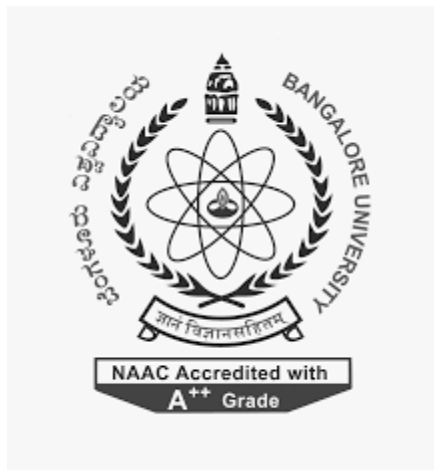


BANGALORE UNIVERSITY



DEPARTMENT OF BOTANY
JNANABHARATHI CAMPUS
BENGALURU -560056

Syllabus for V to VI Semester

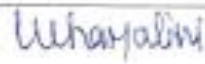
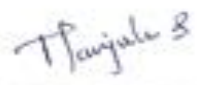
BOTANY

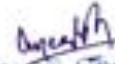
**Curriculum framework for B. Sc Undergraduate
Programme**

Under State Education Policy -2024

April 2026

Proceedings of the Meeting of Board of Studies (UG) in Botany, held on 13th April 2026 at 11.30 AM in the Department of Botany, J.B.Campus, Bangalore University, Bengaluru-560056

Sl.No	Name	Member	Signature
1	Dr.T.G.Umesh Professor and Chairman Department of Botany Bangalore University, Bengaluru	Chairman	
2	Dr.Shubha Professor and Principal Department of Botany GFGC, Vijayanagara, B'lore.	Member	
3	Dr.Kempe Gowda Professor Department of Botany Kanakapura Rural College Kanakapura	Member	
4	Dr.Mamatha.N Professor Department of Botany Government First grade college Vijayanagar, Bengaluru	Member	ABSENT
5	Dr.Ushamalini Professor and Principal Department of Botany GFGC, Channarayana	Member	
6	Dr.Rathnakumari ೨೩ Professor Department of Botany Government First grade college Vijayanagar, Bengaluru	Member	
7	Dr.Manjula S Professor, Department of Botany GFGC, Channarayana	Member	
8	Dr. Venkateshappa S M Associate Professor Dept. of Botany East West First Grade college Bengaluru	Member	
9	Dr.Roopashree M G Professor Dept of Botany KLE Society Nijalingappa College	Member	


Professor & Chairman
Department of Botany
Bangalore University
Jnanabharathi Campus
Bengaluru - 560 056.

10	Dr. Sharanappa P Professor Department of Botany Hassan University Hassan.	External Member	ABSENT
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Minutes of the BOS (UG) Meeting

Chairman welcomed the members to the meeting and the agenda was taken up for the discussion.

1. Members were briefed about the framework issued by the University for finalization of fifth and sixth semester syllabus for B.Sc courses with practical's having three major courses.
2. As per the University Guidelines, two theory papers and two practical's were finalized for fifth semester.
3. Two theory papers and one practical were finalized for sixth semester along with Discipline specific skill (Practical) paper.
4. Chairman was authorized to modify / incorporate corrections as per the direction of University.

The meeting ended with a vote of thanks by the chairman.

Reopashree



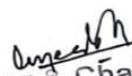


Uthayalini

M.S. Densee

Thayulu S.




Professor & Chairman
Department of Botany
Bangalore University
Jnanabharathi Campus
Bengaluru - 560 056.

Name of the Degree Program : B.Sc., (with three majors)
Subject : Botany
Year/Semester : Third Year V & VI Semester
Year of Implementation : 2026–27
Scheme : SEP–2024–25

CURRICULUM STRUCTURE

Semester	Course Code	Theory / Practical	Credits	Teaching Hours / Week	Course Title	Marks	
						S.A.	F.A.
V	BOTT-501	Theory	3	3	Plant Systematics, Cytology and Genetics	80	20
	BOTP-502	Practical	2	4	Plant Systematics, Cytology and Genetics	40	10
	BOTT-503	Theory	3	3	Medicinal Plants and Herbal Technology	80	20
	BOTP-504	Practical	2	4	Medicinal Plants and Herbal Technology	40	10
VI	BOTT-601	Theory	3	3	Plant Physiology and Plant Biotechnology	80	20
	BOTP-602	Practical	2	4	Plant Physiology and Plant Biotechnology	40	10
	BOTT-603	Theory	3	3	Plant propagation, Breeding and Seed Technology	80	20
	BOTSK-604	Practical/Skill	2	4	Phytotechnology	40	10

