

No. 2419677/2419361  
Fax: 0821-2419363/2419301

e-mail : registrar@uni-mysore.ac.in  
www.uni-mysore.ac.in

UNIVERSITY  OF MYSORE

Estd. 1916

Vishwavidyanilaya Karyasoudha  
Crawford Hall, Mysuru- 570 005

Dated: 28.05.2016

No.AC.2(S)/384/14-15

**NOTIFICATION**

Sub: Minor Modification in the existing Syllabus of B.Sc. in Botany from  
the Academic Year 2016-17.

Ref: 1. Decision of the Faculty of Science & Technology Meeting held on  
16.02.2016.

2. Decision of the Academic Council meeting held on 29-03-2016.

\*\*\*\*\*

The Board of Studies in Botany (UG) which met on 16.11.2015 has resolved to  
minor modification in the existing Syllabus of B.Sc. in Botany UG level from the  
academic year 2016-17.

The Faculty of Science and Technology and the Academic Council at their  
Meetings held on 16.02.2016 and 29.03.2016 respectively have also approved the  
above said proposal and the same is hereby notified.

The Modified B.Sc. in Botany Syllabus is annexed herewith.

The concerned may download the modified contents in the University Website  
i.e., [www.uni-mysore.ac.in](http://www.uni-mysore.ac.in)

Draft approved by the Registrar

  
Deputy Registrar (Academic)

To:

1. The Dean, Faculty of Science & Technology, DOS in Earth Science, MGM.
2. The Chairperson, BOS/DOS in Botany, DOS in Botany, Manasagangotri, Mysore.
3. The Registrar (Evaluation), University of Mysore, Mysore.
4. The Principals of the Affiliated Colleges running UG Programme in Science stream only.
5. The Director, College Development Council, University of Mysore, Mysore.
6. The Coordinator, Directorate of Online & Outreach programme, Parakalamatta, MGM.
7. The Deputy/Assistant Registrar/Superintendent, Academic Section, University of Mysore, Mysore.
8. The Deputy/Assistant Registrar/Superintendent (Evaluation), University of Mysore, Mysore.
9. The P.A. to the Vice-Chancellor/Registrar/Registrar (Evaluation), UOM., Mysore.
10. Office file.



**UNDERGRADUATE SEMESTER SCHEME**

# **BOTANY**

**SYLLABUS**

**2015-16**

**onwards**

**BOTANY**  
**SYLLABUS FOR I SEMESTER**  
**PAPER - I**

**(MICROBIAL DIVERSITY AND PHYCOLOGY)**

**THEORY: 60 + 10 Marks**  
**3 hours per week**

**42 Hours**

**Unit I:** Introduction and a brief account of **microbiology**. 1. Microbes of soil- soil bacteria, soil algae, soil actinomycetes, soil protozoans, 2. Microbes of air- aeroallergens, 3. microbes of water-water blooms, Biological indicators.

**4 Hours**

**Unit II: Virology** - History and discovery, status of viruses in microbiology (Living & non-living characteristics), Structure and multiplication of TMV and Bacteriophage [T4], Viral diseases of plants-Causal organism, symptoms, transmission and management of Tobacco mosaic disease & Yellow mosaic of Bean  
Viriods-general characters, Potato spindle tuber viriod.  
Prions -general characters-prion diseases- Bovine spongyform encephalopathy(BSE) in Cattle, Creutzfeldt- Jacob disease in humans.

**7 Hours**

**Unit III: Mycoplasma** - History, discovery and characteristics. Symptoms and management of Sandal spike disease.

**2Hours**

**Unit IV: Bacteria:** History, discovery and Occurrence. Classification of Bacteria based on morphology, flagellation and nutrition. Ultra structure, reproduction - Vegetative by Fission, Budding & Endospore formation. Sexual by genetic recombination - conjugation, transformation and transduction.

**Role of bacteria in human welfare**-As Natures' scavengers, Bacterial Bio-fertilizers, Industrial curing of tea, tobacco, tanning of leather, Retting of fibres, production of Alcohols and acids.

A mention of bacterial diseases in Plants, Animals and Humans .Brief account of Citrus canker.

**10Hours**

**Unit V: Cyanobacteria:** A general account of occurrence, structure, reproduction and economic importance Blue green algae.

Cyanobacteria -as food, bio-fertilizers, pioneers in plant succession,  
Type study: *Spirulina*, *Nostoc*, *Scytonema*.

**4 Hours**

**Unit VI: Phycology:** A general account, habitat, thallus organization, reproduction, economic importance and a brief account of classification.

Type study: *Chlorella*, *Oedogonium*, *Caulerpa*, *Sargassum* and *Polysiphonia*

**15 Hours**

\*\*\*\*\*88888\*\*\*\*\*

**I SEMESTER PRACTICALS**  
**PRACTICAL- I**  
**MICROBIAL DIVERSITY AND PHYCOLOGY**

**One practical of 3 hours per week**

**14 Practicals**

- Practical I : Study of Microscope (Dissecting and Compound)- Use ,care and mounting techniques.
- Practical II : Microbial instruments - Inoculation loop, Hot air oven, Incubator, Pressure cooker, Haemocytometer
- Practical III,IV : Sterilization techniques, (Preparation of Media-NA / PDA ) study of microbes in air by Petri plate exposure method
- Practical V : Study of TMV, YMBV, Sandal spike, Citrus canker
- Practical VI : Simple staining of bacteria -crystal violet/ Safranin
- Type study :-**
- Practical VII : Spirulina , Nostoc
- Practical VIII : Scytonema / Oscillatoria and Chlorella
- Practical IX : Oedogonium, Hydrodictyon, Chara
- Practical X : Caulerpa , Diatoms
- Practical XI : Sargassum
- Practical XII : Polysiphonia / Batrachospermum

**SCHEME OF BOTANY PRACTICAL EXAMINATION**  
**FOR I SEMESTER—PRACTICAL I**  
**(MODEL QUESTION PAPER)**  
**MICROBIAL DIVERSITY AND PHYCOLOGY**

**Time: 3 Hours**

**Max. Marks: 20**

- I. identify the specimens **A & B** with reasons and labeled sketches.  
(one form of Cyanobacteria and one form Phycology) **2X2=4 marks**  
(Identification with reasons-01, Labelled sketches-01)
- II. Prepare a temporary stained slide of the material **C** . **3 marks**  
Sketch, label identify with reasons .Leave the preparation for evaluation.  
(Staining and mounting -1.5marks, Sketch label reasons -1.5 marks )  
( Protophyta /Algae )
- III. Write critical note on **D , E & F** **2X3=6 marks**  
(one from Protophyta i.e., bacterial/viral disease, one from microbiological instrument and one from Phycology))
- IV. Perform Bacterial Staining of given sample **G** & leave the preparation for evaluation ( Preparation-2 marks, Procedure – 1 mark ) **3 marks**
- V. Identify the Microslides **H & I** With reasons. **2X2= 4marks**  
( Labelled sketch –01, Identification with reasons –01)

**Note: The candidates shall produce the records which shall be signed by the examiners**

**SYLLABUS FOR II SEMESTER**  
**THEORY PAPER – II**  
**MYCOLOGY, PLANT PATHOLOGY, LICHENS AND BRYOPHYTES**

**THEORY: 60 + 10 Marks**  
**3 hours per week**

**42 Hours**

**Unit I: MYCOLOGY:** General Characters, occurrence, Thallus organization, Nutrition, Reproduction, Ainsworth's classification and Economic importance of fungi

**Type study:** 1) Albugo  
2) Rhizopus  
3) Penicillium  
4) Lycoperdon

**12 Hours**

**Unit II:** Edible Mushrooms and poisonous Mushrooms .  
Cultivation of **Mushrooms**, Spawn production, Cultivation methods of *Pleurotus* on Paddy straw by polythene bag method, Nutritional values of Mushrooms

**3 Hours**

**Unit III: PLANT PATHOLOGY** – Introduction and classification of plant diseases, Disease cycle.

Symptoms, causal organisms and management of :-

1. Downy Mildew of sorghum
2. Grain smut of sorghum
3. Tikka disease of groundnut
4. Late blight of potato
5. Koleroga of arecanut
6. Coffee rust.
7. Blast of Paddy
8. Wheat rust - *Puccinia graminis*
9. Red rot of Sugarcane.

A brief account of **Biopesticides**: Neem, Trichoderma, *Bacillus thuringiensis* in pest and disease control.

