

**III B. Sc - SEMESTER- V: BOTANY SYLLABUS**  
**THEORY PAPER – V**

**Paper-V: Cell Biology, Genetics and Plant Breeding**

Total hours of teaching 60 hrs @ 3 hrs per week

---

---

**UNIT – I Cell Biology:**

**(12hrs)**

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes: morphology, organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin.

**UNIT – II Genetic Material:**

**(12hrs)**

1. DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment.
2. DNA structure (Watson & Crick model) and replication of DNA (semi-conservative)
3. Types of RNA (mRNA, tRNA, rRNA), their structure and function.

**UNIT – III Mendelian Inheritance:**

**(12 hrs)**

1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcross and test cross.
2. Chromosome theory of Inheritance.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage maps based on two and three factor crosses.
4. Crossing Over: concept & significance.

**UNIT – IV Plant Breeding:**

**(12 hrs)**

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlines only).

**UNIT – V Breeding, Crop Improvement and Biotechnology:**

**(12 hrs)**

1. Role of mutations in crop improvement.
2. Role of somaclonal variations in crop improvement.
3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).

**Suggested activity:** Seminar, Debate, Quiz, observation of live cells and nucleus in Onion peels, observation of Meiotic nuclei in Maize pollen. Solving Genetics problems.

### **Books for Reference:**

1. Old, R.W. and Primrose S.B. 1994, Principles of Gene Manipulation Blackwell Science, London
2. Grierson, D. and Convey S.N. 1989, Plant Molecular Biology, Blackie Publishers, New York.
2. Lea, P.J. and Leegood R.C. 1999, Plant Biochemistry and Molecular Biology, John Wiley and Sons, London.
3. Power C.B., 1984, Cell Biology, Himalaya Publishing Co. Mumbai
4. De. Robertis and De Robertis, 1998, Cell and Moleceular Biology, K.M. Verghese and Company .
5. Sinnott, E.W., L.C. Dunn & J. Dobshansky (1958) : Principles of Genetics (5th Edition) McGraw Hill Publishing Co., N.Y. Toronto, London.
6. Winchester, A.M. (1958) : Genetics(3rd Edition) Oxford & IBH Publishing House, Calcutta, Bombay, New Delhi.
7. Singleton, R.(1963) : Elementary Genetics, D. Van Nostrand Co., Ltd., Inc., N.Y. & Affiliated East West Press (P) Ltd., New Delhi.
8. Strickberger, M.W. (1976): Genetics(2nd Edition) MacMillan Publishing Co., Inc., N.Y., London
9. Watson, J.D. (1977): Molecular Biology of the Gene, W.A. Benjamin, Inc., Menlo Park-California, Reading-Massachusetts, London, Amsterdam, Don Mills, Ontario, Sydney.
10. Gardner,E.J & Snusted, D.P.(1984): Principles of Genetics (7thedition) John Wiley & Sons, N.Y. Chichester, Brisbane, Toronto, Singapore.
11. Lewin, B. (1985) Genes VII Wiley Eastern Ltd., New Delhi, Bombay, Calcutta, Madras, Hyderabad.
12. Allard R.W(1999): The Principles of Plant Breeding, John & Wiley and Sons.
13. Poelman J.M: Breeding Field Crops, Springer.
14. George Acquaaah(2012):Principles of Plant Genetics & Breeding: Wiley-Blackwell.

**III B. Sc - BOTANY SYLLABUS SEMESTER- V**  
**Practical Paper-V: CELL BIOLOGY, GENETICS AND PLANT BREEDING**  
 Total hours of teaching 30hrs @ 2hrs per week

---

**Suggested Laboratory Exercises:**

1. Study of the structure of cell organelles through photomicrographs.
2. Study of structure of plant cell through temporary mounts.
3. Study of various stages of mitosis using cytological preparation of Onion root tips.
4. Study of DNA packing by micrographs.
5. Study of effect of temperature & organic solvent on permeability of cell membrane.
6. Numerical problems solving Mendel's Laws of inheritance
7. Chromosome mapping using 3 point test cross data.
8. Hybridization techniques – emasculation, bagging (for demonstration only).
9. Field visit to a plant breeding research station.
10. Calorimetric estimation of DNA by diphenylamine method.

