

**III B. Sc, VI Semester; Paper VIII**

**Practical Question paper  
Plant Physiology**

**Time: 3 hrs**

**Max. Marks 40**

Q. 1. Conduct major experiment 'A' write requirements, procedure, record the results with conclusions 15 Marks

Q.2 Perform Minor Experiment B'and report the result. 10Marks

Q.3. Identify 'C' 'D' and 'E' with reasons 5+5+5=15 Marks

**Scheme of evaluation**

**Q 1. Major Experiment A'. 15 Marks**

Requirements:02 Marks

Procedure:03 Marks

Experiment Setting: 05 Marks

Conclusion and results: 05 Marks

**Q 2. Minor Experiment B'. 10 Marks**

Performance: 05 Marks


Procedure, results and conclusion: 05 Maarks

**Q. 3 Spotters any three 15 Marks**

Identification: 01 Mark

Diagram+ reasons and comments: 04 Marks

Each spotter:05 Marks

  
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### III B. Sc, VI Semester; Paper VIII

#### Plant Physiology

#### Practical Syllabus

##### List of Major Experiments

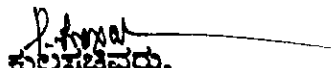
- 1) Measurement of DPD in Plants by Gravimetric (Potato) Method.
- 2) To Measure the Rate of Transpiration under Different Conditions of Light and Wind by Ganong's Photometer.
- 3) Suction Force due to Transpiration
- 4) Separation of Chlorophyll Pigments by Paper Chromatographic Method

##### List of Minor Experiments

- 1) Experiment to Study the Relation between Absorption and Transpiration
- 2) Evolution of Oxygen by Bubble Counting Method, under Different Wavelengths of Light- using Color Transparencences- Red, Blue, Green (Yellow) (During Exam Different Conditions need not be asked)
- 3) Experiment to Study Synthesis of Starch during Photosynthesis
- 4) Mohl's Half Leaf Experiment

##### Spotters

- 1) Experiment to Demonstrate End and Exosmosis using Potato Osmoscope
- 2) Experiment to Demonstrate Unequal Transpiration in Plants by Cobalt Chloride Paper
- 3) Passage of Air through Stomata using Colocasia Leaf
- 4) To Demonstrate that Light is Necessary for Photosynthesis [Ganong's Light Screen Experiment]
- 5) Dewar's Thermos Flask Experiment
- 6) Kuhne's Fermentation Vessel Experiment
- 7) Experiment to Show Geotropism using Clinostat (Nullifying Effect)
- 8) Experiment to Show Phototropism in Plants using Phototropic Chamber.
- 9) Experiment to Determine the Rate of Plant Growth by using Arc Auxanometer
- 10) To Determine the Respiratory Quotient (Rq) of Different kinds of Germinating Seeds using Ganong's Respirometer.

  
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### III B. Sc, VI Semester; Paper VIII

#### Plant Physiology

50 Hours

<b>Max marks</b>	<b>: 80</b>
<b>Internal Assessment marks</b>	<b>: 20</b>
<b>No.of teaching Hours /Week</b>	<b>: 03 hours</b>
<b>Duration of examination</b>	<b>: 03 hours</b>

**Unit 1. Plant Water Relations:** Properties of Water, Significance of water for plants

**Osmosis:** Endosmosis, Exosmosis, Water Potential, DPD, Plasmolysis, Deplasmolysis, Significance of Osmosis, **Absorption of Water:** Introduction, Mechanism of Water Absorption (Active and Passive), **Absorption of Minerals: Mechanism:-**Passive Absorption-, Donnan's Equilibrium. Active Absorption (Lundergardh and Burstorm), Cytochrome Pump Theory. Carrier Concept, **Ascent of Sap:** Concept, Mechanism- TCT Theory, **Mineral Nutrition:** Concept, Macro and Micronutrients, Role of Macronutrients, Deficiency Symptoms – N, P, K, Mg, Ca, Fe, &Mn, Cu, Zn. **10 hr**