**13 Hours**

**Unit IV: LICHENS:** Distribution, types, structure, reproduction and economic importance

**3 Hours**

**Unit V: BRYOPHYTES:** General characters, classification and Economic Importance of Bryophytes  
Structure, Reproduction & Alternation of generations in:-

**Study of :** 1. Marchantia  
2. Anthoceros  
3. Funaria

**11 Hours**

\*\*\*\*\*888888\*\*\*\*\*

## II SEMESTER PRACTICALS

### PRACTICALS - II

#### MYCOLOGY, PLANT PATHOLOGY, LICHENS AND BRYOPHYTES

One practical of three hours per week

14 Practicals

**Practical I** : Methods of staining and mounting fungi using cotton blue and Lactophenol

**Practical II** : Study of Albugo and Rhizopus

**Practical III** : Study of Penicillium and Lycoperdon

**Practical IV** : Demonstration of Mushroom cultivation. ( Two practicals )

**Practical V** : Study of fungal diseases: Tikka disease of groundnut, Late blight of potato, Koleroga of arecanut, White rust, Blast of paddy, Red rot of Sugar cane.

**Practical VI** : Downy mildew of sorghum, Grain smut of sorghum, wheat rust, coffee rust

**Practical VII** : Study of Biopesticides: Neem, Trichoderma and Bacillus thuringiensis

**Practical VIII**: Study of lichens

**Practical IX & X** : Preparation of PDA, Sterilization, pouring, inoculation and culturing of Fungi (Demonstration)

**Practical XI** : Study of morphology, Internal structure and reproduction in Marchantia

**Practical XII** : Study of morphology, Internal structure and reproduction in Anthoceros

**Practical XIII**: Study of morphology, Internal structure and reproduction in Funaria.

### SCHEME OF PRACTICAL EXAMINATION—PRACTICAL II

(MODEL QUESTION PAPER)

#### MYCOLOGY, PLANT PATHOLOGY, LICHENS AND BRYOPHYTES

Time --3 Hours

Max. marks: 20

- I. Identify the specimens **A** and **B** with reasons and labelled sketches **4 marks**  
(One from fungi/pathology and one from Bryophyta)  
Labelled sketch-01 Identification with reasons-01
- II. Prepare a temporary stained slide of the material **C**. Sketch, label and identify with reasons. Leave the preparation for evaluation. **4 marks**  
(Staining and mounting-02, Identification, labelled sketch, reasons-02)
- III. Write critical notes on **D** and **E** **4 marks**  
(One from fungi/pathology/lichen and one from Bryophyta)
- IV. Identify the Microslides **F, G, H and I** with reasons and labelled sketches **8 marks**  
(Identification with reason-01, Labelled sketch-01)  
  
(Two from fungi/pathology and two from lichen/ Bryophyta)

**Note: The candidates shall produce the records which shall be signed by the examiners**

\*\*\*\*\*8888888\*\*\*\*\*

**SYLLABUS FOR III SEMESTER**  
**THEORY PAPER - III**

**PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY**

**THEORY: 60 + 10 Marks**  
**3 hours per week**

**42 HOURS**

**Unit I-- PTERIDOPHYTA :-** Introduction, general characters, classification

**2 Hours**

External and internal structure and reproduction of the following forms:  
(Developmental details not required)

1. Psilotum 2. Selaginella 3. Equisetum 4. Ophioglossum 5. Marsilea

**10 Hours**

A brief account of **Heterospory** and **seed habit** and **Stelar evolution** among Pteridophytes

Brief account of fern house.

**5 Hours**

**Unit II-- GYMNOSPERMS :-** Introduction, general characters and classification.

**2 Hours**

External and internal structure and reproduction of the following forms:

1. **Cycas** - Anatomy of Coralloid root, Young stem and leaf-let. Reproductive organs.
2. **Pinus** - Stem anatomy (Young and old), Anatomy of Needle. Reproductive organs.
3. **Gnetum** - Stem anatomy (Young), Eccentric secondary growth in stem, leaf anatomy. Reproductive organs.
4. A brief account of economic importance of Gymnosperms

**10 Hours**

**Unit III--ANATOMY of Angiosperms**

**Tissues** - Classification. Theories of apical meristem.

A brief account of Simple and complex tissues

**4 Hours**

**Anatomy-** Study of anatomy of **Dicot** and **Monocot** -Roots, Stems and Leaves  
Secondary growth in Dicot stem. Anomalous secondary growth in Monocot  
stem (Ex.: Dracaena), Type of woods

A brief account of Trichomes, Stomata and Laticifers

**6 Hours**

**Unit IV--PALEOBOTANY**

A brief account of the study of Geological time-scale, Fossil types.  
Type study of **Rhynia, Cycadeoidea**

**3 Hours**

\*\*\*\*\*888888888\*\*\*\*\*

### III SEMESTER PRACTICALS

#### PRACTICALS - III

#### PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY

One practical of three hours per week

14 Practicals

**Practical 1: Sectioning and staining** method. Slide preparation. The material for slide preparation may be chosen from any Angiosperm- Roots, Stems and Leaves.

**Practical 2.** Study of **Tissue systems**: Parenchyma, Collenchyma, Sclerenchyma, Xylem and Phloem.

**Practical 3.** Anatomy of Dicot and Monocot-- **Stems**  
(Materials may be chosen from Tridax/Zinnia, Grass/ Sorghum)

**Practical 4:** Anatomy of Dicot and Monocot--**Roots**  
(Materials may be chosen from Cicer, Grass/ Sorghum)

**Practical 5:** Anatomy of Dicot and Monocot-- **Leaves**  
(Materials may be chosen from Datura/Zinnia, Grass/ Sorghum/Maize)

**Practical 6:** Study of morphology, anatomy and reproductive organs of **Psilotum**

**Practical 7:** Study of morphology, anatomy and reproductive organs of **Selaginella**.

**Practical 8:** Study of morphology, anatomy and reproductive organs of **Equisetum**.

**Practical 9:** Study of morphology, anatomy and reproductive organs of  
**Ophioglossum,**

**Osmunda**

**Practical 10:** Study of morphology, anatomy and reproductive organs of **Marsilea**

**Practical 10:** Study of morphology, anatomy and reproductive organs of **Cycas**

**Practical 11:** Study of morphology, anatomy and reproductive organs of **Pinus**

**Practical 12:** Study of morphology, anatomy and reproductive organs of **Gnetum**

**Practical 13:** Study of morphology, anatomy and reproductive organs of  
**Fossil forms**—with slides and Photographs

\*\*\*\*\*8888888\*\*\*\*\*



## SCHEME OF PRACTICAL EXAMINATION—PRACTICAL III

(MODEL QUESTION PAPER)

### PTERIDOPHYTA, GYMNOSPERMS, ANATOMY & PALEOBOTANY

**Time: 3 HOURS**

**Max. marks: 20**

- I. Identify the specimens A and B, giving reasons** **4 Marks**  
( One from Pteridophytes and one from Gymnosperms)
- II. Prepare a temporary stained transverse section of the given material C. Sketch, Label and Identify giving reasons. Leave the preparation for evaluation** **4 marks**  
( Preparation- 2 marks, Identification with diagram-1 mark and reason-1 mark)
- III. Write critical notes on D and E** **4 marks**  
( One from Pteridophytes and one from Gymnosperms)
- IV. Identify the microslides- F,G, H and I with labelled sketches, giving reasons** **8 marks**  
( One from Pteridophytes, one from Gymnosperms, one from Anatomy and one from Paleobotany)

**NOTE: In Paleobotany :** Photograph or Slide may be kept

**The candidates shall produce the records which shall be signed by the examiners**

\*\*\*\*\*888888888888\*\*\*\*\*

## SYLLABUS FOR IV SEMESTER

### THEORY PAPER - IV

## MORPHOLOGY OF ANGIOSPERMS, REPRODUCTIVE BIOLOGY AND ECOLOGY

THEORY: 60 + 10 Marks  
3 hours per week

42 HOURS

### Unit I: MORPHOLOGY OF ANGIOSPERMS

1. **Parts of a flowering plant** : Monocot and Dicot plant
- Root System** : Tap and Fibrous root system
2. **Root modifications** : Fusiform, Napiform, Conical, Fasciculated, Tuberous, Prop, Stilt, Climbing, Respiratory, Parasitic and Epiphytic