**III B. Sc – SEMESTER- V, BOTANY PRACTICAL MODEL PAPER**  
**PAPER-V: CELL BIOLOGY, GENETICS AND PLANT BREEDING**

---

- |  |                   |
|--|-------------------|
| 1. Perform the Experiment <b>A</b> .Perform squash on onion root tip, prepare the slide, identify at least one division stage. Write the procedure and draw the diagram of reported stage. | 1 x 15 = 15marks  |
| 2. Give the experimental protocol of the experiments <b>B</b>  | 1 x 10 = 10 marks |
| 3. Solving numerical problems on Mendelian inheritance <b>C,D</b>  | 2x7 1/2 =15 marks |
| 4. Record & Viva   | = 10 marks        |
|  | -----<br>50 marks |

A-Onion root squash technique

B- Estimation of DNA by diphenylamine method

C&D Numerical problems on Mendelian Inheritance.

---

### III B. Sc - SEMESTER- V: BOTANY THEORY SYLLABUS

#### PAPER-VI: PLANT ECOLOGY & PHYTOGEOGRAPHY

Total hours of teaching 60 hrs @ 3 hrs per week

---

#### UNIT – I. Elements of Ecology (12 hrs)

1. Ecology: definition, branches and significance of ecology.
2. Climatic Factors: Light, Temperature, precipitation.
3. Edaphic Factor: Origin, formation, composition and soil profile.
4. Biotic Factor: Interactions between plants and animals.

#### UNIT– II. Ecosystem Ecology (12 hrs)

1. Ecosystem: Concept and components, energy flow, Food chain, Food web, Ecological pyramids.
2. Productivity of ecosystem-Primary, Secondary and Net productivity.
3. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

#### UNIT – II Population & Community Ecology (12 hrs)

1. Population -definition, characteristics and importance, outlines –ecotypes.
2. Plant communities- characters of a community, outlines – Frequency, density, cover, life forms, competition.
3. Interaction between plants growing in a community.

#### UNIT – IV Phytogeography (12 hrs)

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and causes

#### UNIT- V: Plant Biodiversity and its importance (12 hrs)

1. Definition, levels of biodiversity-genetic, species and ecosystem.
2. Biodiversity hotspots- Criteria, Biodiversity hotspots of India.
3. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ* methods).
4. Seed banks - conservation of genetic resources and their importance

**Suggested activity** :Collection of different soils, studying their texture, observing polluted water bodies, student study projects, debates on man's activity on ecosystem and biodiversity conservation methods, visiting a nearest natural vegetation area. Visit to NGO, working in the field of biodiversity and report writing; to study Honey Bees and plants yielding honey.

### Books for Reference:

1. Daubenmire, R.F. ( ): Plants & Environment (2nd Edn.,) John Wiley & Sons., New York
2. Puri, .G.S. (1960): Indian Forest Ecology (Vol.I & II) Oxford Book Co., New Delhi & Calcutta.
3. Billings, W.B. (1965): Plants and the Ecosystem Wadsworth Publishing Co., Inc., Belmont.
4. Misra, R. (1968): The Ecology work Book Oxford & INH Publishing Co., Calcutta
5. Odum E.P. (1971): Fundamentals of Ecology (2nd Edn.,) Saunders & Co., Philadelphia & Natraj Publishers, Dehradun.
6. Odum E.P. (1975): Ecology By Holt, Rinert & Winston.
7. Oosting, H.G. (1978): Plants and Ecosystem Wadworth Belmont.
8. Kochhar, P.L. (1975): Plant Ecology. (9th Edn.,) New Delhi, Bombay, Calcutta-226pp.,
9. Kumar, H.D. (1992): Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
10. Kumar H.D. (2000): Biodiversity & Sustainable Conservation Oxford & IBH Publishing 10. Co Ltd. New Delhi.
11. Newman, E.I. (2000): Applied Ecology Blackwell Scientific Publisher, U.K.
12. Chapman, J.L&M.J. Reiss (1992): ecology (Principles & Applications). Cambridge University Press, U.K.
13. Cain, S.A . (1944): Foundations of Plant Geography Harper & Brothers, N.Y.
14. Mani, M.S (1974): Ecology & Biogeography of India Dr. W. Junk Publishers, The Haque
15. Good, R. (1997): The Geography of flowering Plants (2nd Edn.) Longmans, Green & Co., Inc., London & Allied Science Publishers, New Delhi

