



DEPARTMENT OF BOTANY

SYLLABUS FOR V & VI SEMESTER

B.Sc., BOTANY

FRAMED ACCORDING TO STATE EDUCATION POLICY

(SEP 2024)

MAY 2026

PROCEEDINGS OF THE MEETING OF BOARD OF STUDIES IN SERICULTURE HELD
ON 23RD, 29TH, & 30TH MAY 2026 IN TUMKUR UNIVERSITY, TUMAKURU

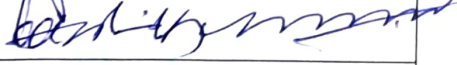
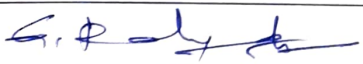
MINUTES OF THE BOS MEETING

1. The Meeting began with the welcome address by the Chairperson. The agenda was placed in the meeting for discussion and decision.
2. Discussed and finalized the SEP syllabus for V and VI Semester B.Sc. Sericulture (both theory & practical).
3. Question paper pattern for both theory & practical and Scheme of evaluation for practical's has been discussed and finalized
4. Formative and Summative assessment for both theory & practical's has been discussed and finalized.
5. Syllabus for two Skill enhancement papers for both theory & practical, along with question paper pattern for both has been discussed and finalized
6. The Board has authorized the Chairperson to incorporate corrections if there are any, in case of exigencies.
7. The meeting ended with a vote of thanks by the Chairperson.


Chairperson
ಶಾಲಿನಿ ಬಿ.ಆರ್.
ಅಧ್ಯಕ್ಷರು

Members of the Board of Studies

ಸಸ್ಯ ಶಾಸ್ತ್ರ ಸ್ನಾತಕ ಅಭ್ಯಯನ ಮಂಡಳಿ
ಮುಖ್ಯಕಾರ್ಯದರ್ಶಿ

Sl. No.	Name of the Members	Designation	Signature of the Members
1.	Prof. Shalini B. R.	Chairman	
2.	Dr. M. N. Sreenivasa	Member	
3.	Dr. L. H. Shivashankarappa	Member	
4.	Dr. Rohith. L. Shankar	Member	Absent
5.	Dr. Rahamathulla G.	Member	
6.	Dr. H. B. Mahesh	Member	Absent
7.	Dr. R. S. Umakanth	Member	


Chairperson
ಶಾಲಿನಿ ಬಿ.ಆರ್.
ಅಧ್ಯಕ್ಷರು
ಸಸ್ಯ ಶಾಸ್ತ್ರ ಸ್ನಾತಕ ಅಭ್ಯಯನ ಮಂಡಳಿ
ಮುಖ್ಯಕಾರ್ಯದರ್ಶಿ

BOTANY V SEMESTER [SEP 2026-27]

**Paper V: MORPHOLOGY OF ANGIOSPERMS, PLANT TAXONOMY
& ECONOMIC BOTANY**

Programme	B. Sc. (Botany)
Course Title	Paper V: Morphology of Angiosperms, Plant Taxonomy & Economic Botany (Theory)
Course Code	BOTT 501
Total Hours of Teaching	45
Number of Teaching Hours / Week	3 Hours
Number of Credits	3
Formative Assessment	20
Summative Assessment	80
Course Outcome	
1. Pupil will be able to understand the Morphology and General Characters of Angiosperms 2. Pupil will be able to understand the Identification, Classification and Nomenclature of Angiosperms 3. Pupil will be able to understand the Economic importance of Angiosperms	