**Unit 2. Transpiration:** Types of Transpiration, Structure of Stomata, Mechanism of Stomatal Transpiration- Starch- Sugar Inter Conversion Theory, Significance, **Guttation:** Structure of Hydathode, Differences between transpiration and guttation, **Translocation of Solutes:** Types - Mechanism of translocation-Mass Flow Hypothesis, **Enzymes:** Nomenclature, Structure, Classification and Properties **15 hr**

**Unit 3. Photosynthesis:** Introduction, Structure of chloroplast, Mechanism Light Reaction- Cyclic and Non Cyclic Photo-Phosphorylation, Dark Reaction- C3 Pathway, Law of Limiting Factors, C4 Pathway, **Respiration:** Introduction, Structure of Mitochondrion, Types of Respiration, Mechanism of Aerobic Respiration- Glycolysis- Kreb's cycle, Electron Transport System. **15 hr**

**Unit 4. Phytohormones-** Definition, Types of Hormones, Physiological and Practical Application of Auxins, Gibberellins, Cytokinins, ABA, Ethylene **05 hr**

**Unit 5. Physiology of Flowering-**Photoperiodism, types, Role of phytochrome, Vernalization and Dormancy, **Plant Movements** – A General Account, Classification, Trophic Movements. **05 hr**

III B. Sc, VI Semester; Paper VII

Cytology & Genetics

Scheme of Valuation

Time: 3 hrs

Max. Marks 40

Q. 1. Prepare squash of material 'A' identify, sketch label the stage with reasons 10 Marks

For preparation	-	6 marks
For identification	-	1 marks
Sketch and Label	-	1 marks
Reasons	-	2 marks


Q. 2. Prepare smear of material 'B' identify, sketch label the stage with reasons 10 Marks

For preparation	-	6 marks
For identification	-	1 marks
Sketch and Label	-	1 marks
Reasons	-	2 marks

Q. 3. Identify the slides C and D –sketch, label with reasons (one from mitosis, one from Meiosis)  
(05 marks each) 10 marks

For identification	-	1 marks
Sketch and Label	-	2 marks
Reasons	-	2 marks

Q. 4. Solve the given genetic problems of 'E' and 'F'  
Each- 5 Marks 10 marks

  
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**Practical Question Paper**

**Time : 3 Hrs**

**Max Marks : 40**

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- I Prepare squash of material 'A' Identify, sketch label the stage with reasons  
**10 Marks**
- II Prepare smear of material 'B' identify sketch, label the stage with reasons  
**10 Marks**
- III Identify the slides C and D –sketch, label with reasons  
(One from mitosis, and one from Meiosis) **10 Marks**
- IV Solve the given genetic problems of 'E' and 'F' **10 Marks**

- ii)  $YyRr \times YyRR$ ..... $YyRr \times Yyrr$   
 iii)  $Yyrr \times yyRR$ ..... $YyRr \times YyRr$

Note: Select any 2 pairs for setting.

6. In pea, tallness (T) is dominant over dwarfness (t). A tall plant crossed with dwarf produces off spring of which about 50% are tall 50% are dwarf. What are the genotypes of the progeny?
7. In tomatoes, red fruit color® is dominant over yellow®. A pure red fruited plant is crossed to a yellow fruited one. What will be the appearance of  $F_1$ ? The  $F_1$  are interbred and produce 320 off spring in the  $F_2$ . How many of them will be red and how many yellow? What will be the genotypes of  $F_2$  and in what number?

8. 9:7 ratio:

The two non -allelic dominant genes C and O alone produce white flowers in pea plants. When both the dominant genes at least in single dose are present together in a genotype they produce purple flowers in the pea plants. What are the genotypes of the parents in the following crosses?

- i) Purple flowered parent X white flowered parent  
 ii) White flowered plant X white flowered plant.

9. 12:3:1 (Epistasis):

The white fruit color in summer squash is controlled by a dominant gene (W) and color control in fruit by its recessive allele (w). Yellow fruit is governed by an independently assorting hypostatic gene (G) and green by its recessive allele (g). When dihybrid plants are crossed, the off spring appears in the ratio of 12 white: 3 yellow: 1 green. What fruit color ratio is expected from the crosses given below?