(S.A. – Summative Assessment; F.A. – Formative Assessment)

V SEMESTER

BOTT – 501: Plant Systematics, Cytology and Genetics

Programme Name	B.Sc./ BOTANY	Semester	V
Course Title	Plant Systematics, Cytology and Genetics		
Course Code	BOTT-501	No. of Credits	3
Contact Hours	45 hours	Duration of Examination	3 hours
Formative Assessment Marks	20	Summative Assessment Marks	80

Course Outcomes:

Upon completion of this course, students will be able to :

CO1 : Understand Taxonomic Principles including systems of classification and Apply Nomenclature Rules for naming plants.

CO2 : Evaluate evolutionary trends in Angiosperms by analysing phylogenetic concepts .

CO3 : Perform systematic studies and know diagnostic features of key Dicot and Monocot families.

CO4 : Understand the genetic material, analyse chromosome structure and illustrate the cell cycle events along with gene expression mechanism.

CO5 : Understand principles of inheritance to predict phenotype and genotype ratios in genetic crosses and to analyse gene interactions along with linkage and crossing over

UNIT I	Taxonomy I: Aim and scope of taxonomy. Broad outline of classification of Bentham and Hooker. APG–IV system and their relative merits and demerits. Species concept: Taxonomic hierarchy, species, genus and family. ICN – rules for nomenclature. Taxonomic tools, Herbarium and its techniques, virtual herbarium. Floras and their importance. Botanical gardens and their importance. Phylogenetic systems – terms, concepts, primitive and advanced homology , analogy, parallelism, convergence, monophyletic, polyphyletic, clades, synapomorphy, Sympleiomorphy and	13 hrs
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	Apomorphy. Origin and evolution of Angiosperms – coevolution of angiosperms and animals.	
UNIT II	Taxonomy II : Taxonomic studies of following families: Magnoliaceae, Brassicaceae, Rutaceae, Leguminosae (Papilionatae, Caesalpinioideae and Mimosoideae), Euphorbiaceae, Apiaceae. Cucurbitaceae, Rubiaceae, Asteraceae, Asclepiadaceae and Lamiaceae. Monocotyledonae Families: Poaceae, Aracaceae, Musaceae and Orchidaceae.	10 hrs
UNIT III	Cytology Structure, function and replication of DNA, Types of RNA. Structure of Eukaryotic Chromosome, nucleosome model. Heterochromatin and Euchromatin, Types of Chromosomes – Based on centromere position. Karyotype and Ideogram. Cell Cycle – Phases of eukaryotic cell cycle, PCD. Cell division – Mitosis & Meiosis and their significance. Genetic code and its properties, Transcription and Translation. Gene expression in prokaryotes (trp operon), Gene expression in eukaryotes, Britten-Davidson model .	12 hrs
UNIT IV	Mendelian Genetics: Biography of Mendel in Brief : Mendel experiments, Monohybrid cross – law of dominance, Law of segregation and purity of genes. Homozygous, heterozygous, phenotype, genotype, test cross and back cross. Dihybrid cross: law of independent assortment, dihybrid test cross, incomplete dominance (<i>Mirabilis jalapa</i>) and codominance . Interaction of genes. Epistasis (dominant and recessive) supplementary factors, complementary factors Polygenic inheritance in maize, Self sterility (<i>Nicotiana</i>) linkage and crossing over (In <i>Maize</i>)	10 hrs

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22. Sambamurthy, A.V.S.S. 2005. *Taxonomy of Angiosperms*. IK International Publishers, New Delhi.
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Internal Assessment	Marks
Attendance	5 marks
Assignment/Seminar	5 marks
Two tests	10 marks
Total	20 marks

COURSE ARTICULATION MATRIX MAPPING OF POs V/S CO's*

	Programme Outcomes (Plant systematics, Cytology and Genetics)											
Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	1	1	1	1	1	1	1	1
CO2	1	2	2	3	1	1	1	1	1	1	1	1
CO3	3	3	2	2	1	1	1	2	2	2	1	1
CO4	1	1	3	1	1	1	1	2	1	1	1	1
CO5	1	1	3	1	1	1	1	1	1	1	1	1