**III B. Sc - SEMESTER- V: BOTANY PRACTICAL  
PRACTICAL PAPER-VI: PLANT ECOLOGY & PHYTOGEOGRAPHY**

Total hours of teaching 30 hrs @ 3 hrs per week

---

---

1. Study of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, psychrometer, rain gauge, and lux meter.
2. Permeability (percolation; total capacity as well as rate of movement) of different soil samples.
3. Determination of soil pH
4. Study of morphological and anatomical adaptations of hydrophytes and xerophytes (4 each)
5. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus by species area curve method
6. Study of Phytoplankton and macrophytes from water bodies.
  6. Study of species diversity index of vegetation.
7. Estimation of Primary Productivity of an ecosystem
8. To study field vegetation with respect to stratification, canopy cover and composition.
9. Study of plants included in agro forestry and social forestry.
10. To locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.
11. The following practical should be conducted in the Field/lab with the help of photographs, herbarium, Floras, Red data book- Study of endangered plants species, critically endangered plants species, vulnerable plant species and monotypic endemic genera of India.

**III B. Sc - SEMESTER- V: BOTANY PRACTICAL MODEL PAPER  
PAPER–VI: PLANT ECOLOGY & PHYTOGEOGRAPHY**

---

1. Study Project under supervision	=	15 Marks
2. Record & Viva-Voce	=	10 Marks
3. Experiment <b>A</b>	=	10 Marks
4. Anatomical adaptations of <b>B</b> (Section cutting)	=	10 Marks
5. Spotters <b>C&amp;D</b> (2x2 1/2)	=	5 Marks
		-----
Total =		50 Marks

---

1. Study Project of a surrounding Ecosystem (terrestrial or aquatic)(plant diversity, animal diversity, human activity, pollution levels, restoration efforts under supervision.
2. Presentation of the project work in Q & A session.
3. **A** -determination of soil porosity/PH/percolation/retaining capacity.
4. **B**- Xerophyte/Hydrophyte anatomical adaptations.
5. **C & D**-anemometer/rain gauze/lux meter.

BOTANY

Model Theory Question Paper

III B.Sc SEMESTER -V

Paper -V (Cell Biology, Genetics and Plant Breeding)

Time : 3 Hrs

Max.Marks : 75 Marks

Section- A : సెక్షన్: ఏ

5x5=25 Marks

Answer any five of the following:

Draw neat and labeled diagrams wherever necessary.

ఏ ఐదో ఏదు అక్షరం జాబాబులు వ్రాయండి.

1. Enumerate Eukaryotic cell Components.

నిజజీవకణ కణము యొక్క కణాంశాలను గుర్తిస్త్రయండి.

2. Write Short notes on types of Chromosomes.

వివిధ రకాల క్రోమోజోమ్లను గుర్తి లక్షణ లక్షణ వ్రాయండి.

3. Write about the structure and function of m-R.N.A.

m-R.N.A. నిర్మాణము, విధులను గుర్తి వ్రాయండి.

4. Discuss about the Griffith and Avery Experiment.

గ్రీఫిత్ మరియు ఆవేరి ప్రయోగమును గుర్తి వ్రాయండి.

5. Test cross : పరీక్షా సంకరణము

6. Complete Linkage : సంపూర్ణ సహ లక్షణ

7. Plant Hybridization : వెలక్రీ ప్రబంధము

8. Molecular Plant Breeding : అణు ప్ర బంధము

K. Sujatha  
Dr. K. Sujatha  
BOS chair person

1. G. S. S. S.  
(D. HOVINDARASULU)  
BOS member

2. B. Lakshmi  
Dr. B. Lakshmi  
B.O.S. member

Section-B

5x10=50 Marks

Answer all Questions:

Draw neat and labeled diagrams wherever necessary.

అన్ని ప్రశ్నలను సమాధానములు అయియు  
అవసరమైనచోట పటములు గీయు.

9.(a) Write an essay on structure and function of Plasma membrane.

ప్లాస్మా కేరము, నిర్మాణము లిధులను గూర్చి అయింది

(or)

(b) Describe the Ultra structure of Chromosomes.

క్రోమోజోముల సూక్ష్మ నిర్మాణమును వర్ణించండి.

10.(a) Describe Hershey- Chase Bacteria Phage Experiment.

హెర్షీ- చౌజ్ బాక్టీరియా ఫేజ్ ప్రయోగమును వర్ణించండి

(or)

(b) Write an essay on DNA replication.