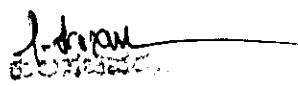
- i)  $WWgg \times WwGG$  ii)  $WwGg \times wwgg$

10. Linkage and Crossing over :

In corn there is a dominant gene for colored seed and another dominant gene for full seed. The recessive alleles of these genes produce colorless seed and shrunken seed. Plants homozygous for colored full seed are crossed with colorless shrunken and the test cross of the  $F_1$  yields the following results.

Colored full	190
Colorless shrunken	198
Colored Shrunken	1
Colorless full	5

Would you say that these two genes are linked? If so what is the percentage of crossing over?

  
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**III B.Sc. VI Semester Paper VII**  
**Cytology and genetics**  
**Practical Syllabus**

**Time: 3Hrs**

**Max Marks :40**

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- I Preparation of Mitotic slides. Ex: Onion (root tip)
- II Preparation of Meiosis Ex : Onion /Rheo (Flower buds)
- III Study of different stages of mitosis and meiosis (from permanent slides)
- IV Genetic 5 problems –From the given list
- V Technique of making permanent slides of mitosis and meiosis.

**List of Genetic Problems –Botany**

1. In garden peas the effect of the tall allele (T) is dominant over that of dwarf (t) and the effect of the smooth seeds allele (S) is dominant over that of wrinkled (s) these two gene pairs also are known to assort independently of each other
  - a) What proportion of phenotypes would be expected among the progeny of tall smooth seeded  $F_1$  Plants crossed to each other if each such  $F_1$  plant was deiced from a cross b/n pure breeding tall smooth seeded variety (TTSS) and a dwarf wrinkled seeded variety (ttss)?
  - b) Would proportions of phenotypes in the  $F_2$  generation be changed if the  $F_1$  plants of (a) were crossed between a tall wrinkled seeded variety and a dwarf smooth variety.
  - c) What phenotype results would be expected if the  $F_1$  plants of (a) were crossed to a dwarf wrinkled seeded plant.
2. Around seeded, dwarf pea plant was crossed with a wrinkled seeded, tall one. In the  $F_2$  328 were round, tall, 115 round, dwarf, 120 wrinkled tall and 36 wrinkled dwarf, 1230 wrinkled tall dwarf were produced. Decide whether these- characters are showing independent assortment.
3. In tomatoes, yellow fruit and dwarf characters are due to recessive alleles of genes which produce the more common red fruited, tall plant. If pollen from a pure dwarf plant bearing red fruit is placed on the pistil of a pure tall plant bearing yellow fruit, what type of off springs be expected in the  $F_1$ ? If these are crossed among themselves, what off spring would be expected in the  $F_2$ ?
4. A tall red when crossed with dwarf red plant produces a dwarf white plant. Give the genotypes of the parents.
5. What type of gametes will be formed by the pea plants involved in the following crosses?  
Determine the Phenotype ratio of the off spring
  - i)  $YyRr \times yyrr$ ..... $YyRR \times yyrr$

III B. Sc, VI Semester; Paper VII

Cytology and Genetics

50 Hours

Max marks	: 80
Internal Assessment marks	: 20
No.of teaching Hours /Week	: 03 hours
Duration of examination	: 03 hours


**Unit 1. The Cell:** Ultra Structure of Plant Cell, Organization, Function and its Components- Cell Wall, Plasma Membrane [Fluid Mosaic Model] Golgi Complex, Endoplasmic Reticulum, Mitochondria, Ribosome, Plastids, Peroxisomes, Lysosomes), Cytoplasm: Vacuole-Non Living Inclusions-Nucleus-Ultrastructure  
10 hr

**Unit 2. Chromosomes:** Number Size, Classification (Based on Centromere) Structure (Metaphase) Nucleosome Model, Karyotype, Idiogram, Heterochromatin and Euchromatin, Chromosomal Aberrations: Deletions, Duplications, Translocations & Inversions, Mitosis and Meiosis in Plants: Significance – Differences, Variation in Chromosome Number: Polyploidy – Types Significance.  
10 hr

**Unit 3. DNA:** Structure (Watson and Crick Model) DNA Replication, RNA: Types, Structure-Function (t-RNA, m-RNA, r-RNA), Concept of Gene: Characteristics, Gene Expression, Genetic Code: Characteristics, Codon Dictionary, Protein Synthesis: Mechanism, Regulation of Gene Expression: In prokaryotes- Lac Operon Concept. Gene Mutations  
10 hr