***Low correlate -1; Moderate correlate – 2: High (Substantial) correlate-3**

BOTP - 502: Plant Systematics, Cytology and Genetics (Practical)

Practical-V: BOTP - 502	Plant Systematics, Cytology and Genetics
Teaching Hours: 4 hours/week	Credits: 2
Duration of Exam: 3 hours	Maximum Marks: 50 (Exam 40 + IA 10)

LIST OF EXPERIMENTS

Sl.No.	Experiments	Units
1	Morphology of Angiosperms – Vegetative Structure and modifications of root & leaf.	1
2	Morphology of Angiosperms – Inflorescence and flower.	1
3	Morphology of Angiosperms – Fruits (Simple, aggregate & multiple).	1
4	Methods of identification of plants with technical terms.	1

5	Study of taxonomic characters of families included in theory (Minimum one genus from each family).	6
6	Herbarium techniques.	1
7	Study of local flora by arranging local collection trips.	1
8	Study of different stages of mitosis by squash technique using Onion root tip, anthers and permanent slides.	2
9	Genetic problems related to Mendel's law , incomplete dominance and interaction of genes (any six)	1
Submission of 6 Herbarium, one mitosis and one meiosis slides.		

Internal Assessment	Marks
Attendance/continuous assessment	5 marks
Test	5 marks
Total	10 marks

**Practical – V: BOTP-502: Plant Systematics, Cytology and Genetics
Practical Question Paper**

Time: 3 hours

Max. Marks: 40

1. Assign the specimens 'A', & 'B' to their respective families giving diagnostic features. 3×2 = 6
2. Describe 'D' in technical terms. Draw the floral diagram with floral formula. 1x4= 4
3. Identify the specimen 'E', 'F' & 'G' with their morphological & biological importance. 3×2 = 6
4. Prepare the squash/smear of material 'H' (Mitosis / Meiosis). 6x1 = 6
5. Identify and comment on "I" 3x1= 3
6. Solve the Genetic problems 'J'. 5x1= 5
6. Record and Submission. 10

Scheme of evaluation

1. One Dicotyledonae, one Monocotyledonae (Identification - ½ mark, Classification - 1 mark, Diagnostic features - 1½ mark)
2. Dicot plant (Floral diagram – 2 marks, floral formula – 2 marks)
3. Root/Stem/Leaf modification/Inflorescence/Fruit (Identification - ½ mark, labelled diagram - 1 mark, description - 1 mark)
4. Preparation – 2 marks, Diagram & identification of stage – 2 marks, Description – 2 marks
5. Spotters related to molecular biology

6. Solving of Genetic problem – 5 marks
6. Submission of herbaria with field notes of family's studies & slides (1 Mitosis & 1 Meiosis)

BOTT - 503: MEDICINAL PLANTS AND HERBAL TECHNOLOGY

Programme Name	B.Sc./ BOTANY	Semester	V
Subject	BOTANY		
Course title	MEDICINAL PLANTS AND HERBAL TECHNOLOGY		
Course code	BOTT-503	No. of credits	3
Contact hours	45 hours	Duration of examination	3 hours
Formative assessment marks	20	Summative assessment marks	80

Course Outcomes:

Upon completion of this course, students will be able to:

CO1: Understanding the history and scope of medicinal plants, distinguishing between various indigenous medical sciences and their foundations

CO2: Identify key Medicinal Plants and understand the specific plant parts used and their therapeutic applications.

CO3: Understand the role of herbal medicines in siddha system and cultivation of medicinal plants and their curing capacity of various ailments

CO4: Analyse and identify active plant principles of selected medicinal plants

CO5: Understand the drug adulterations, methods of drug evaluation along with screening for active principles.