Unit	Content	Teaching Hours
1	Morphology of Angiosperms: Root- Introduction and classification, modifications (Storage, Mechanical support & Vital functions). Stem- Introduction, underground, sub-aerial & aerial modifications. Leaf- Introduction, types, phyllotaxy and its types, stipule; types, modification of leaf. Inflorescence- types; Racemose, Cymose & Special types. Flower- parts of a typical flower, symmetry, types of flower based on position of ovary. Calyx & Corolla; Aestivation & its types. Androecium, Gynoecium, Placentation and its types, Fruits- Simple, aggregate, composite & multiple fruits, endospermic & non-endospermic seeds.	15 Hours
2	Fundamentals of Taxonomy: Introduction- Systems of classification (Bentham & Hooker, Engler & Prantl), Brief account of APG-IV system. Principles & Rules of ICN- Binomial nomenclature, Flora & e-Flora, Botanical gardens of India, Botanical Survey of India (BSI). Herbaria & Herbarium Techniques. Account of Cytotaxonomy, Chemotaxonomy, & Numerical taxonomy.	10 Hours
3	Study of Families: Dicot Families; Archichlamydeae- Annonaceae, Brassicaceae, Fabaceae (Papilionaceae, Caesalpinaceae & Mimosae), Rutaceae, Apiaceae, Euphorbiaceae. Metachlamydeae- Apocyanaceae, Labiatae, Verbenaceae, Rubiaceae, Compositae, Cucurbitaceae. Monocot Families- Poaceae & Musaceae.	15 Hours

4	Economic Botany: Introduction, Cereals- (Rice, Wheat, Ragi, Jowar, Maize) & Millets. Pulses- (Bengal gram, Pigeon pea, Horse gram, Green gram, Black gram). Oil yielding plants- (Coconut, Safflower, Sunflower & Castor). Spices and Condiments- (Clove, Black pepper, Cinnamon & Cardamom). Fibre yielding plants- (Cotton, Coir & Jute). Beverages- (Coffee, Tea & Cocoa). Timber yielding plants- (Teak & Rosewood). Medicinal plants- (Ashwagandha, Sarpagandha & Amla).	5 Hours
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Pedagogy: Lectures, Demonstration with live Specimens, Charts, Assignments, Seminars and Field visits.

Methods of Assessment for Theory

Formative Assessment		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

BOTANY - V SEMESTER

**Paper V: MORPHOLOGY OF ANGIOSPERMS, PLANT TAXONOMY
& ECONOMIC BOTANY**

Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: 1) Answer all parts

2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following

10 x 2 = 20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following

6 x 5 = 30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following

3 x 10 = 30

- 19.
- 20.
- 21.
22. a)
- b)

BOTANY V SEMESTER [SEP 2026-27]

Paper VI: CYTOLOGY, GENETICS & PLANT BREEDING

Programme	B. Sc. (Botany)
Course Title	Paper VI: Cytology, Genetics & Plant Breeding (Theory)
Course Code	BOTT 502
Total Hours of Teaching	45
Number of Teaching Hours / Week	3 Hours
Number of Credits	3
Formative Assessment	20
Summative Assessment	80
Course Outcome	
1. Pupil will be able to understand the General Characters of Plant Cell and structure and functions of cell organelles. 2. Pupil will be able to understand the structure of Chromosome and chromosomal aberrations in Plants 3. Pupil will be able to understand the Cell cycle, stages of Mitosis & Meiosis in Plant cells along with linkage and crossing over 4. Pupil will be able to understand the methods and techniques involved in Plant Breeding	

Unit	Content	Teaching Hours
1	Cytology: Introduction, Plant cell & its components, Structure & functions: Cell wall, Cell membrane (fluid mosaic model), Mitochondria, Chloroplast, Endoplasmic Reticulum, Golgi apparatus, Ribosome, Nucleus. Chromosomes: Size, number, structure & classification based on position of centromere, autosomes & allosomes, Karyotype & Idiogram. Nucleosome concept, Salivary gland chromosome, Lampbrush chromosome. Chromosomal Aberrations: Numerical aberrations, Euploidy- Haploidy, Diploidy, Polyploidy (Auto & Allo polyploidy), Significance of polyploidy, Aneuploidy. Structural aberrations: Deletion, Duplication, Inversion, Translocation and their significance. Cell Division: Cell cycle, Mitosis, Meiosis and their significance.	18 Hours
2	Genetics: Introduction & terminologies, Mendel and his work, Mendelian laws, test cross & its significance, incomplete dominance. Interaction of genes: supplementary, complementary, epistasis and polygenic inheritance (Genetic problems related to above concepts). Linkage & crossing over, chromosomal mapping, cytoplasmic inheritance (Plastid inheritance in <i>Mirabilis jalapa</i>)	17 Hours
3	Plant Breeding: Introduction, aims & objectives of plant breeding, methods of plant breeding. Hybridization: types (intraspecific, interspecific & intrageneric), steps involved in hybridization, heterosis. Artificial methods of vegetative propagation (Cutting, Layering & Grafting)	10 Hours