#### **Shoot system:-**

3. **Stem modifications** : Rhizome, Tuber, Corm, Bulb, Runner, Stolon, Offset, Sucker, Phylloclade (*Opuntia*, *Euphorbia tirucalli*), Cladode (*Ruscus*, *Asparagus*)
4. **Leaf** : Parts, Phyllotaxy, Simple and Compound leaves ( Pinnate and Palmate)
- Leaf modifications** : Tendril, Spine, Phyllode, Pitcher
5. **Inflorescence** : Racemose types, Cymose types and Special types (Cyathium, Thyrsus, Verticillaster, Hypanthodium)
6. An account of **floral morphology**
7. **Fruits** : Classification- **Simple** ( Dry dehiscent, dry indehiscent, Schizocarpic and Fleshy types), **Aggregate** and **Composite** types
8. Structure of **seed** : Dicot
9. Structure of **Grain** : Monocot

10 Hours

### Unit II - REPRODUCTIVE BIOLOGY ( Embryology )

1. Structure of **Anther**, T.S. of anther, Microsporogenesis, Development of male gametophyte, Role of tapetum. Palynology- Sculpturing, Apertures, NPC- System. Applied aspects- Paleo-palynology and Melitto palynology
2. Structure of **Ovule**, types of Ovule, Megasporogenesis, Development of female gametophyte ( Polygonum type)
3. **Pollination Biology** : Types, Contrivances and significance of cross pollination, pollen pistil interaction.
4. Fertilization : A general account.
5. **Endosperm** : Types and development- a brief account
6. **Embryo** : Dicot type with development-Crucifer type
7. Experimental embryology, Apomixis, Polyembryony
8. Scope of Reproductive biology

13 hours

### Unit III- ECOLOGY

1. **Ecosystem** : Classification, Concepts and components of ecosystem, concept of biosphere
2. **Ecological factors** : Brief account ( Climatic, Edaphic, Topographic and Biotic )
3. Study of : **Forest** (dry deciduous), **Freshwater**(Pond) and **Marine water** ecosystems
4. Endangered plants, : Endemism and Red data books
5. **Biogeochemical cycles** : Carbon cycle, Nitrogen Cycle , Phosphorous cycle
6. **Ecological adaptations** : Hydrophytes, Xerophytes, Halophytes, Parasites, Epiphytes
7. **Plant succession** : Definition, Steps of succession and types( Xerosere, Hydrosere)
8. **Phytogeography** : Definition, Vegetational types of Karnataka

16 hours

## IV SEMESTER PRACTICALS PRACTICALS IV

One practical of 3 hours per week

14 practicals

**Practical 1:** Study of parts of the Dicot ( *Mustard*) and Monocot(*Maize/Sorghum*) plants and Modifications of Root ( 2 practicals )

**Practical 2:** Modifications of Stem

**Practical 3:** Modifications of Leaf

**Practical 4:** Study of Inflorescences : Racemose types

**Practical 5:** Study of Inflorescences : Cymose and Special types

**Practical 6:** Study of Floral parts: *Tribulus* flower. Cohesion and adhesion of stamens, modifications of stamens and carpels. Examples- Rose, *Canna*, *Hibiscus*, *Calotropis*-*Gynostegium* and Pollinia.

**Practical 7:** Study of Fruits—Simple, Aggregate and Composite type

**Practical 8:** Study of Anther (T.S.) and Ovule of different types (L.S.)

**Practical 9:** Mounting of different pollen grains in Lactophenol

*Hibiscus*, *Catharanthus*, *Solanum*, *Lycopersicum*, Honey-sample

**Practical 10:** Mounting of Endosperm ( *Cucumis*) Mounting of Embryo ( *Crotalaria*)

**Practical 11: Morphological characters of :-**

**Hydrophytes:** *Eichhornia*, *Elodea*. **Halophytes:** Vivipary and Pneumatophores.

**Xerophytes:** *Casuarina*, *Euphorbia tirucalli*, *Opuntia*. **Epiphytes:**

Orchids. **Parasites:** *Cuscuta*, *Loranthus/Viscum*

**Practical 12: Anatomical characters ( Slides only):** *Eichhornia*, *Elodea*, *casuarina* stem,

*Nerium* leaf, Orchid root T.S., *Cuscuta*-T.S. of host stem with parasite

**Practical 13: Study of Ecological Instruments:** Hygrometer, Anemometer, Rain Gauge, Altimeter

**Note: An Ecological field study shall be conducted for 1-2 days.**

### SCHEME OF PRACTICAL EXAMINATION- PRACTICAL IV

(MODEL QUESTION PAPER)

#### MORPHOLOGY OF ANGIOSPERMS, REPRODUCTIVE BIOLOGY AND ECOLOGY

Time : 3 Hours

Max. Marks : 20

- I. Identify the specimens **A** and **B**, mentioning the type of modification, giving suitable reason (Select two specimens out of root, stem, leaf) **4 marks**
- II. Write critical notes on **C** and **D** **4 marks**  
(Select one from Inflorescences and one from Fruits)
- III. Write Ecological features of **E** and **F** **4 marks**  
(Select two specimens out of Hydrophytes, Xerophytes, Epiphytes, Halophytes, Parasitic flowering plants)
- IV. Identify the slides **G** and **H** **4 marks**  
( Select one from Ecological Anatomy and one from Embryology)
- V. Prepare a temporary stained mount of **I** **2 marks**  
( Select from Pollen grains, embryo / endosperm)
- VI. Write a note on the given Ecological Instrument **J** **2 marks**

\*\*\*\*\*

## SYLLABUS FOR V SEMESTER THEORY PAPER -V

**TAXONOMY OF ANGIOSPERMS, ECONOMIC BOTANY AND ETHNOBOTANY**  
**THEORY: 80 + 20 Marks. 3 hrs/week** **42 HOURS**

### UNIT I--TAXONOMY

Principles of Taxonomy, A brief account of Classical and modern Taxonomy  
Systems of classification: Broad outline of Bentham and Hooker's and  
Engler and Prantl's-Classifications with merits and demerits.A brief account of APG  
system of classification  
Plant Nomenclature- Binomial system, ICBN Principles and aims.  
Numerical taxonomy and Chemotaxonomy **05 Hours**

**UNIT II** --Field and Herbarium Techniques, Herbaria, Botanical gardens, Floras  
and their importance(Hassan, Mandya and Mysore Dist floras),  
Botanical Survey of India and its functions. **04 Hours**

**UNIT III.**- Study of following Families according to Bentham and Hooker's system of  
Classification  
**DICOTS:** 1.Ranunculaceae 2.Magnoliaceae 3.Brassicaceae 4.Malvaceae  
5.Rutaceae 6.Fabaceae 7.Rosaceae 8.Cucurbitaceae 9.Apiaceae 10.Rubiaceae  
11. Asteraceae 12. Asclepiadaceae 13. Solanaceae 14. Acanthaceae  
15.Verbenaceae 16. Lamiaceae 17.Amaranthaceae 18. Euphorbiaceae  
**MONOCOTS:**1. Orchidaceae. 2. Musaceae 3.Liliaceae 4. Arecaceae.5. Poaceae  
**25 Hours**

### UNIT IV-ECONOMIC BOTANY (Cultivation aspects not required)

Food plants: Rice, Wheat, Maize, Ragi  
Fodder plants: Sorghum,Cow pea, Subabul  
Fibre plants: Cotton, Jute, Coir  
Spices: Cardamom, Clove, Cinnamon, Pepper  
Beverages: Coffee and Tea  
Perfumes :Jasmine, Pachouli, Sandal  
Dyes : Indigo, Bixa, Lawsonia  
Narcotic Plants: 1.Opium, 2.Cannabis, 3.Tobacco  
Insecticides: Neem, Pyrethrin, Nicotine  
Oil yielding plants: Ground nut, Coconut, Safflower, Sunflower  
Timber : Rose wood, Teak, Honne  
Specify medicinal plants which are in practicals

**05Hours**

### UNIT V –ETHNOBOTANY

Introduction and significance of Ethnobotany :  
Importance of sacred groves and their conservation:  
1.*Phyllanthus emblica* and *Phyllanthus amarus* 2. *Hemidesmus indicus* 3.*Terminalia  
chebula*. 4. *Strychnos nux-vomica* 5. *Aloe vera* 6.*Boerhaavia diffusa*. 7.*Withania  
somnifera*

**03 Hours**

\*\*\*\*\*

## V SEMESTER PRACTICALS PRACTICALS -V

### One Practical of 3 Hours/ Week

- I . Technical description of the plants
- II. Construction of floral diagrams with floral formulae. Herbarium technique
- III. Study of the plants belonging to the Families prescribed in the theory  
**(One or Two plant representatives per Family)**
- IV. **Field Visits:** Field trips to the local areas to study, identify and record the Flora. Field visit report has to be submitted along with the Tour report at the time of practical examination.
- V. Study of plants of economic importance (Economic Botany)
- VI. Study of medicinal plants- *Acorus, Adhatoda,, Azadirachta, Eclipta, Costus, Cyanodon, Centella, Turmeric, Asparagus, Garlic, Ocimum, Tinospora, Cymbopogon, Piper longa, Rauwolfia* (Live or dry plants/ herbarium specimens/ photographs of above plants)
- VII. Ethnobotany
- VIII. Preparation of **Five Herbarium** sheets and submitting the same at the time of examination (Mostly of uncultivated plants)
- IX. As a part of the curriculum, a compulsory Botanical trip/ tour of about three days is to be conducted to study the different types of vegetation, medicinal plants and to collect herbarium specimen. A visit to herbal gardens/ Ayurvedic College.