UNIT I	Medicinal Plants: Brief history, scope and importance of medicinal plants. Pharmacognosy and Pharmacology: Indigenous medicinal sciences. Definition and Scope of Ayurveda, Siddha and Unani.	15 hrs
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	Classification of drugs based on the source. Common medicinal plants: parts used and their uses – <i>Terminalia chebula</i>, <i>T. bellerica</i>, <i>Curcuma longa</i>, <i>Cinnamomum zeylanicum</i>, <i>Aloe vera</i>, <i>Phyllanthus amarus</i>, <i>Piper longum</i>, <i>P. nigrum</i>, <i>Catharanthus roseus</i>, <i>Tinospora cordifolia</i>, <i>Boerhavia diffusa</i>, <i>Centella asiatica</i>.	
UNIT II	Herbal Medicines: History and Scope, Definition of medical terms. Role of medicinal plants in Siddha systems of medicine. Cultivation, harvesting, processing, storage, marketing and utilization of medicinal plants. Medicinal uses of the following herbs in curing various ailments – Tulsi, Ginger, Fenugreek, Indian Goose Berry and Ashoka. Medicinal plant banks. Micro-propagation of important species (Ashwagandha, Neem and Tulsi), Herbal food products.	15 hrs
UNIT III	Phytochemistry: Active principles, methods of testing, identification and utilization of the medicinal herbs – <i>Catharanthus roseus</i> (cardiotonic), <i>Withania somnifera</i> (drug acting on nervous system), <i>Clerodendron phlomidis</i> (anti-rheumatic) and <i>Centella asiatica</i> (memory booster). Analytical Pharmacognosy: Types of drug adulteration, methods of drug evaluation and biological testing of herbal drugs. Phytochemical screening for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds).	15 hrs

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Internal Assessment	Marks
Attendance	5 marks
Assignment/Seminar	5 marks
Two test	10 marks
Total	20 marks

COURSE ARTICULATION MATRIX MAPPING OF POs V/S CO's*

Course outcomes	Programme Outcomes (Medicinal plants and Herbal Technology)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	1	1	1	1	1	1	1	1
CO2	1	2	2	3	1	1	1	1	1	1	1	1
CO3	3	3	2	2	1	1	1	1	2	2	1	1
CO4	1	1	3	1	1	1	1	2	1	1	1	1
CO5	1	1	3	1	1	1	1	1	1	1	1	1

***Low correlate -1; Moderate correlate – 2: High (Substantial) correlate-3**

BOTP - 504: MEDICINAL PLANTS AND HERBAL TECHNOLOGY

(Practical)

Practical-V: BOTP – 504	MEDICINAL PLANTS AND HERBAL TECHNOLOGY
Teaching Hours: 4 hours/week	Credits: 2
Duration of Exam: 3 hours	Maximum Marks: 50 (Exam 40 + IA 10)

LIST OF EXPERIMENTS

Sl.No.	Experiments	Units
1	Identification of Medicinal plants and Aromatic Plants: their uses	2
2	Preparation of Herbal formulations : Khashayam , Choornam , Lepa Thailam	2
3	Extraction of bioactive compounds from plant tissues by different methods	2
4	Preliminary Phytochemical Screening of Aqueous/ methanolic / crude Extract of Neem and Amla for Alkaloids, Flavonoids, Tannins, Saponins, Phenols	2
5	Evaluation of Plant compounds : testing for color/odour/taste/texture	1
6	Study of Food adulteration : Pure /Adulterated Ex , Pepper ,Turmeric etc	1
7	Separation of phytochemicals by TLC method	1
8	Antimicrobial assay of phytochemicals by disc diffusion method	1
9	Visit to herbal garden/Medicinal plant bank/medicinal plant nursery	1

Internal Assessment	Marks
Attendance/continuous assessment	5 marks
Test	5 marks
Total	10 marks

Practical – V: BOTP-504: MEDICINAL PLANTS AND HERBAL TECHNOLOGY
Practical Question Paper

Time: 3 hours

Max. Marks: 40

1. Identify & comment on given medicinal/ aromatic plant “A” 1x 5= 5

2. Prepare the herbal/ traditional formulations for the given/provided material “B” & comment on its uses 1x5=5

3. Perform the preliminary phyto-chemical screening of the given extract “C” (Neem/Amla) & identify the presence of any two active principles (alkaloids/ flavonoids/ Tannins/ Phenols/ saponins) 1x10= 10

4. a. Evaluate the given plant compounds “D” for their colour/odour/taste/texture 1x2=2
 b. Identify the food adulterant present in the given material “E” 1x3=3

5. Separate the phytochemical compound from the given plant sample “F” using TLC method 1x5=5

6. Record and Submission. 5+5=10

Scheme of evaluation

1. Any one Medicinal / Aromatic plant (Plant or specimen or crude extract or powder or herbarium sheet) (Identification – 1 M, Botanical name, family & part used -1½ M, Key diagnostic character, active principle present- 1M, uses- 1½ M). 5M