Pedagogy: Lectures, Charts, Permanent slides, Assignments and Seminars.

Methods of Assessment for Theory

Formative Assessment		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

Paper VI: CYTOLOGY, GENETICS & PLANT BREEDING
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: 1) Answer all parts
2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following 10 x 2 = 20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following 6 x 5 = 30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following 3 x 10 = 30

- 19.
- 20.
- 21.
22. a)
- b)

Practical Paper V: Morphology of Angiosperms, Plant Taxonomy & Economic Botany and Cytology, Genetics & Plant Breeding

Programme	B. Sc. (Botany)
Course Title	Paper V: Morphology of Angiosperms, Plant Taxonomy & Economic Botany and Cytology, Genetics & Plant Breeding
Course Code	BOTP 503
Total Hours of Teaching	48
Number of Teaching Hours / Week	4 Hours
Number of Credits	2
Formative Assessment	10
Summative Assessment	40

Sl. No.	Practical Syllabus
1	Root, Stem & Leaf modifications
2	Study of Inflorescence
3	Study of flower and its parts
4	Study of fruits
5	Study of families included in theory (Archichlamydeae, Metachlamydeae and Monocotyledonae)
6	Study of economically important plants included in theory
7	Study of Mitosis (Onion root tips)
8	Study of Meiosis (Onion flower buds)
9	Genetic problems related to theory portion
10	Study of Vegetative Propagation techniques

Methods of Assessment for Practical

Formative Assessment	
Components for IA	Marks Assigned
Practical Test	10
Summative Assessment	
Semester End Practical Examination	40

Practical Paper: Morphology of Angiosperms, Plant Taxonomy & Economic Botany and Cytology, Genetics & Plant Breeding [BOTP 503]

Model Question Paper for Practical Examination

Time: 3 Hours

Max Marks: 40

Sl. No.	Experiments / Questions	Marks Assigned
1	Assign the specimens A, B & C to their respective families with reasons	3 x 3 = 9
2	Identify & Comment on specimens D, E, F & G	4 X 2 = 8
3	Prepare temporary squash of the material H , Identify and Comment	5
4	Genetic Problems I	3
5	Identify and Comment on the Photocopies / Slides J & K	2 x 2 = 4
6	Submission of Field / Industrial visit Report	2
7	Submission of permanent slides	2
8	Submission of Herbarium	2
9	Class Record	5

Scheme of Valuation

Sl. No.	Experiments / Questions	To be given	Marks Distribution
1	A, B & C	A from Archichlamydae, B from Metachlamydae & C from Monocotyledonae	Identification + Classification – 1 Mark, Reasons – 2 Marks
2	D, E, F & G	2 Specimens from Morphology 2 Specimens from Economic Botany	Identification – 1 Mark Comment – 1 Mark
3	H	Onion Root tips / Flower buds	Preparation – 2 Marks, Identification – 1 Mark, Labeled diagram – 1 Mark, Comment – 1 Mark
4	I	From topics included in Theory	3 Marks
5	J & K	Salivary gland Chromosome, Karyotype, Vegetative propagation methods	Identification – 1 Mark Comment – 1 Mark
6	Submission	Field / Industrial visit Report	2
7	Submission	Submission of permanent slides	2
8	Submission	Submission of Herbarium	2
9	Submission	Class Record	5

References:

1. B.P. Pandey – *A Textbook of Botany: Angiosperms* – S. Chand & Company Ltd., New Delhi.
2. B.P. Pandey – *Plant Taxonomy* – S. Chand & Company Ltd., New Delhi.
3. V. Singh, D.K. Jain & P.C. Pande – *Taxonomy of Angiosperms* – Rastogi Publications, Meerut.
4. T. Pullaiah & S. Karuppusamy – *Taxonomy of Angiosperms* – Regency Publications, New Delhi.
5. B.K. Verma – *Introduction to Taxonomy of Angiosperms* – PHI Learning Pvt. Ltd., New Delhi.
6. Gurcharan Singh – *Plant Systematics: Theory and Practice* – Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Simpson, M.G. – *Plant Systematics* – Academic Press, USA.
8. Judd, W.S. et al. – *Plant Systematics: A Phylogenetic Approach* – Sinauer Associates, USA.
9. P.C. Trivedi – *Economic Botany* – Pointer Publishers, Jaipur.
10. S.L. Kochhar – *Economic Botany in the Tropics* – Macmillan India Ltd., New Delhi.
11. Hill, A.F. – *Economic Botany* – McGraw-Hill Book Company, New York.
12. Annie Ragland & V. Kumaresan – *Morphology of Angiosperms, Taxonomy and Economic Botany* – Saras Publication, Nagercoil.
13. A.J. Eames – *Morphology of Angiosperms* – McGraw Hill, New York.
14. P.S. Verma & V.K. Agarwal – *Cytology* – S. Chand & Company Ltd., New Delhi.
15. Bruce Alberts et al. – *Molecular Biology of the Cell* – Garland Science, New York.
(A globally recognized standard text for cell biology)
16. Geoffrey M. Cooper & Robert E. Hausman – *The Cell: A Molecular Approach* – Sinauer Associates, Sunderland.
17. S.B. Primrose & R.M. Twyman – *Principles of Gene Manipulation and Genomics* – Blackwell Publishing, Oxford.
18. P.K. Gupta – *Genetics* – Rastogi Publications, Meerut.
19. Gardner, Simmons & Snustad – *Principles of Genetics* – John Wiley & Sons, New York.
20. Klug, Cummings & Spencer – *Concepts of Genetics* – Pearson Education, San Francisco.
21. Griffiths et al. – *Introduction to Genetic Analysis* – W.H. Freeman & Company, New York.
22. P.S. Verma, V.K. Agarwal & S. Chandra – *Genetics* – S. Chand & Company Ltd., New Delhi.
23. C.B. Powar – *Cell Biology* – Himalaya Publishing House, Mumbai.
24. Veer Bala Rastogi – *Cell Biology* – Medtech Publishers, New Delhi.
25. B.D. Singh – *Plant Breeding: Principles and Methods* – Kalyani Publishers, New Delhi.
26. P.K. Gupta – *Plant Breeding* – Rastogi Publications, Meerut.
27. R.L. Chaudhary – *Introduction to Plant Breeding* – Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
28. Allard, R.W. – *Principles of Plant Breeding* – John Wiley & Sons, New York.

BOTANY V SEMESTER [SEP 2026-27]

SEC Paper: MICROTECHNIQUES

Programme	B. Sc. (Botany)
Course Title	SEC: Microtechniques
Course Code	BOTSECT 1
Total Hours of Teaching	15 for Theory & 15 for Practical
Number of Teaching Hours / Week	1 Hour for Theory & 2 Hours for Practical
Number of Credits	1 for Theory & 1 for Practical
Formative Assessment	10
Summative Assessment	40