### SCHEME OF PRACTICAL EXAMINATION. PRACTICAL- V (MODEL QUESTION PAPER)

#### Taxonomy of Angiosperms, Economic Botany, Ethno-botany.

Time 3 Hours

Max. marks 40

- I Assign the plants **A, B** and **C** to their respective Families, giving reasons- **12 marks**  
(One from Polypetalae, one from Gamopetalae and one from Monochlamydeae / Monocot,) Family name and classification-1 mark, Characters with important diagrams -3 marks
- II. Describe the plant **D** in technical terms. **4 marks**
- III. Draw the floral diagram with floral formula of **E** **4 marks**  
(floral diagram - 3 marks, floral formula-1 mark)
- IV. Comment on **F, G, H** and **I** (Economic Botany) **2X 4= 8 marks**  
( Botanical name and family-1 mark, Part used, uses-1 mark)
- V. Identify and write the medicinal uses of **J, K** and **L** **2X 3= 6 marks**  
( Botanical name and family-1 mark, Part used, uses-1 mark)
- VI. Comment on **M** and **N** (Ethnobotany) **3X 2= 6 marks**  
( Local and Botanical name-1 mark, family and Part used-1 mark, Ethnomedicinal uses-1 marks)

**Note: Valued record, Tour report and Herbarium sheets shall be signed by the Examiners**

\*\*\*\*\*888888888\*\*\*\*\*

# SYLLABUS FOR V SEMESTER

## THEORY PAPER –VI

### CELL BIOLOGY, MOLECULAR BIOLOGY AND EVOLUTION

**THEORY: 80 + 20 Marks**  
**3 Hours/ Week**

**42 HOURS**

#### CELL BIOLOGY

##### UNIT -I

Principles and uses of Light, Phase contrast, Fluorescent and Electron Microscopes

Ultra structure of Prokaryotic and Eukaryotic cells.

**Cell organelles-** Cell wall, Cell membrane, Nucleus, Mitochondrion, Chloroplast, Endoplasmic reticulum, Golgi apparatus, Lysosomes and Ribosome.

**Chromosome-** Structure, nucleosome concept, number, Karyotype and Idiogram,

**10 Hours**

##### UNIT – II. Cell cycle and its regulation, Mitosis, Meiosis and their significance

Numerical variation in chromosomes, Euploidy, Induction of polyploidy in plants  
Aneuploidy (Detailed account)

Structural changes in Chromosomes: Deletion, duplication, Inversion and  
Translocation

**9 Hours**

#### MOLECULAR BIOLOGY

##### UNIT III. Nucleic acids as genetic material-Avery et.al's experiment, Fraenkel Conrat's experiment

**DNA-** Chemistry, structure, types and function

**RNA-** Chemistry, structure, types and function

**DNA-replication-** mechanism of replication in Prokaryotes and Eukaryotes

**Gene Concept-** Gene structure, action, One gene-one enzyme concept and One gene-one polypeptide concept

**10 Hours**

##### UNIT IV. Central dogma of Molecular Biology, Genetic code, Protein Synthesis- Transcription, RNA splicing and Translation, Gene regulation in prokaryotes ( Operon concept) and Eukaryotes(Gene battery).

Molecular basis of genetic disorders- Sickle cell Anaemia and Thalassemia

**8 Hours**

#### EVOLUTION

##### UNIT V. A brief account of the origin of Life and concept of evolution

**Theories of Organic Evolution-** Lamarckism, Darwinism, Weismanism, DeVries theory, **Neo Darwinism** - Isolation, Mutation, Genetic Drift and Speciation

**5 Hours**

\*\*\*\*\*888888\*\*\*\*\*

**PRACTICALS FOR V SEMESTER  
PRACTICAL - VI**

**One Practical of 3 Hours/ Week**

**14 Practical**

1. Preparation of Fixatives and Stains
2. Study of Mitosis-Onion root tip
3. Study of Meiosis- Onion/ Chlorophytum flower buds
4. Micrometry
5. Karyotype Study
6. Isolation of DNA from Coconut endosperm
8. **Photographs and Charts from Evolution, Molecular biology and Cell Biology.**
  1. Cell organelles, 2. Electron Microscope, 3. Phase Contrast Microscope ,
  4. DNA replication 5. Lac operon 6. H.G.Khorana 7. Miller's experiment
  8. Genetic disorder- Sickle cell anaemia 9. Lamarck 10. Darwin. 11. Weismann

**SCHEME OF PRACTICAL EXAMINATION. PRACTICAL -VI**

(MODEL QUESTION PAPER)

**Cell biology, Molecular biology and Evolution.**

**Time 3 Hours**

**Max. marks 40**

- I.** Make a temporary squash preparation of the given material **A**, identify, sketch and label with reasons. Leave the preparation or evaluation **6 marks**  
(Preparation-3 mks, Identification of stage-1 mk, Labelled sketch-1 mk, Reasons-1 mk)
- II.** Make a temporary squash preparation of the given material **B**, identify, sketch and label with reasons. Leave the preparation or evaluation -Meiosis. Squash preparation **6 marks**  
(reparation-3 marks, Identification of stage-1 mk, Labelled sketch-1 mk, Reasons-1 mk)
- III.** Identify the given stages **C** and **D** **3X 2= 6 marks**  
(C- Mitotic stage, D- Meiotic stage (Both slides)  
(Identification 1 mark, labeled sketch 1 mark, reasons 1 mark)
- IV.** Comment on **E** and **F** **2X2= 4 marks**  
(E- Stain, F- Fixative)
- V.** Micrometry **G-** Calibrate the ocular micrometer using stage micrometer and measure the given material **6 marks**  
(Procedure-2 marks, Calibration-2 marks, Measurement-2 marks)
- VI.** Critically comment on Karyotype- **H** **3 marks**
- VII.** Comment on **I, J** and **K** **3X3 =9 marks**  
(Photographs- I -Cell Biology Cell organelles and Microscope charts, J-Mol. Biology,  
K - Evolution)

# SYLLABUS FOR VI SEMESTER

## THEORY PAPER VII (PLANT PHYSIOLOGY AND PLANT PROPAGATION)

THEORY: 80 + 20 Marks. 3 Hours / Week

42 HOURS

### PLANT PHYSIOLOGY

#### UNIT I :-

- Plant and Water Relations-** Diffusion, Imbibition, Osmosis, Cell as an Osmotic system, Concept of water Potential
- Short Distance Transport -** Active and Passive absorption of water. Absorption of minerals- Donnan's Equilibrium, Carrier Concept.
- Long Distance Transport -** Ascent of Sap, Root pressure Theory, TCT Theory, Phloem Transport- Munch's Hypothesis
- Transpiration** - Definition, Types, Mechanism of Stomatal movement- Starch-Sugar Inter conversion Hypothesis, Action of potassium ion transport, Antitranspirants, Guttation.

A brief account of mineral nutrition, concept of hydroponics and aeroponics, Role of P, Mg, K, Mn, Bo, Cu,

12 hours

#### UNIT II :-

- Growth** - Definition, Phases of growth, Sigmoid curve
- Growth Hormones** - Chemical nature, biosynthesis and application of Auxins, Gibberellins, Cytokinins, Ethylene, and ABA.
- Growth and Movements** - Tropisms: Phototropism, Thigmotropism, Geotropism and Hydrotropism.

**Photoperiodism, Vernalisation and Phytochrome.**

8 hours

#### UNIT III :-

- Enzymes** - Classification, properties, and mode of action.
- Photosynthesis** - Introduction, significance, Photosynthetic apparatus and Pigments  
**Mechanism-** light and dark reactions- C<sub>3</sub>, C<sub>4</sub>, and Photorespiration
- Respiration** - Introduction, significance, types, **Aerobic** - mechanism, Glycolysis, Krebs' cycle, Terminal Oxidation, ATP Synthesis - Chemiosmotic theory, Anerobic respiration- alcoholic and lactic acid fermentation.

