Horticulture
   d. H – Biotechnology
10. Physiology set up (comment 5m; diagram 5m)
11. Observation note book - 10 marks