	Content	Teaching Hours
Unit 1 (Theory) 1 Hr/Week	Microscopy: Introduction, Types- Simple, Compound, Electrical & Electron microscopes, Working principle & uses. Staining technique: Simple & Differential staining, Cytological Stains (Safranin & Acetocarmine), Reagents, Fixatives & Preservatives, Gram staining. Micrometry: Introduction, Measurement of cells & spores, Camera Lucida & its parts. Haemocytometer: Introduction, Counting of cells. Preparation of slides: Squash / Smear preparation, Use of fixatives (Carnoy's fluid & Formalin) and mounting media (Glycerol & DPX). Preparation of Media: Introduction, Types (Solid & Liquid), Composition (MS media & PDA media), Sterilization methods (Physical & Chemical).	15 Hours
Unit 2 (Practical) 2 Hrs/Week	Study of Microscopes (simple, compound, electrical, electron & projection microscopes. Preparation of Stains (Safranin & Acetocarmine), Reagents (MnSO ₄ , K ₂ Cr ₂ O ₇ , KI, AgNO ₃), Fixatives (GAA, Acetone, Xylene & Butanol) & Preservatives (Formalin). Measurement of Cell/ spores using Micrometry. Study of Camera Lucida in Biological Research. Counting of cells / spores using Haemocytometer / Colony counter. Temporary squash / smear preparation for Cytological studies. Preparation of culture media (PDA & MS).	30 Hours

Methods of Assessment

Formative Assessment	
Components for IA	Marks Assigned
Practical Test	10
Summative Assessment	
Semester End Theory Examination	40

***Note:** 1. No separate practical examination.

2. Practical syllabus must be covered in theory question paper

References:

1. D.R. Singh – *Principles and Techniques In Histology, Microscopy And Photomicrography*
2. J. Sanderson – *Biological Microtechnique*
3. R. Marimuthu – *Microscopy and Microtechnique*

BOTANY - V SEMESTER

SEC Paper 1: MICROTECHNIQUES (Theory)

Model Question Paper for Theory Examination

Time: 1½ Hours

Max Marks: 40

Instructions: 1) Answer all parts

2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **FIVE** of the following

5 x 2 = 10

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Part - B

II. Answer any **FOUR** of the following

4 x 5 = 20

- 7.
- 8.
- 9.
- 10.
- 11.

Part - C

III. Answer any **ONE** of the following

1 x 10 = 10

- 12.
13. a)
- b)

BOTANY VI SEMESTER [SEP 2026-27]
Paper VII: PLANT PHYSIOLOGY & METABOLISM

Programme	B. Sc. (Botany)
Course Title	Paper VII: Plant Physiology & Metabolism (Theory)
Course Code	BOTT 601
Total Hours of Teaching	45
Number of Teaching Hours / Week	3 Hours
Number of Credits	3
Formative Assessment	20
Summative Assessment	80
Course Outcome	
1. Pupil will be able to understand the importance of Water for plant growth & Mechanisms involved in water absorption and conduction. 2. Pupil will be able to understand the Principles & processes of Bioenergetics 3. Classification and Nomenclature of Enzymes & their mechanism of action and different pathways involved in Photosynthesis 4. Pupil will be able to understand the types of plant growth hormones and their role in plant development	

Unit	Content	Teaching Hours
1	Plant Water Relations: Importance of water, biological solutions, membrane permeability, diffusion, osmosis. Water potential and its components, Absorption of water, Pathway of water, mechanism of active and passive absorption, factors affecting rate of water absorption. Ascent of sap- Introduction, mechanism- vital & physical force theories. Mineral Nutrition- A brief account on micro and macro nutrients. Role & deficiency symptoms of Nitrogen, Phosphorous, Potassium, Zinc, Boron, Molybdenum. Transpiration- Introduction, types, structure of stomata, mechanism of stomatal movement (K^+ ion exchange theory), Significance of transpiration, Antitranspirants & Guttation. Translocation of Organic solutes- Introduction, protoplasmic streaming theory, Munch's mass flow hypothesis, Vein loading and unloading.	15 Hours
2	Photosynthesis: Introduction, structure of photosynthetic apparatus, photosynthetic pigments, photosystem-I & II, mechanism- Light reaction and Dark reaction, C ₃ cycle, C ₄ and CAM pathway. Factors affecting photosynthesis. Law of limiting factors. Respiration- Introduction, Types of respiration, Structure of mitochondria, Mechanism of aerobic respiration; Glycolysis, Krebs's cycle, Terminal Oxidation. An account on anaerobic respiration (Fermentation). Respiratory quotient.	15 Hours