14 hours

#### UNIT IV :-

- Nitrogen metabolism** - nitrogen fixation, nodulation, mechanism- biological nitrogen fixation, nitrate reduction, Aminoacids and their synthesis

3 hours

#### UNIT V :-

- Plant propagation** - methods of vegetative propagation: - stem cutting, grafting, trenching, layering, suckers, stolons, tubers, corms.  
Advantages of plant propagation, Basic nursery methods and green house techniques,

5 hours

\*\*\*\*\*



## VI SEMESTER PRACTICALS. PRACTICAL- VII

One Practical of 3 Hours/ Week

14 Practicals

### Major Experiments:

- Determination of Osmotic potential by plasmolytic method. *Tradescantia*, or *Rhoeo*/ Onion peel/ Spirogyra
- Experiment on the relationship between transpiration and absorption.
- Experiment on Oxygen evolution during photosynthesis. Effect of 1)-light intensity 2) quality of light.(Red, Blue, Green)
- Separation of chloroplast pigments by paper chromatography.
- Demonstration of Starch in the leaf.
- Suction force due to Transpiration.
- Determination of stomatal index, Area of stomatal aperture and stomatal frequency
- Standardization of pH meter using buffer tablet. Determination of pH of the given solution (Extract of Tamarind leaf and Betel leaf or any locally available specimen )

### Minor Experiments:

- Streaming of cytoplasm ( Staminal hairs, Hydrilla leaf)
- Determination of transpiration by Ganong's Potometer.
- Experiment to demonstrate fermentation ( Kuhne's vessel )
- Measurement of growth by using Auxanometer.
- Experiment to demonstrate Geotropism, Phototropism and Hydrotropism
- Root pressure experiment
- Ganong's Respirometer
- Determination of unequal transpiration by using cobalt chloride paper.

### Biochemical tests for carbohydrates, fats and proteins.

**Propagation:** Demonstration of grafting, bud-grafting, wedge-grafting, cuttings and layering.

## SCHEME OF PRACTICAL EXAMINATION.

### VI SEMESTER. PRACTICAL- VII

### PLANT PHYSIOLOGY AND PLANT PROPAGATION

Time: 3 hours

Max. Marks: 40

I. Perform the major experiment **A**. Write the procedure, results, inference and leave the setup for evaluation.

**10 Marks**

(Indent- 2 marks, Procedure-2 marks, Setting/conducting- 3marks, Results/calculation/ interpretation- 3 marks)

II. Comment on **B, C & D** ( Minor expt.)

**5X3 =15 marks**

III. Perform the Biochemical test of **E** by elimination method  
(Procedure-5 marks, Result -2 marks)

**7 marks**

IV. Perform Plant propagation method of **F & G** .

**2X4= 8 marks**

( **F**)Air layering ( Gootee ), trench layering.(**G**)grafting (approach, Bud, wedge)

(Procedure significance & labeled diagram-2 marks, conducting/skill - 2marks)

\*\*\*\*\*

**SYLLABUS FOR VI SEMESTER  
THEORY PAPER -VIII  
GENETICS, GENETIC ENGINEERING, PLANT BIOTECHNOLOGY, AND PLANT  
BREEDING**

**THEORY: 80 + 20 Marks  
3 Hours/ Week**

**42 HOURS**

**GENETICS**

- UNIT I :- Introduction** - Mendel's law of inheritance, Test cross, Backcross, Incomplete dominance.
- Interaction of genes:-**
- Complementary gene action - flower color in sweet pea
  - Supplementary interaction - Anthocyanin pigmentation in Snapdragon
  - Epistasis - fruit color in summer squashes
- Multiple factor inheritance** - Ear size in maize
- Linkage and crossing over** - linkage in maize. Gene mapping by 2 and 3 point test cross, interference and coincidence.

**15 hrs**

**UNIT II:-**

**Cytoplasmic inheritance** - Plastid inheritance in *Mirabilis jalapa* and Cytoplasmic male sterility in *Maize*.

**Mutation** - spontaneous and induced, Transposable genetic elements

**4 hrs**

**PLANT BREEDING**

**UNIT III-** A brief history – Aims and objectives of plant breeding  
Techniques in plant breeding – hybridization( intergeneric and interspecific), Hybrid vigour and Hybrid seed production.  
Germplasm maintenance, pollen banks, and quarantine measures. Plant breeding work done in India- paddy and cotton.

**6 hrs**

**GENETIC ENGINEERING**

**UNIT IV-** A concise account of recombinant DNA Technology, Restriction enzymes, Ligases, Cloning vectors, Construction of genomic DNA and C-DNA libraries. Gene transfer methods- Agrobacterium mediated gene transfer, Electroporation and shot gun method.

A brief account of Genomics and its applications. A brief account of hazards and safe guards in Recombinant DNA Technology.

**8 hrs**

**PLANT BIOTECHNOLOGY**

**UNIT V – Introduction – Scope of Biotechnology**

Tissue culture- Techniques, differentiation, totipotency, Organogenesis, Somatic hybridization, Somatic embryos and synthetic seeds. Anther culture - haploid production and its significance.

**Applications of Biotechnology-** Transgenic plants in crop improvement, use of microbes in Industry and Agriculture. Production of Penicillin, Alcohol, Single Cell Proteins, Enzymes.

**9 hrs**

\*\*\*\*\*

## VI SEMESTER PRACTICALS. PAPER- VIII

**One Practical of 3 Hours/ Week**

**14 Practicals**

- A. Synthetic seed preparation
- B. Mounting of *Rhizobium/Anabaena* from root nodules/*Azolla*
- C. Solving the genetic problems related to theory portion. (Monohybrid/ Dihybrid crosses /Interaction of genes)
- D. Construction of linkage maps- two point test cross
- E. Hybridization techniques- emasculation and bagging.
- F. Experiment on pollen germination-(Hanging drop method).
- G. Study of biotechnology products- Antibiotics, Rhizobium, Single Cell Protein.
- H. Photos of Transgenic plants, callus, multiple shoots, and Tissue culture Equipments.
- I. Identification of photos and charts pertaining to theory portion.-Genetic engineering
- J. Tissue culture- Sterilization of glass wares, Preparation of M S medium, Inoculation of explants (2 classes)

### Genetic problems:

#### PROBLEMS ON MONOHYBRID CROSS

- 1) In Tomatoes Red fruit color (R ) is dominant over yellow (r). 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 springs 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 numbers ?
- 2) In man, brown eye (B) is dominant over blue eye (b). A man and his wife both brown eyed, beget a blue eyed child. What are the genotypes of the parents ?
- 3) In pea plant, Tallness (T) is dominant over dwarfness (t). A tall pea crossed with dwarf produces offerings of which 50% are tall and 50% are dwarf. What are the genotypes of the parents ?
- 4) In *Drosophila*, grey (G) is dominant to black (g). Two grey bodied flies when crossed produce 150 grey and 49 black. Give the genotypes of the parents and genotypes of the progeny

#### PROBLEMS ON DI- HYBRID CROSS

- 1) In garden pea, yellow seed color (Y) is dominant over green (y) and round seed shape (R) is dominant over wrinkled (r). The character pair segregate separately. A pure yellow wrinkled variety is crossed to a pure green round. Give the phenotypes and genotypes of  $F_1$  and phenotypic ratio of  $F_2$  generation.

- 2) A Man has brown eyes and red hair. He married a woman with blue eyes and dark hair. Give the genotype of the parents and children  
Note : Dark hair (D) is dominant over red (d) and brown eyes (B) is dominant over blue (b)
- 3) In garden pea, tall (T) is dominant over dwarf (t) and red flower color (R) is dominant over white (r). A tall red plant is crossed to a dwarf white plant . Give the genotypes of P<sub>1</sub> and F<sub>1</sub> generations. Give the phenotypic ratio of F<sub>2</sub>.
- 4) A tall red when crossed with dwarf red produces a dwarf white. Give the genotypes of the parents.

### PROBLEMS ON INTERACTIN OF FACTORS

1. In maize, the aleurone color (seed color ) is expressed due to the effect between two different gene pairs. A maize variety with purple colored corn (AACC) is crossed to colorless corn (aacc). Give the phenotype and genotype of F<sub>1</sub> and F<sub>2</sub> generations. What will be the phenotypic ratio in F<sub>2</sub> generation?
2. Two white flowered strains of the sweet pea ( *Lathyrus odoratus*) were crossed, producing an F<sub>1</sub> with only purple flowers. Random crossing among the F<sub>1</sub> produced 96 progeny plants, 53 exhibiting purple flowers and 43 with white flowers.
  - a) What phenotypic ratio is approximated by the F<sub>2</sub> ?
  - b) What type of interaction is involved ?
  - c) What were the probable genotype of the parental strains.