**Unit 4. Genetics:** Biography of Mendel- Contrasting Characters of Pea Plant- [Terms – Homo and Heterozygous, Phenotype, Genotype] Monohybrid Cross- Explanation of Law of Dominance- Law of Segregation- Dihybrid Cross, Explanation – Law of Independent Assortment Test Cross  
10 hr

**Unit 5. Deviation from Mendelian Laws:** Incomplete Dominance (*Mirabilis jalapa*), Modification of Mendelian Ratios: (with Reference to Plant Examples) Interaction of Genes- Epistasis- Complementary Factor- Supplementary Factors. Multiple Alleles (Self Sterility in *Nicotiana*) Linkage and Crossing over in Maize: Chromosome Mapping.  
10 hr

  
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## Subject-Botany V Semester

### Paper VI- B.: Plant Tissue Culture, Medicinal Plants, Economic Botany and Evolution.

Duration of examination- 03 hr

Max. marks:

40(Based on theory syllabus)

1. Medicinal plants- Extraction (uses) from various parts
2. Economic importance of plants studied in theory

## V Semester

### Paper VI- B.: Practical Question Paper

Duration of examination- 03 hr

Max. marks: 40

(Plant Tissue Culture, Medicinal Plants, Economic Botany and Evolution)

- Q.1. Identify the specimens 'A', & 'B'. Sketch, label and write the medicinal importance. 2X5=10
- Q.2. Write the economic importance of 'C', 'D', 'E', 'F', and 'G' 3X5=15
- Q.3 Comment on F & G 2x5=10
- Q.5 Identify & write the contribution of H' 1x5=5

## Subject-Botany

### Scheme of Valuation (Paper VI-B)

Time-03 hr

Max. marks: 40

- Q.1. Identify the specimens 'A', & 'B'. Sketch, label and write the medicinal importance. 3X5=15
- (From different parts-Root, Stem, Leaf, Fruit)
- Identification= 01 Mark
- Sketch and Label- Morphology= 02 Marks } each 05 marks
- Medicinal importance= 02 Marks
- Q.2. Write the economic importance of 'C', 'D', 'E', 'F', and 'G' 3X5=15
- Identification = 01 Mark
- Botanical name, Family, Part used and uses = 04 Marks } 05 Marks each
- (from different groups)
- Q.3 Comment on F & G (From Tissue culture) 2x5=10
- (Callus, rooting, shooting, M. S. Media)
- Q.4 Identify and write contribution of H' 1x5=5
- ((Evolution- Photograph of Lamark, Darwin, Hugo de-Vries or others)

**Subject-Botany V Semester Paper VI B (Choice based)**

**Paper VI- B: Plant Tissue Culture, Medicinal Plants, Economic Botany and Evolution.**

**50 hr**

**UNIT-1.** Plant tissue culture: Aim and scope, totipotency, types of tissue culture, callus culture and its importance. Organogenesis, anther culture and its importance. **10 hr**

**UNIT-2.** Medicinal plants, *Rauwolfia serpentina*, *Vinca rosea*, *Tylophora asthamaticca*, *Cinchona officinalis*, *Withania somnifera*, *Tinospora cordifolia*, *Adathoda vasica*, *Atropa belladonna* (*Bellodona*), *Melia azadirachta* (Neem), *Eucalyptus globules*, *Holorrhina antidysentrica*, *Metha viridis* (Miat), *Alove vera*, *Asparagus racemosus*, *Acorus calamus* (Baje). **15 hr**

**UNIT-3. Economic Botany-I:** Introduction, Food plants- Cereals and Millets, Rice, Wheat, Maize, Jowar, Ragi, Bajra.

Pulses- Begal gram, Green gram, Black gram, Pigeon pea.

Oil and Fats- Sunflower, Groundnut, Coconut, Safflower.

Spices and Condiments- Asafoetida, Coriander, Cardomum, Clove, Cinnomom, Red pepper (Chilly) **10 hr**

**UNIT-4. Economic Botany-II:** Beverages- Coffee, Tea and Cocoa.

Timber plants- Teak, Rosewood and Neem.


