

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR
SECOND YEAR B.Sc. Botany Effective from session 2016-17
PAPER I: Paper Code.....
TAXONOMY AND EMBRYOLOGY OF
ANGIOSPERMS

Unit-1

Taxonomic categories; concept of species, genus and family; Herbarium techniques. Systems of classification of Bentham and Hooker, Engler and Prantl, Hutchinson and Takhtajan. Angiosperm Phylogeny Group.

- 10 hours

Unit-2

International rules of nomenclature, range of floral structure, floral variation, and economic importance of Ranunculaceae, Brassicaceae, Papaveraceae, Capparidaceae, Caryophyllaceae, Malvaceae, Rutaceae, Cucurbitaceae, Myrtaceae, Leguminosae, Rosaceae, Apiaceae (Umbelliferae).

-10 hours

Unit-3

Range of floral structure, floral variation and economic importance of Rubiaceae, Asteraceae, Primulaceae, Solanaceae, Asclepiadaceae, Convolvulaceae, Apocynaceae, Acanthaceae, Lamiaceae, (Labiatae), Euphorbiaceae, Poaceae(Graminae).

-10 hours

Unit-4

Classical theory of morphology of flower; Primitive stamens and carpel; Microsporogenesis, Megasporogenesis, Structure and Development and male and female gametophytes, Fertilization, Nutrition of Embryo sac.

-10 hours

Unit-5

Structure, development and types of endosperm and embryo, Polyembryony, Apomixis, Molecular basis of apomixis. Experimental embryology; Culture of anther, endosperm and embryo; *in vitro* Fertilization.

-10 hours

Note:

The paper setter is required to set questions of 3 types contained in 3 Sections (**Section A**- 10 questions, **Section B**- 10 questions and **Section C**- 4 questions) from the 5 units of each paper. There will be 10 questions in **Section A** which will be asked from all the 5 units, i.e., 2 questions from each unit. These questions have to be answered in one word or a few words only. Each question will be of half mark. All the questions in **Section A** are compulsory. In **Section B**, 10 questions will be set from the 5 units, i.e., 2 questions from each unit. Students are required to attempt at least 1 question from each unit. Each

question will carry 5 marks. The answers of each question should be given in about 250 words. In **Section C** there will be 4 descriptive type questions set from all the 5 units, not more than 1 question from each unit. These questions may also have sub-divisions. The students are required to answer 2 questions, each in approximately 500 words. Each question will carry 10 marks.

In short, pattern of question paper and distribution of marks for UG classes will be as under:

- **Section A:** 10 questions, 2 questions from each unit, short answer, all questions compulsory. Total marks : **05**
- **Section B:** 10 questions, 2 question from each unit, 5 question to be attempted, at least 1 from each unit, answer approximately in 250 words. Total marks : **25**
- **Section C:** 04 questions (question may have sub-division), not more than 1 question from each unit, descriptive type, answer in about 500 words, 2 questions to be attempted. Total marks : **20**

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PAPER II: Paper Code.....
ANATOMY OF ANGIOSPERMS,
ECONOMIC BOTANY AND ETHNOBOTANY

Unit-1

Plant anatomy : Introduction, organization of meristems; theories related to their organization; cell wall gross microscopic structure and chemistry.

-10 hours

Unit-2

Tissue and tissue systems; Parenchyma, Collenchyma, Sclerenchyma, Xylem, Phloem, Secretory structures and periderm.

-10 hours

Unit-3

Primary and Secondary Structure : Structure of root, stem and leaf. Primary and secondary anomalous structure with special reference to *Aristolochia*, *Salvadora*, *Bignonia*, *Achyranthes*, *Amaranthus*, *Boerhaavia*, *Mirabilis*, *Chenopodium* *Dracaena*, *Tinospora*.

-10 hours

Unit-4

Study the economic botany of the following :

Cereals : *Triticum*, *Zea*

Pulses : *Glycine max*, *Cajanus cajan*

Fibres : Classification; *Gossypium*, *Crotalaria*, *Corchorus*;
artificial fibres.