### PROBLEMS ON 2 POINT TEST CROSSES

1. In tomato, red fruit (R) is dominant over yellow fruit (r) and yellow flowers (W) are dominant over white flowers (w). A cross is made between true breeding plants with red fruit and yellow flowers and plants with yellow fruit and white flowers. The F<sub>1</sub> generation plants are then test crossed to plants with yellow fruits and white flowers. The following results are obtained.
  - 333 red fruits/ yellow flowers
  - 64 red fruits/ white flowers
  - 58 yellow fruits/ yellow flowers
  - 350 yellow fruits/ white flowers
 Calculate the map distance between the two genes.

2. Two different traits affecting pod characteristics in garden pea plants are enclosed by genes found on chromosome 5. Narrow pod is recessive to normal pod, yellow pod recessive to green pod. A true breeding plant with narrow, green pods was crossed to a true breeding plant with normal yellow pods. The F<sub>1</sub> were then test crossed to plants with narrow, yellow pods. The following results were obtained.
  - 144 normal green pods
  - 150 narrow yellow pods
  - 11 normal yellow pods
  - 9 narrow green pods
 How far apart are these two genes?

\*\*\*\*\*

**SCHEME OF PRACTICAL EXAMINATION  
V I SEMESTER—PRACTICAL VIII**

**Time: 3 Hrs**

**Max. marks: 40**

1. **A-** Prepare synthetic seeds/ Perform inoculation of explant  
( Procedure-2 marks, conducting - 2marks) **4 marks**
2. **B-** Perform Emasculation and bagging experiment  
(Demonstration- 2 marks, Procedure & diagram-1 mk, Significance-1mk) **4 marks**
3. **C-** Mount the given microbe ( Rhizobium/Anabaena)  
(Mounting- 1.5 marks, Importance of the organism-1.5 marks) **3 Marks**
4. Solve the genetic problems **D, E** and **F** **4X3= 12 marks**  
(D- Monohybrid cross, E- Dihybrid cross, F- Interaction of factor/two point test crosses)
5. Comment on **G, H, I** and **J.** **3x4=12 marks**  
**G** - Biotechnology products, **H**- Tissue culture photo, **I**- Tissue culture equipment/photograph, **J**- Photographs from Genetic Engineering, (Identification 1 mark, Critical notes – 2 marks)
6. Perform pollen germination expt.of **K** **5marks**  
( Requirements-1 mk, Preparation- 2 mks, Procedure and significance-2 mks)

@@@@@@@@@@@@

**B.Sc., BOTANY SEMESTER SCHEME (I SEM TO IV SEM)  
THEORY QUESTION PAPER PATTERN**

**Time: 3 Hrs.**

**Max Marks: 60**

- Q I. Explain/Define 5 out of 7 questions. **5X2=10**  
Q II. Write notes on any 4 of the following 6 Questions **4X5=20**  
QIII. Give a detailed account of any 5 of the following 7 Questions **5X6=30**

(While selecting major questions all the units concerned should be taken into consideration)

**B.Sc., BOTANY SEMESTER SCHEME (V and VI SEM)  
THEORY QUESTION PAPER PATTERN**

**Time: 3 Hrs.**

**Max Marks: 80**

- Q I. Explain/Define 10 out of 12 of the following. **10X2=20**  
Q II. Write notes on any 6 of the following 8 Questions **06X4=24**  
QIII. Give a comprehensive and detailed account of any 6 the following 8 Questions **06X6=36**

(While selecting major questions all the units concerned should be taken into consideration)

XXXXXXXXXX

## SUGGESTED READINGS- REFERENCES

Author	Title of the Book	Publisher
<b>VIRUSES AND BACTERIA</b>		
R.C.Dubey and D.K. Maheshwari	A textbook of Microbiology	S. Chand & company, Ramnagar N.Delhi-110005.
P.D. Sharma	Microbiology	Rastogi Publications; Shivaji road Meerat; 250002; India
P. D. Sharma	Microbiology and Plant pathology	Rastogi Publications; Shivaji road Meerat; 250002; India
H. C. Dube	Text book of fungi, Bacteria & Virus	Vani Educational books , Vikas house 20/4, Industrial area, Sahidabad, 201010, Ghaziabad, UP.
Power & Dagainawala	General Microbiology. Vol. I	Himalaya Publishing house, Bombay
Power & Dagainawala	General Microbiology. Vol. II	Himalaya Publishing house, Bombay
Pelzar Michael.J	Text Book of Microbiology	
Prescott, Lansing and Others	Microbiology	
Ananthanarayana .R . Jayaram Panicker	Text Book of Microbiology	Orient and Longman, New Delhi.
a) salle. A. J.	Functional Principles of Bacteriology	Tata Mc graw Hill
Vinita Kale and Kishore Bhusari	Applied Microbiology.	Himalaya Publishing house, Bombay
Frazier William. C.	Food Microbiology	
Cruckishank	Text book of Medical Microbiology	ELBS Publisher , New Delhi
Rangaswamy.G.	Diseases of crop plants in India.	Prentice Hall of India N.Delhi
Sundar Rajan	College Microbiology	Vardaman Publishers , Bangalore. Vol. III & Vol. IV.
William. C. Frazier and Dennis C. West hoff. 3 <sup>rd</sup> Edn	Food Microbiology	Tata McGraw Hill Publishing company.
<b>ALGAE</b>		
K.N. Bhatia	A Treatise on Algae	R. Chand & company, Publishers, N.Delhi.
Chopra. G.L	A Text book of Algae	Pradeep Pub., Jalandhar.

G. M. Smith	Cryptogamic Botany Vol. I	Mc Graw Hill , New York. Thomas, Nelson and Sons
Prescott, G.W	The Algae to Review	Rastogi Publications
Kumar, M.A and Kashyap. A.K.	Recent advances in physiology	
Fritsch. F. E.	Structure and Reproduction of Algae Vol. I & Vol. II	Cambridge University Press
Chapman V.J & Chapman D.J.	The Algae 2 <sup>nd</sup> Edn.	Mac Milan, Publishing New York.
Singh, Pande , Jain.	A text book of Botany	Rastogi Publications; Shivaji road Meerat; 250002; India
B. P. Pandey	Simplified course in Botany	S. Chand & company, Ltd. Ramnagar N.Delhi-110005.
Darley. M. W.	Algal Biology	Black well Publishers.
<b>FUNGI</b>		
Smith. G. M.	Cryptogamic Botany Vol. I	Mc Grawhill, New York.
Allexopolos. C. J. and Mims. C. W.	Introduction to Mycology	Wiley Eastern Ltd. New Delhi.
Chopra G. L. and Verma. V	Text book of Fungi	Pradeep publications, Jalandar
Mundkur, B. B.	Fungi & Plant diseases	Mac Milan & Co Calcutta
Rangaswamy, G.	Diseases of India 3 <sup>rd</sup> Edition	Prentice Hall of India New Delhi.
Sharma. P. D.	The fungi	Rastogi Publications
Vashista, R.R	Fungi	S. Chand and Company, New Delhi.
<b>BRYOPHYTA</b>		
Pandey. B.P.	Bryophyta	S. Chand and Company, New Delhi.
Vashista. B. P.	Bryophyta	S. Chand and Company, New Delhi.
Parihar. N.S.	Bryophyta	Central book depot, Allahabad.
G. M. Smith	Cryptogamic Botany vol. I	Mc Grawhill, New York
G. L. Chopra	Class Book and Pteridophytes	Pradeep Publications, Jalandar.
Chauhan D.K.S	Bryophytes and Pteridophytes	
<b>ANATOMY</b>		
Eames A.J. and Mac	Introduction to Plant Anatomy	MC Graw Hill, New York.
Daniels, L. H		
Katherien Esau	Anatomy of seed plants	Wiley Eastern, New Delhi.
Pandey. B. P	Introduction to Plant Anatomy	S. Chand and Company.