3	Enzymes: Introduction, nomenclature, properties & classification, Lock and Key mechanism of enzyme action. Nitrogen metabolism- Biological nitrogen fixation, Nitrogen cycle. Phytohormones: Definition, role & practical applications of Auxins, Gibberellins, Cytokinins, Ethylene, & Absciscic acid in agriculture and horticulture. Plant Movements- Phototropism, Geotropism & Hydrotropism. Physiology of flowering- Photoperiodism, Vernalization & Phytochromes. A brief account on Seed dormancy.	15 Hours
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Pedagogy: Lectures, Charts, Assignments and Seminars.

Methods of Assessment for Theory

Formative Assessment		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

BOTANY - VI SEMESTER

Paper VII: PLANT PHYSIOLOGY & METABOLISM
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: 1) Answer all parts
2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following 10 x 2 = 20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following 6 x 5 = 30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following 3 x 10 = 30

- 19.
- 20.
- 21.
22. a)
- b)

BOTANY VI SEMESTER [SEP 2026-27]

Paper VIII: MOLECULAR BIOLOGY & PLANT BIOTECHNOLOGY

Programme	B. Sc. (Botany)
Course Title	Paper VIII: Molecular Biology & Plant Biotechnology (Theory)
Course Code	BOTT 602
Total Hours of Teaching	45
Number of Teaching Hours / Week	3 Hours
Number of Credits	3
Formative Assessment	20
Summative Assessment	80
Course Outcome	
1. Pupil will be able to understand the Structure and functions of DNA 2. Pupil will be able to understand the Tissue culture techniques and applications 3. Pupil will be able to understand the Genetic engineering techniques and its applications	

Unit	Content	Teaching Hours
1	Molecular Biology: Introduction, Identification of genetic materials (Griffith & Avery's experiment), Chemical nature of genetic materials, Nucleoside & Nucleotide. DNA: Structure (double helix model), Replication (Semi conservative method), Forms of DNA. RNA: Genetic & Non-genetic RNA (rRNA, mRNA & tRNA). Biosynthesis of Proteins: Central dogma, Transcription & Translation, Genetic code, Regulation of gene expression in Prokaryotes (Lac-Operon) & Eukaryotes. Blotting techniques (Northern & Southern). Biomolecular techniques: DNA fingerprinting, PCR.	20 Hours
2	Plant Biotechnology-1: Tissue Culture- Introduction, Sterilization techniques, Media preparation, Totipotency, Steps involved in tissue culture, organ, callus, anther & protoplast culture, Somatic hybridization, Cybrids, Applications of plant tissue culture.	10 Hours
3	Plant Biotechnology-2: Genetic Engineering- r-DNA technology, tools of r-DNA technology (Plasmids, PBR322, PUC18 & Ti Plasmid), REN, DNA ligase, Bioreactor, Genomic c-DNA library. Applications of Genetic engineering- in agriculture (Bt Cotton & Golden rice), in medicine (Insulin production). Bioinformatics: Introduction, aim & scope, A brief account of NCBI, Biological databases; DNA database (DDBJ) & Protein database (PIR).	15 Hours

Pedagogy: Lectures, Charts, Permanent slides, Assignments, Seminars and Field visits.

Methods of Assessment for Paper VIII Theory

Formative Assessment		
Components for IA	Marks Assigned	Total
Assignment – No. 1	5	20
Test – No. 1	5	
Assignment – No. 2	5	
Test – No. 2	5	
Summative Assessment		
Semester End Theory Examination	80	

BOTANY - VI SEMESTER

Paper VIII: MOLECULAR BIOLOGY & PLANT BIOTECHNOLOGY
Model Question Paper for Theory Examination

Time: 3 Hours

Max Marks: 80

Instructions: 1) Answer all parts
2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **TEN** of the following 10 x 2 = 20

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

Part - B

II. Answer any **SIX** of the following 6 x 5 = 30

- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.