Textile fibres- Cotton, Coir, Sunhemp.

Narcotic drugs- Tobacco and Opium.

Vegetables- Carrot, Cabbage, Brinjal, Okra, Cucurbits, Tomato.

Fruits- Muskmelon, Watermelon, Strawberry, Blackberry, Raspberry, Gooseberry, Grapes, Mango, Citrus fruits, Banana, Custard apple, Papaya, Pomegranate. **10 hr.**

**UNIT-5.** Evolution- Origin of life (in brief); A brief account of theories of evolution of Lamark, Darwin, Hugo de Vries, Modern synthetic theory. **5 hr.**

  
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**Subject-Botany: V Semester**  
**Paper- VI A. Scheme of valuation**

**Time- 03 hr**

**Max. marks: 40**

Q.1. Write the critical notes on 'A' and 'B'

5X2=10

(Gootee, Grafting types to the set up)

Identification = 01 Mark

Sketch & Label = 02 Marks }

Critical notes= 02 Marks

Each: 05 Marks

Q.2. Identify the technique involved in 'C' and write the comments 5X1=5

Identification = 01 Mark

Sketch & Label =02 Marks

Comments= 02 Marks

(Bagging and Emasculation)- Hybridisation technique

Q.3. Conduct the qualitative analysis of the samples 'D', 'E' & 'F' 5X3=15

(Both Negative and Positive tests should be written)

Q.4. Extract the DNA from the given sample 'G'/spotters

10X1=10

**Subject-Botany:V Semester**

**Paper- VI A. Plant Breeding and Biotechnology**

**Practical syllabus**

**Duration of examination- 03 hr**

**Max. marks: 40**

**(Based on theory syllabus)**

1. Training of vegetative propagation methods
2. Hybridization techniques
3. Qualitative analysis of samples- Starch, Sucrose, Glucose, Proteins, Fats
4. DNA Extraction
5. Photographs of recombinant DNA Technology, GM plants, DNA Finger printing Technology, Hybridoma Technology.

**Subject-Botany:V Semester**

**Practical Question paper (Practical-VI A)**

**Duration of examination- 03 hr**

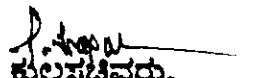
**Max. marks: 40**

- Q.1. Write the critical notes on 'A' and 'B' 5X2=10
- Q.2. Identify the technique involved in 'C' and write the comments 5X1=5
- Q.3. Conduct the qualitative analysis of the samples 'D', 'E' & 'F' 5X3=15
- Q.4. Extract the DNA from the given sample 'G'/Any two spotters 10X1=10

**Practical Skill; Visit to Horticulture/Agricultural departments/laboratories** to have the knowledge of plant propagation and other techniques with report 5 Marks

Record

5 Marks

  
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**III B. Sc, V Semester; Paper VI-A**  
**Plant Breeding and Biotechnology**

**50 Hours**

<b>Max marks</b>	<b>: 80</b>
<b>Internal Assessment marks</b>	<b>: 20</b>
<b>No.of teaching Hours /Week</b>	<b>: 03 hours</b>
<b>Duration of examination</b>	<b>: 03 hours</b>

**UNIT-1: Plant Breeding:** Introduction, Principles, and Objectives of Plant Breeding.

**Methods of Plant Breeding;** Mass Selection, Pure Line Selection, Clonal Selection, Significance.Plant breeding in producing new and improved varieties of medicinal plants.

**10hr**

**UNIT-2: Hybridization:** Introduction, Definition, Types, Objectives, Techniques, Selection of Parents, Emasculation, Artificial Cross Pollination, Harvest,

**10 hr**

**UNIT-3:Mutation Breeding-** Breeding for disease resistance- New Varieties, Vegetative

Propagation: Introduction, Cutting, Gooty, Grafting (Types) Approach, Bud, Wedge Grafting.

**10 hr**

**UNIT-4: Biotechnology-**Introduction, Scope of Biotechnology, A Brief Account ontools used in genetic engineering, recombinant DNA Technology (RDT), DNA finger printing and its applications.Production of human insulin through recombinant DNA technology, productionof monoclonal antibodies through hybridoma technology and their applications.