Singh. V., Pandey, P.C and Jain, D.K.	Anatomy of seed plants	Rastogi publications, Meerat.
Tayal M. S.	Plant anatomy	Rastogi publications, Meerat.
Ganguli Das L Datta	College Botany Vol. I	
Venkateshvaralu	Cytology and Anatomy	
<b>EMBRYOLOGY</b>	<b>OF</b>	
<b>ANGIOSPERMS</b>	<b>&amp;</b>	
<b>TAXANOMY</b>		
Bhojwani. S. S. & Bhatnagar, S. P.	The Embryology of Angiosperms	Vikas publishing HOUSE, New Delhi.
Singh, Pandey, Jain	The Embryology of Angiosperms	Rastogi publications, Shivaji Road, Meerat, 250002.
Maheshwari , P	The Embryology of Angiosperms	MC Graw Hill publishing Company, New Delhi.
Johri, B.M.	Comparative Embryology of Angiosperms	Ind. Sci. Acad. Bull. No.41, New Delhi.
Eames A. J.	Morphology of Angiosperms	MC Graw Hill, New York.
Reinert . J and Yeoman M.M	Plant cell and Tissue culture.	Narosa publishing House New Delhi.
Vashishta	Plant Anatomy	
George H.M. Lawarance.	Taxonomy of Vascular plants	
R.N. sutaria	A Text book of systematic Botany	
A. C. Dutta	Botany for Degree Students.	
<b>PTERIDOPHYTA</b>		
Bold , H.C., Alexopoulos, C.J & Delevoryas, T.	Morphology of plants and Fungi	Harper C Row, New York.
Eames, Arthur, J.	Morphology of vascular plants (lower groups ).	Mc Graw Hill, New York.
Parihar, N.S. 1977	The Biology and Morphology of Pteridophytes.	Central book depot. Allahabad.
Pandey, S.N.& Others	Text book of Botany, Vol. II	Vikas publishing House, New Delhi.
Rashid,A.1986	An introduction to Pteridophyta.	Vani educational books, New Delhi.
Sporne,K.R.1970	The Morphology of Pteridophytes	Hutchinson university library, London.
Vashista,P.C. 1987	Pteridophyta	S. Chand and Co., New Delhi.
<b>GYMNOSPERMS</b>		
Datta, S.C.	An Introduction to Gymnosperms.	Asia publishing house, New Delhi.
Pandey, B.P.	Gymnosperms.	K. Nath and Co.



Ramaswamy, S.N. 1984	Anavrutha beeja sasyagalu (Gymnosperms)	Prasaranga, University of Mysore, Mysore.
Saxena and Sarabhai 1993	Text book of Botany Vol. II.	Ratna Prakashana Mandir, Agra
Sporne, K.R.1969	The Morphology of Gymnosperms.	Hutchinson university library, London.
Trivedi, B.S.& Singh, D.K	An Introduction to Gymnosperms.	Shashidhar Malaviya Prakashan.
Vashista, B.R.	Gymnosperms.	S.Chand & Co. New Delhi.
Andrews, H.N. 1961	Studies in palaeobotany.	Wiley, New York.
Biswas, C. & Johri, B.M. 1997	The Gymnosperms.	Narosa, New Delhi.

### **PLANT PHYSIOLOGY**

Conn, E.E. and Stumpf, P.K. 1976	Out line of Biochemistry	Wiley-Estern, New Delhi.
Datta, S.C.	Plant physiology	Centar book Depot, Allahabad.
Delvin, R.M. 1969	Plant physiology	Affiliated East West, New Delhi.
Delvin, R.M. & Barker, A.V. 1971	Photosynthesis	Affiliated East West, New Delhi.
Jain, V.K. 1990	Fundamentals of Plant physiology	S.Chand & Co. New Delhi.
Kumar, H.D. & Singh, H.N. 1975, 1993	Plant Metabolism I Edn. & II Edn.	East West Press Pvt. Ltd. New Delhi.
Krishnamurthy, H.N.	Physiology of plant Growth and Development.	Atma Ram & Sons, New Delhi.
Lehninger, A.L. 1978	Biochemistry	
Noggle, G.R. and Fritz George, J. 1977.	Introductory Plant physiology	Prentice Hall of India Pvt. Ltd.
Rao, K.N. Sudhakar Rao and Bharatan, S. 1987	The function of plant.	S.Vishwanatha, Pvt. Ltd.
Rabinowitch, E. & Govindjee. 1970	Photosynthesis	Wiley Eastern, New Delhi.
Salisbury, E.E. & ross, C.W. 1986	Plant physiology	First Indian Edn. CBZ Publishers and Distributers, New Delhi.

### **ECOLOGY & ENVIRONMENTAL BIOLOGY**

Aarne Vesilid, P & Jeffrey Pierce, J. 1983	Environmental Pollution and Control	Ann Arbor Science, Michigan.
BentonAllen.H & Warner,WE	Field Biology an Ecology	McGraw Hill.
Colinvaux paul, A. 1973	Introduction to Ecology	John Wiley and Sons, New York.

Dash, M.C.	Fundamentals of Ecology	Tata-McGraw Hill publishing Co. New Delhi.
Dara, S.S. 1993	A Text book of Environmental Chemistry and Pollution Control.	S.Chand & Co, New Delhi.
Kormondy Edward, J. 1986	Concept of Ecology	Prentice Hall of india New Delhi.
Kochhar, P.L. 1990	Plant Ecology	Ratna Prakashan mandir, Agra.
Kotpal, R.L. 7 Bali, N.P. 1987	Concept of Ecology	Vishal Publications, Jalandar.
Kumar, H.D. 1990	Concept of Ecology	Vikas, New Delhi.
Lloyd, J.R. 1980	Man and the ecosystem.	Macmillan Education Ltd. London.
Mason, C.E. 1981	Biology of fresh water Pollution	Longman Inc., newe York.
Misra, K.C. 1989	Manual of plant Ecology	Oxford and IBH, New Delhi.
Odum, E.P. 1971	Fundamentals of Ecology	Saunders, W.B. Philadelphia
Odum, E.P. 1983	Basic Ecology	Wiley, New York.
Pratap Mowli, P & Venkata Subbaya, N. 1989.	Air Pollution and Control	Divyajyoti prakashan Jodhpur.
Sharma, P.D.	Ecology and Environment	Rastogi Publications, Meerut
Sharma, P.D.	Environmental Biology	I Edn. Rastogi Publications, Meerut.
Trivedi, R.N. 1993	Text book of Environmental Sciences	Anmol Publications, New Delhi.
Vashista, P.C. 1989	Plant Ecology	Vishal Publications jalandhar.
Verma, P.S. and Agarwal, V.K. 1992	Principles of Ecology	S.Chand & Co., New Delhi.
Whittaker, R.H. 1975	Communities and Ecosystems II Edn.	Macmillan, new York.

**CYTOLOGY, GENETICS  
AND ELOLUTION**

Ahluwalia Kavita, B. 1985.	Genetics	Wiley Eastern Ltd.
Booker, R.J 1999	Genetics-Analysis and Principles	Addiison Wesley Longman, California.
Archana Sharma, 1990	The Chromosomes	Oxford and IBH, New Delhi
Ayala, F.J. and Klug, Jr. 1984	Modern Genetics II Edn.	Benjamin Cummings.
Cherayil, J.D 1974	Gene and Genetics	Tata mcGrawHill, New Delhi
De Robertis, E.D.P. Solez, F.A & Nowinski, W.W. 1966	Cell Biology	W.B.Saunders and Co. Philadelphi
Dobzhansky, T., Ayala, J., Stebbins	Evolution	Surjeet publications, New Delhi

Dobzhansky, T. 1951	Genetics and Origin of species	Oxford and IBH publishing Co., New Delhi
Dowben Robert, M 1971	Cell biology	Harper and Row publishers,
Gardner, E.J &Snustad,D.P. 1984&1990	Principles of Genetics	John Wiley and Sons,
Gupta, P.K 1987	Genetics	Rastogi publications,meerut.
Hexter, W and Yost Henry, T. 1977	The Science of Genetics	Prentice Hall of India. New York.
Jha, A.P. 1993.	Genes and Evolution	Macmillan, India, New Delhi
Huxley, j. 1974	Evolution	George allen & Unwin, London.
Kochhar, P.L.1994	Genetics and Evolution	15 <sup>th</sup> Edn. Rattan prakashan Mandir, Agar.
Loewy ariel,g. & Philip Siekevitz. 1974	Cell structure and function	Amerind Publishing co. New Delhi Holt, Rinehart and Winston, New York.
Marril David, j. 1962	Evolution and Genetics	Konark Publishers pvt.Ltd. A. 149, Main Vikar Marg, New Delhi
Nair, P.G.K. Prabhakar Achar, K.	A Text book of Genetics & Evolution	Brooks-Cole, California.
Fair banks, D.J. and Anderson, W.R. 1999	Genetics – the community of life	
Pawar, C.B.1983	Essentials of Cytology	Himalayan publishing house, Bombay.
Savage, J.M. 1969	Evolution	Oxford and IBH, New Delhi
Stansfields, W.D.1977	The Science of Evolution	Calif polytechnic state university and Macmillan, New York.
Sinnot, E.W., Dunn, L.C., & Dobzhansky, T 1958	Principles of Genetics	McGraw Hill, New York
Snustad, D.P., Simmons, M.J. & Jenkins, J.R. 1997	Principles of Genetics	John Wiley, New York.
Swanson Carl, P. 1963	Cytology and Cytogenetics	Macmillan & Co., Ltd. London.
Swanson Carl, P & Webster Peter, L.	The Cell	Prentice Hall of India Pvt. Ltd., New Delhi
Strickberger Monroe, W. 1968	Genetics	Macmillan Company, New York.
Strichberger Monroe, W. 1996	Evolution	John & Bartlett Sandburry.
Winchester, A.M. 1966	Genetics	Oxford & IBH, New Delhi