 2. Choorna/ Khashayam/ Lepa/ Thaila (Requirements-1M, Procedure-1 M, Conducting the experiment- 2M & uses-1M). 5M

 3. Neem/ Amla extract to be given (Requirements-1M for each test (2M), Procedure for qualitative analysis of any two active principle present-1M each (2M), Conducting the experiment- 2M each (4 M), observation & result- 1M each (2M). 10 M

 4. a. colour/ odour/taste/ texture -½ M each (2M)
 b. Procedure-1M, observation-1M, result-1M (3M). 5M

 5. Requirements-1M, Procedure-1M, Conducting the experiment-2M & Result- 1M. 5M

 6. Submission of Record-5M & Field visit report-5M. 10M
- 10M

VI SEMESTER
BOTT - 601: PLANT PHYSIOLOGY AND PLANT BIOTECHNOLOGY

Programme Name	B.Sc.	Semester	VI
Subject	Botany		
Course title	Plant Physiology and Plant Biotechnology		
Course code	BOTT-601	No. of Credits	3
Contact hours	45 hours	Duration of Examination	3 hours
Formative assessment marks	20	Summative assessment mark	80

Course Outcomes:

Upon completion of this course, students will be able to :

CO1: Explain the fundamental principles of plant water relations, including water potential, mechanism of absorption and the physiological process of transpiration and mineral nutrition.

CO2 :Analyse the molecular mechanisms of photosynthesis and aerobic / anaerobic respiration to understand energy transformation in plants

CO3: Understand the principles of enzyme kinetics and classification to understand metabolic pathways specifically focusing on the biological nitrogen fixation and nitrogen cycle.

CO4 : Design protocols for plant regeneration using micro propagation, organogenesis and embryo culture while understanding the concept of cellular totipotency

CO5: examine the tools and techniques of genetic engineering and Agrobacterium mediated gene transfer for crop improvement.

UNIT I	Plant Water Relations: Importance of water as a solvent. Imbibition, Diffusion, Osmosis, Osmotic pressure, Turgor pressure, Wall pressure, Water Potential and its components, Mechanism of water absorption & Factors affecting water absorption. Mechanism of Ascent of sap: Vital & Physical force theories.	10 hrs
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	Phloem transport: Transport of organic solutes, Path of transport, Vein loading & unloading, Mass flow hypothesis. Transpiration: Types and process, Mechanism of guard cell movement & K⁺ ion mechanism, antitranspirants. Mineral nutrition: Micro and macronutrients – their importance and deficiency symptoms.	
UNIT II	Photosynthesis: Principle of light absorption, Emerson's enhancement effect, Photosystem I and II, Light reaction – Hill reaction, Photophosphorylation (Cyclic and Non cyclic), Carbon reaction (Calvin cycle, C4 – Pathway, CAM), factors affecting the process. Respiration: Mechanism of aerobic respiration – Glycolysis, TCA cycle, ETS & oxidative phosphorylation. Mechanism of anaerobic respiration (Alcoholic fermentation), Respiratory Quotient & its significance, factors affecting respiration.	12 hrs
UNIT III	Enzymes and Nitrogen metabolism: Classification and mechanism of enzyme action, Nitrogen cycle & Nitrogen fixation. Plant Growth Regulators: Metabolism, physiological effects, mode of action of Auxins, Gibberellins, Cytokinins, Ethylene and ABA. Plant movements: Nastic movements – nyctinasty, chemo nasty and seismonasty. Tropic movements – phototropic, hydrotropic, geotropic and thigmotropic. Photobiology: A brief account of dormancy, photoperiodism, phytochrome and its role, Florigen concept and vernalisation.	10 hrs
UNIT IV	Plant Biotechnology: Scope of Plant tissue Culture, concept of cellular totipotency, Organogenesis & Embryogenesis. Basic aspects of plant tissue culture- Sterilization, Culture media and its preparation. Role of growth hormones in plant tissue culture. Anther culture & protoplast culture. Applications of tissue culture. Recombinant DNA Technology: Steps and tools involved in genetic engineering: vectors : Plasmids (Cloning and Expression vectors) , Restriction enzymes, ligases Construction of Genomic and c-DNA libraries. Electroporation and <i>Agrobacterium</i> mediated gene transfer technique. Transgenic crops: Golden rice, Pest resistant Bt Cotton, Bt Brinjal and GM Mustard, CRY genes. Applications and threats from transgenic plants	13 hrs