**10 hr**

**UNIT-5: Gene Therapy:** Kinds, Somatic and Gene Therapy, Production of GM plants Ex: Golden rice, Bt- Cotton, Applications of biotechnology– In Agriculture, Pharmaceutical and Industries, Sustainable Agriculture-Bio-fertilizers, Advantages.

**10 hr**

Reproductive characters

02 Marks

Floral diagram

03 Marks

'E'- Floral formula

01 Marks

III. Write the morphological and biological importance of 'F''G''H' and 'I'

20 Mark

Two from Modifications

One from root -

One from stem -

One from Inflorescence -


One from Fruits

Identification - 01 Marks

Sketch label - 02 Marks

Reasons -02 Marks

Each -05 Marks

  
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**III B. Sc, V Semester; Paper V Practicals  
BASED ON THEORY**

**III B. Sc, V Semester; Paper V  
Practical Question Paper  
Morphology and Taxonomy of Angiosperms**

**Duration of practical examination-3 hr**

**Max.Marks. 40**

Q. 1. Identify the families of 'A', 'B' and 'C' with their distinguishing characters **12 Marks**

Q. 2. Describe 'D' in technical terms and Draw floral diagram, and write floral formula of 'E'

**08 Marks**

Q. 3. Write the morphological and biological importance of E, F, G and H **20 Marks**

**IA for practicals**

Submission of Herbarium/ photographs -**05 Marks**

Record including tour report}-**05 Marks**

Study Tour Compulsory

**SCHEME OF VALUATION:**

Time : 3 hours	Subject Botany Fifth Semester	Max marks :40
Practical -V, Morphology, and taxonomy of Angiosperms		

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**I Identify the families 'A', 'B' and 'C' with their salient characters - 12 Marks**

Identification - **01 Marks**

Distinguishing characters

(5/6 characters) -

**03 Marks**

**(04 Marks each)**

(One from –Polypetalae, one from –Gamopetalae, one from  
monochlamydae/monocot)

**II Describe 'D' in technical terms and Floral formula and floral diagram of 'E'**

'D'- Vegetative characters

**02 Marks**

III B. Sc, V Semester; Paper V

Morphology and Taxonomy of Angiosperms

50 Hours

Max marks	: 80
Internal Assessment marks	: 20
No. of teaching Hours /Week	: 03 hours
Duration of examination	: 03 hours

Unit 1. Morphology: Vegetative morphology

02 hr

Root: introduction, Classification, underground root modifications (Fusiform, conical, napiform) aerial root modification-(Support, epiphytic, respiratory, Parasitic, floating, climbingroot)

Unit 2. Stem: introduction, characteristics

03hr

Modification of stem: underground- Rhizome, stem tuber, corm and bulb

Sub aerial modifications: runner, offset, stolon, & sucker

Aerialstem modification: Stem tendrils, phylloclade, cladode, thorns, bulbils

Unit 3. Leaf: General introduction, structure (brief) Stipules (Kinds)

05 hr

Leaf modification: leaf tendrils, spines, hools phyllode- insectivorous plants- Nepenthes, utricularia, & Drosera

Phyllotaxy: types- alternate, opposite and whorled

Floral morphology

Unit 4. Inflorescence- types-Racemose, Cymose –types, Special types

10 hr

Flower: A complete account on floral morphology

Fruit: general account –classification, types of fruits

Taxonomy of Angiosperms

Unit 5. Principles of Classification, Systems of Classification

30 hrs


Ex: Bentham and Hooker, Binomial Nomenclature, Species Concept, Herbarium, Techniques.

Study of the Following Families with plants of economic importance

**Dicots:** Annonaceae, Brassicaceae, Capparidaceae, Malvaceae, Rutaceae, Fabaceae (including 3 sub-families caesalpinaceae, papilionaceae, leguminaceae) Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepidaceae, Solanaceae, Acanthaceae, Lamiaceae, Verbenaceae, Amaranthaceae and Euphorbiaceae

**Monocots:** Liliaceae, Arecaceae, Poaceae

**STUDY TOUR IS COMPULSORY.**

  
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