**PLANT BREEDING,  
ECONOMIC BOTANY AND**

## TAXONOMY

- Allard, R.W. 1960 Principles of Plant Breeding John Wiley, New York
- Bailey, L.H. 1966 Manual of cultivated plants Macmillan & Co., New York.
- Chandrasekharn, S.N., Cytogenetics and Plant Breeding Varadachary and Co., Madras.
- Parthasarathy, S.V. 1973
- Chaudhari, H.K. 1980 Elementary principles of Plant Breeding Oxford and IBH publishing Co., New Delhi.
- Hartman, h.T. & Kester, D.E. 1976 Plant Breeding Principles and practices, Prentice Hall of India Pvt. Ltd., New Delhi.
- Hill, Albert, F. 1983 Economic Botany .Tata-McGraw Hill publishing Co. New Delhi.
- Jain S.C. Medicinal plants Oxford University Press, London.
- Hutchison, J. 1973 The families of Flowering plants Oxford and IBH publishing Co., New Delhi
- Lawrence, George, H.M. 1964. Taxonomy of Vascular plants Tata-McGraw Hill publishing Co. New Delhi.
- Naik, V.N. 1984 Taxonomy of Angiosperms Narosa publishing House New Delhi.
- Johri, B.M.& Bhatnagar, S.P. Taxonomy of Angiosperms Regency Publications, New Delhi.
- Pullaiah, T. 1998 Taxonomy of Angiosperms Harper & Row, New York.
- Radford, A.E., Dickison, W.C., Massey, Jr & Bell, C.R. 1974 Vascular Plant Systematics
- Poehlman, J.M. & Dhirendranath, B. Breeding Asian Field Crops Oxford and IBH publishing Co., New Delhi
- Ramaswamy, S.N., Radhakrishna Rao, M & Govindappa, D.A. 2001 Flora of Shimoga District Prasaranga, University of Mysore, Mysore.
- Ramaswamy, S.V. & Razi, B.A. 1973 Flora of Bangalore District. Prasaranga, University of Mysore, Mysore.
- Rendle, A.B. 1979 Classification of Flowering Monocotyledons Vol.I. (Indian Reprint Edition) Vikas Publishing house, New Delhi.
- Rendle, A.B. 1979 Classification of Flowering plants- Dicotyledons Vol. II. (Indian Reprint Edition) Vikas Publishing house, New Delhi.
- Samba Murthy, A.V.S.S. & Subramanyam, N.S. 1973 A text book of Economic Botany. Tata-McGraw Hill publishing Co. New Delhi.
- Saldhana, Cecil, J. 1984 Flora of Karanataka, Vol. I & Vol. II Oxford and IBH publishing Co., New Delhi

- Saldhana, Cecil, J., & Nicolson Dan, H. 1976 Flora of Hassan district (Karnataka, India) Amerind Publishing Co. Pvt.Ltd., New Delhi.
- Saxena and Sarabhai. 1993 Text book of Botany, Vol. III. Ratan Prakashan Mandir.Agra.
- O.P. Sharma Plant Taxonomy Tata-McGraw Hill publishing Co. Ltd.4/12, Asif ali road, New Delhi.
- Sharma, B.D., Singh, N.P., Raghavan, R.S. & Miss. Deshpande,U.R. 1984 Flora of India series 2: Flora of Karnataka. Botanical Survey of India & Dept. of Environment, New Delhi.
- Singh, V. Taxonomy of Angiosperms Rastogi Publications.
- Sivarajan, V.V. 1984 Introduction to Principles of plant taxonomy Kalyani Publications, New Delhi.
- Umarao Singh,, Wadhvani, A.M. & Johri, B.M. 1983 Dictionary of Economic plants in India ICAR, New Delhi.
- Vashishta, P.C. 1976 Taxonomy of Angiosperms R.Chand & Co., New Delhi
- GENERAL**
- Ashok Bendre and Ashok Kumar A Text book of Practical Botany Vol.I & II Rastogi Publications, Shivaji road, Meerut.
- Dr. H.M. Srivastava Practical Botany Vol.I & II Pradeep publications opp. Sitta Mandhir, Jalandhar.
- Sundararajan, S. College Botany Vol. I, II, III & IV Subha's Publications, Bangalore.
- Kottakkal Arya Vaidya sala's Medicinal Plants Vol. 1- 5 Cambridge University press, U.K.
- BOOKS ON BIODIVERSITY**
- Global Biodiversity Assesment
- Heywood, H & Watson, R.J. 1995 Biodiversity and Ecosystem functions Springer-verlag, Berlin.
- Schulze,E.D.& Mooney, H (eds.) 1992 Biodiversity and Ecosystem function, Scope. John wiley, Chichester.
- Mooney, H.A.et.al. (eds). 1996 Biodiversity: Implications for global food security Macmillan India Ltd. Madras.
- Swamynathan, M.S. & Jana, S. 1992 Endemic plants of the Indian region BSI Calcutta
- Ahmedullh, M. & Nayar,M.P.1987 Vol. I. BSI Calcutta
- Jain, S.K.& Sastry,A.R.K 1980 Threatened Plants of India- A State-of-the-Art report BSI Calcutta
- Jain, S.K.& Sastry,A.R.K (eds) 1984 Indian plant red data book Vol.I BSI Calcutta
- Puri, S.K. Biodiversity Database projects in India. Indira Gandhi Conservation Monitory Centre, New Delhi.

**BIODIVERSITY INFORMATION CENTRE**

1. World plant conservation Bibliography ( WCMC). Royal Botanic Gardens, Kew, Richmond, Surrey, England.
2. IUCN Centre for Biodiversity information.
3. WFCC(World Data Centre on Microorganisms). Saitama, Japan.
4. IPGRI, Rome. International plant genetic resources Institute – Directories of Germplasm Collections.

---

-

SOFT CORE-IN BOTANY B.Sc.,

Ref: AC2(S)/522/2012-13 dated: 15.11.14

**Medicinal Botany and Human Welfare**

32 hours

1. **History:** Scope and Importance of medicinal plants, definition and scope of Ayurveda. Plants used in Ayurvedic treatments. Siddha medicinal system and plants used in siddha medicine. Unani: history and concept 15 hours
2. **Beverages:** Alcoholic beverage: preparation of red wine. Non alcoholic beverages, Coffee and Tea – curing of coffee and tea. 05 hours
3. **Fungal Medicines:** Antibiotics- penicillin and streptomycin, medicinal mushrooms. Cultivation of Mushrooms. 05 hours
4. **Role of plants in relation to human welfare.**
  - (a) Importance of forestry, their utilization and commercial aspects
  - (b) Avenue trees
  - (c) Ornamental plants of India.
  - (d) Fruits and nuts: Fruit crops of Karnataka and their commercial importance. Type of woods and its uses, Aromatic plants. 12 hours

**Practicals**

1. Preparation of wine
2. Mushroom cultivation
3. Taxonomy of some important medicinal plants , diabetic plants and anticancerous plants
4. Soxhlet extraction of any two medicinal plants
5. Taxonomy of fruits, ornamental and aromatic plants
6. Listing of crude drugs in pansari shops and thesis identification.
7. Identification of forest trees through bark, wood flowers, Leaves and fruits.
8. Study of important medicinal plants and their uses.

**References:-**

1. Trivedi P. C. 2006. Medicinal plants: Ethnobotanical Approach Agrobios, India.
2. Purohit and vyas: 2008. Medicinal plant cultivation: A Scientific approach 2<sup>nd</sup> end Agrobios, India.
3. Yoganarasimhan S.N. Medicinal plants of India. vol. 1. Karnataka, Interline publishing Pvt. Ltd.