Wood : Classification, mechanical properties; *Shorea*,
Tectona, *Pinus*, *Cedrus*.

Paper : Raw materials and manufacture.

Sugar : Sugarcane, Beet.

-10 hours

Unit-5

Study of economic uses of the following :

Medicinal Plants : *Rauwolfia*, *Datura*, *Cinchona*, *Papaver*.

Beverages : Alcoholic; Non-alcoholic: tea and coffee.

Spices and : *Coriandrum*, *Cuminum*, *Ferula*, *Curcuma*,

Condiments *Trigonella*, *Elettaria*, *Capsicum*, *Piper*, *Zingiber*.

Oil : *Arachis*, *Cocos*, *Helianthus*.

Ethnobotany : Introduction; Aims and Objectives; Study of important plants of various groups from Ethnobotanical point of view as food, fodder and Medicine with special reference to Rajasthan.

-10 hours

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PAPER III: Paper Code.....
CYTOGENETICS, PLANT BREEDING,
EVOLUTION AND BIOSTATISTICS

Unit-1

Cell Biology - Structure of cell (of both prokaryotes and eukaryotes); membranes; cell organelles, ergastic substances. Chromatin- euchromatin, heterochromatin. Chromosomes - Type and organization; morphology, chemical constituents; Structural changes in chromosomes and their significance.

-10 hours

Unit-2

Cell Division - Amitosis, mitosis, meiosis; synaptonemal complex; Linkage and crossing over. Gene (Chromosomal) mapping ; Sex determination.

-10 hours

Unit-3

Mendel's laws of inheritance - Monohybrid and dihybrid ratio, incomplete dominance; Modifications of dihybrid ratio; cytoplasmic inheritance (Inheritance of plastids and streptomycin resistance in *Chlamydomonas*); Principles of plant breeding. Selection, introduction, clonal propagation, hybridization, mutation breeding.

-10 hours

Unit-4

Green Revolution, conservation of germplasm, centres of origin. Cytology in relation to taxonomy; Polyploidy; Breeding work on wheat. Indian initiative for genome projects (Rice, Tomato).

-10 hours

Unit-5

Evolutionary theories, catastrophism, the Lamarck's theory, development of Darwin's theory, Evidences of evolution, adaptations, natural selection patterns of evolution, origin of species. Elementary study of biostatistics; mean, mode, median, standard deviation.

-10 hours

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PRACTICALS: Paper Code.....

The practical exercises have been divided into following two groups :

Group-I : Taxonomy, Embryology and Economic Botany.

Group-II : Anatomy, Cytology, Genetics and Statistics.

GROUP-I

(A) TAXONOMY

1. Ranunculaceae : *Ranunculus, Nigella, Delphinium*
2. Brassicaceae : *Brassica, Raphanus, Iberis*
3. Papaveraceae : *Argemone, Papaver.*
4. Capparidaceae : *Capparis, Cleome.*
5. Caryophyllaceae : *Stellaria, Spargula, Viscaria, Dianthus (Single)*
Gypsophylla.
6. Malvaceae : *Hibiscus, Althea*
7. Rutaceae : *Citrus, Ruta, Murraya*
8. Leguminosae : *Pisum, Crotalaria ; Cassia, Caesalpinia, Bauhinia,*
Tamarindus ; Acacia, Prosopis, Mimosa.
9. Myrtaceae : *Callistemon, Eucalyptus*
10. Cucurbitaceae : *Citrullus, Cucumis*
11. Apiaceae : *Coriandrum, Foeniculum*
12. Rubiaceae : *Hamelia*
13. Asteraceae : *Helianthus, Tridax, Launaea, Ageratum.*
14. Primulaceae : *Anagallis.*
15. Apocynceae : *Catharanthus, Nerium, Thevetia.*
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16. Asclepiadaceae : *Calotropis, Leptadaenia, Cryptostegia*
17. Solanaceae : *Solanum, Nitotiana, Petunia. Datura*
18. Acanthaceae : *Barleria, Adhatoda, Justicia, Peristrophe.*
19. Lamiaceae : *Ocimum, Salvia*
20. Euphorbiaceae : *Euphorbia, Ricinus*
- 21 Poaceae : *Triticum.*

The above list of plants is only suggestive and can be replaced depending on local availability.