D. N. A. ప్రతికృతిని గూర్చి అయింది

11.(a) Discuss about Chromosomal theory of Inheritance.

క్రోమోజోముల అనువంశికత సిద్ధాంతమును గూర్చి వర్ణించండి.

(or)

(b) Write about Crossing over Concept and its Significance.

పాకేజి సిద్ధాంత భావన మరియు ప్రాముఖ్యతను వర్ణించండి.

1. 

(D. GOVINDARATU)

BOS member

2. 

DR. B. LAKSHMI

BOS member

  
Dr. K. Sujatha  
BOS chairperson

12.(a) Write an essay on objectives of Plant Breeding.

వృక్ష ప్రజనన ముఖ్య లక్ష్యాలను గుర్తించి వ్రాయండి.

(or)

(b) Describe about advantages and limitations of Plant Selection.

మొక్కల ఎంపికలకు ఉన్న ప్రయోజనాలు మరియు పరిమితులను గుర్తింపండి.

13.(a) Explain the role of Mutations in Crop-Improvement.

పంటల అభివృద్ధిలో ఉత్పత్తి వర్తనాల యొక్క పాత్రను వివరించండి.

(or)

(b) Describe the uses of DNA markers in Plant Breeding.

వృక్ష ప్రజననములో DNA మార్కర్ల పాత్రను వివరించండి.

K. Sujatha  
Dr. K. Sujatha  
BOS chairperson.

1. Dr. Anlu  
(D. HOUINDA R. ATULU)  
BOS member

2. Dr. Lakshmi  
Dr. B. LAKSHMI  
BOS member

BOTANY

Model Theory Question Paper

III B.Sc SEMESTER -V

Paper -VI (Plant Ecology & Phyto Geography)

Time : 3 Hrs

Max.Marks : 75 Marks

Section- A

5x5=25 Marks

Answer any five of the following:

Draw neat and labeled diagrams wherever necessary.

: ఏ వేని ఇనుకొనలకు సమాధానములు  
అవసరమైతే పడయాలి.  
అవసరమైతే పడయాలి గీయాలి

1. Origin of soil : మృత్తిక ఆవిర్భావము.
2. Food Chain : ఆహార శ్రేణి నామము
3. Significance of Ecology : ఆరణ్య శాస్త్ర ప్రాముఖ్యత
4. Ecotype : ఎకాటైప్
5. Energy Flow : శక్తి ప్రవాహము
6. Plant Distribution : మొక్కల పంపిణీ.
7. In-Situ Conservation : స్థానిక సంరక్షణ
8. Net Productivity : నెట్ ఉత్పత్తి.

K. Sujatha  
Dr. K. Sujatha  
BOS Chairperson

1. D. Iyengar  
(D. IYENGAR)

BOS member  
2. B. Lakshmi  
Dr. B. Lakshmi  
B-O-S. member

Section-B

5x10=50 Marks

Answer all Questions:

Draw neat and labeled diagrams wherever necessary.

1. దేవుని ప్రశ్నలకు సమాధానములు వ్రాయండి.  
అవసరమైనచో చిత్రములు గీయండి.

9. (a) Describe the role of Temperature and Light in Ecology.

ఆవరణ శాస్త్రములో ఉష్ణం, ప్రకాశం మరలయు అంకిత చిత్రను వ్రాయండి.

(Or)

(b) Discuss about the interactions between Plants and Animals in Ecology.

ఆవరణ శాస్త్రములో మొక్కలు మరియు జంతువుల మధ్య సంబంధాలను వివరించండి.

10. (a) Explain the significance of Ecological Pyramids.

ఇది ఒక అవకాశం పర్యావరణ ప్రాముఖ్యతను వివరించండి.

(Or)

(b) Write an essay on Nitrogen Cycle.

నత్రజన్య చక్రము గురించి వ్యాసము వ్రాయండి.

11. (a) Describe the role of Plant Communities in Ecology.

ఆవరణ శాస్త్రములో వృక్ష సంఘాల చిత్రను గుర్తు వ్రాయండి.

(Or)

(b) Write about the importance of Plant Population.

వృక్ష జనాభా అవగాహన ప్రాముఖ్యతను వివరించండి.

K. Sujatha  
Dr. K. Sujatha  
BOS chairperson

1.   
C.D. GOVINDARAJULU  
BOS member

2.   
Dr. B. LAKSHMI  
B.O.S. member