Part - C

III. Answer any **THREE** of the following 3 x 10 = 30

- 19.
- 20.
- 21.
22. a)
- b)

**Practical Paper VII: Plant Physiology & Metabolism and Molecular Biology
& Plant Biotechnology**

Programme	B. Sc. (Botany)
Course Title	Paper VII: Plant Physiology & Metabolism and Molecular Biology & Plant Biotechnology
Course Code	BOTP 603
Total Hours of Teaching	48
Number of Teaching Hours / Week	4 Hours
Number of Credits	2
Formative Assessment	10
Summative Assessment	40

Sl. No.	Practical Syllabus
1	Determination of Osmotic potential of plant cell sap by Plasmolytic method
2	Determination of Stomatal index
3	Determination of rate of photosynthesis at different wavelengths of light
4	Determination of evolution of Oxygen during Photosynthesis
5	Experiment to demonstrate Suction force / Transpiration pull
6	Separation of photosynthetic pigments by paper chromatography and measurement of R _f values
7	Isolation of DNA from onion leaf
8	Quantitative estimation of DNA by DPA method
9	Study of Southern & Northern blotting, PCR, DNA fingerprinting and PBR ₃₂₂ (Photocopies)
10	Kuhne's fermentation experiment (Demonstration)
11	Phototropism and Geotropism (Demonstration)

Methods of Assessment for Practical

Formative Assessment	
Components for IA	Marks Assigned
Practical Test	10
Summative Assessment	
Semester End Practical Examination	40

BOTANY VI SEMESTER [SEP 2026-27]

**Practical Paper VII : Plant Physiology & Metabolism, and
Molecular Biology & Plant Biotechnology [BOTP 603]**

Model Question Paper for Practical Examination

Time: 3 Hours

Max Marks: 40

Sl. No.	Experiments / Questions	Marks Assigned
1	An experiment to determine osmotic potential by plasmolytic method or / Stomatal index of material A	7
2	Separation of photosynthesis pigments B by paper chromatography	8
3	Comment on C and D	3 x 2 = 6
4	Estimation of DNA sample E by DPA method Or / Estimation of RNA sample E by Orcinol method	8
5	Comment on F and G	3 x 2 = 6
6	Class Record	5

Scheme of Valuation

Sl. No.	Experiments / Questions	To be given	Marks Distribution
1	A	Onion epidermal peel	Procedure – 2 Marks, Conduction – 4 Marks, Results – 1 Mark
2	B	Leaf extract	Requirements – 1 Mark, Procedure – 2 Marks, Conduction – 3 Marks, Rf values – 2 Marks
3	C & D	Photocopies of techniques & Transpiration experiment	Identification – 1 Mark Comment – 2 Marks
4	E	DNA sample	Procedure – 2 Marks, Conduction – 4 Marks, Results – 2 Marks
5	F & G	Demonstration experiments	Identification – 1 Mark Comment – 2 Marks
6	Submission	Class Record	5

References:

1. Taiz, L., Zeiger, E., Møller, I.M. & Murphy, A. – *Plant Physiology and Development* – Sinauer Associates, Sunderland (USA).
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4. Hans Mohr & Peter Schopfer – *Plant Physiology* – Springer-Verlag, Berlin.
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6. S.N. Pandey & B.K. Sinha – *Plant Physiology* – Vikas Publishing House Pvt. Ltd., New Delhi.
7. H.S. Srivastava – *Plant Physiology* – Rastogi Publications, Meerut.
8. P.S. Verma & V.K. Agarwal – *Plant Physiology* – S. Chand & Company Ltd., New Delhi.
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12. De Robertis, E.D.P. & De Robertis, E.M.F. – *Cell and Molecular Biology* – Lippincott Williams & Wilkins, Philadelphia.
13. James D. Watson et al. – *Molecular Biology of the Gene* – Pearson/Benjamin Cummings, San Francisco.
14. Geoffrey M. Cooper & Robert E. Hausman – *The Cell: A Molecular Approach* – Sinauer Associates, Sunderland.
15. S.B. Primrose & R.M. Twyman – *Principles of Gene Manipulation and Genomics* – Blackwell Publishing, Oxford.
16. H.D. Kumar – *Molecular Biology and Biotechnology* – Vikas Publishing House, New Delhi.
17. H.S. Chawla – *Introduction to Plant Biotechnology* – Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
18. B.D. Singh – *Biotechnology: Expanding Horizons* – Kalyani Publishers, New Delhi.
19. P.K. Gupta – *Elements of Biotechnology* – Rastogi Publications, Meerut.
20. Slater, A., Scott, N.W. & Fowler, M.R. – *Plant Biotechnology: The Genetic Manipulation of Plants* – Oxford University Press, Oxford.
21. S.S. Bhojwani & M.K. Razdan – *Plant Tissue Culture: Theory and Practice* – Elsevier, Amsterdam.
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23. I.K. Vasil (Ed.) – *Cell Culture and Somatic Cell Genetics of Plants* – Academic Press, Orlando.
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26. Brown, T.A. – *Gene Cloning and DNA Analysis* – Wiley-Blackwell, Oxford.

BOTANY VI SEMESTER [SEP 2026-27]

SEC Paper: HYDROBIOLOGICAL TECHNIQUES (Theory)

Programme	B. Sc. (Botany)
Course Title	Paper: Hydrobiological Techniques
Course Code	BOTSECT 2
Total Hours of Teaching	15 for Theory & 15 for Practical
Number of Teaching Hours / Week	1 Hour for Theory & 2 Hours for Practical
Number of Credits	1 for Theory & 1 for Practical
Formative Assessment	10
Summative Assessment	40

	Content	Teaching Hours
Unit 1 (Theory) 1 Hr/Week	Water Sampling: Selection of sampling sites, Sampling procedure, Preservation & Handling of samples for Algal (Phytoplankton) studies. Water & Sediment sampling - Von Dorn water sampler, Shallow water sampler, Eckmen Dredge sediment sampler. Nygaard & Palmer's water pollution indices for Pollution studies. Microbial examination of water- Sampling, Transport & Preservation of water samples, MPN of Coliforms. Statistical evaluation of Data using Average, Mean deviation, Standard deviation, Standard error, Correlation & Regression. Wastewater treatment plants, Biological waste treatment, Activated sludge process.	15 Hours
Unit 2 (Practical) 2 Hrs/Week	Determination of pH, Turbidity & Conductivity. Evaluation of Dissolved Oxygen in a given Water sample. Evaluation of Chloride content in a given Water sample. Determination of Hardness of a given Water sample. Counting of Algal cells / filaments / colonies using colony counter. Study of Instruments: pH meter, Nephelo turbidity meter, Conductivity meter. Visit to Water treatment Plant / Water testing laboratory.	30 Hours

Methods of Assessment

Formative Assessment	
Components for IA	Marks Assigned
Practical Test	10
Summative Assessment	
Semester End Theory Examination	40

***Note:** 1. No separate practical examination.

2. Practical syllabus must be covered in theory question paper

References:

1. G.A. Cole – *Textbook of Limnology*
2. J. Schwoerbel – *Methods of Hydrobiology (Freshwater Biology)*
3. B.B. Hosetti & Kumar Arvind – *Textbook of Applied Aquatic Biology*

SEC Paper 2: HYDROBIOLOGICAL TECHNIQUES (Theory)

Model Question Paper for Theory Examination

Time: 1½ Hours

Max Marks: 40

Instructions: 1) Answer all parts
2) Draw neat labelled diagrams wherever necessary

Part - A

I. Answer any **FIVE** of the following

5 x 2 = 10

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Part - B

II. Answer any **FOUR** of the following

4 x 5 = 20

- 7.
- 8.
- 9.
- 10.
- 11.

Part - C

III. Answer any **ONE** of the following

1 x 10 = 10

- 12.
13. a)
b)