(B) EMBRYOLOGY SLIDES :

1. Placentation : Types
2. Ovules : Types
3. T.S. Anther
4. L.S. Mature Seed: Maize/Gram/Pea
5. L.S. bud with anther and gynoecium.
6. Pollinium (whole mount).
7. V.S. Cyathium.

8. V.S. *Ficus* inflorescence.
9. Dissection of embryo/endosperm from monocot and dicot seeds.
(C) All plants of economic importance as prescribed in theory paper including the ethnobotany of the following:
i. *Butea monosperma*
ii. *Dendrocalamus strictus*
iii. *Saccharum bengalense*
iv. *Pongamia pinnata*

GROUP-II

(A) ANATOMY

1. Stem : *Boerhaavia*, *Achyranthes*, *Bignonia*, *Chenopodium*, *Leptadaenia*, *Nyctanthes*, *Salvadora*, *Dracaena*, *Triticum*, *Mirabilis*, *Aristolochia*, *Amaranthus*, *Chenopodium*.
2. Root : *Tinospora*, *Ficus*.
3. Study of meristems through permanent slides and photographs.
4. Tissues (parenchyma, collenchyma and sclerenchyma); (temporary and permanent slides, photographs).
5. T.S. Leaf: Dicot and Monocot leaf (temporary and permanent slides).

(B) CYTOLOGY and GENETICS

Study of prokaryotic cells (bacteria), viruses, eukaryotic cells with the help of light and electron microphotographs.
Study of the photomicrographs of ultrastructure of cell organelles, Study the structure of nuclear pore complex by photograph.
Smear preparation of root tips and onion bud for different stages of mitosis and meiosis.
Study of special chromosomes (polytene & lampbrush) either by slides or photographs.
Monohybrid and Dihybrid crosses and test cross.

(C) STATISTICS

Mean, Mode, Median, Standard Deviation.

(D) EMASCULATION

T.S. Stem: Primary Structure: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary structure: *Helianthus* (only Permanent slides).
T.S. Root: Primary structure: Monocot: *Zea mays*; Dicot: *Helianthus*; Secondary structure: *Helianthus* (temporary and permanent slides).
Anamolous secondary growth in *Bignonia*, *Nyctanthus*, *Amarathus*, *Draceana*, *Triticum*, *Salvadora*, *Boerhaavia*, *Mirabilis*, *Aristolochia* and *Ficus*, *Tinospora* root.

BOOKS SUGGESTED

Bhojwani, S.S. and Bhatnagar, S.P.: The Embryology of Angiosperms, Vikas Publishing House, Delhi, 1974.

Dutta, S.C.: Hand Book of Systematic Botany, Asia Publishing House, Bombay, 1979.
Gupta, P.K.: Cytology, Genetics and Evolution, Rastogi Publications.
Hill, A.H.: Economic Botany, McGraw Hill Book Co., 1952.
Mitra, J.N. : Elements of Systematic Botany of Angiosperms and Plant Ecology, The World Press Pvt. Ltd., Calcutta, 1977. Vikas Publishing House, Delhi.
Pandey, B.P.: Economic Botany, S. Chand And Co.Pvt. Ltd., 1988.
Tiagi, Y.D. and Kshetrapal, S. : An Introduction to Taxonomy of Angiosperms. Ramesh Book Depot, Jaipur, 1974.
P.K. Gupta : Genetics.
Sinha, U. and Sinha: Cytogenetics, Plant Breeding and Evolution.
Shukla and Chandel: Cytogenetics and Plant Breeding.
Choudhary, H.K. Elementary Principles of Plant Breeding.

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