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Internal Assessment	Marks
Attendance	5 marks
Assignment/Seminar	5 marks
Two test	10 marks
Total	20 marks

COURSE ARTICULATION MATRIX MAPPING OF POs V/S CO's*

	Programme Outcomes (Plant Physiology and Plant Biotechnology)											
Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	1	1	1	1	1	1	1	1	1
CO2	2	1	3	2	-	-	1	1	2	1	1	1
CO3	2	1	3	1	2	1	2	1	1	1	1	1
CO4	1	2	1	1	1	3	2	2	1	1	1	1
CO5	1	2	2	1	1	3	-	1	-	1	1	1

*Low correlate -1 ; Moderate correlate – 2 : High (Substantial) correlate-3

BOTP - 602: PLANT PHYSIOLOGY AND PLANT BIOTECHNOLOGY (Practical)

Practical – VI: BOTP-602	Plant Physiology and Plant Biotechnology
Teaching Hours: 4 hours/week	Credits: 2
Duration of Exam: 3 hours	Maximum Marks: 50 (Exam 40 + IA 10)

	List of experiments	
1	Evolution of oxygen during photosynthesis	1 Unit
2	Separation of Chlorophyll pigments by Paper chromatography	1 Unit
3	Evolution of CO ₂ , heat during Respiration and Kuhn's fermentation	1 Unit
4	Study of Phototropism, Geotropism and Hydrotropism	1 Unit
5	Biochemical tests for Reducing sugars, amino acids ,Protein and Starch	1 Unit
6	Preparation of MS media	1 Unit
7	Explant preparation and inoculation	1 Unit
8	Preparation of synthetic seeds	1 Unit
9	Extraction of Genomic DNA from cauliflower/spinach leaves	1 Unit

10	Plant Biotechnology spotters – Anther culture, Protoplast culture, Steps in Recombinant DNA technology, Construction of c-DNA & genomic libraries	1 Unit
Industrial visit and sub mission of report is compulsory		

Internal Assessment	Marks
Attendance/continuous assessment	5 marks
Test	5 marks
Total	10 marks

BOTP – 602: Plant Physiology and Plant Biotechnology

Practical Question Paper

Time: 3 hours

Max. Marks: 40

1. Separate the photosynthetic pigments from sample “A” by paper chromatography and measure the RF values 10
2. Perform the ‘ Biochemical test for sample B and C 3 x 2 =6
3. Comment on experiment setup “D” and “E” 4 ×2 =8
4. Identification of photographs / spotters “F” 3 × 1 = 3
5. Prepare synthetic seed from given material “G” 5x1=5
6. Record and Industrial visit report 8

Scheme of Evaluation

1. Experiment A (Requirements - 2 marks, Procedure - 2 marks, Setting/conducting - 3 marks, Calculation & Results - 3 marks).
2. Perform the Biochemical test B & C (Positive test 1 mark & Negative test 2 marks)

3. Experiment D & E (Identification - 1 mark, Requirements - 1 mark, Procedure - 2 marks & Results - 1 mark)
4. Photograph/Spotters F, G, H: Identification - 1 mark, Diagram - 1 mark & comment - 1 mark
5. Principle -1 procedure -2 result-1
6. Submission of class record - 5 marks

BOTT – 603: PLANT PROPAGATION, BREEDING AND SEED TECHNOLOGY

Programme Name	B.Sc./ BOTANY	Semester	VI
Subject	BOTANY		
Course title	PLANT PROPAGATION , BREEDING AND SEED TECHNOLOGY		
Course code	BOTT- 603	No. of credits	3
Contact hours	45 hours	Duration of examination	3 hours
Formative assessment marks	20	Summative assessment marks	80

Course Outcomes:

Upon completion of this course, students will be able to:

- CO1:** Understand various plant propagation methods, including specialised techniques like budding, grafting, layering and manage propagation structures.
- CO2:** Understand and analyse the plant breeding methods, genetic basis of plant breeding including mechanisms like sterility and incompatibility.
- CO3:** Apply principles of heterosis and mutation breeding to develop improved crop varieties with higher yield ,resistance ,and better nutritional quality
- CO4:** Evaluate seed quality through standardised methods and understand the regulatory framework for seed certification and processing.
- CO5:** Design seed quality, health, and certification standards

UNIT I	Plant propagation: Introduction to plant propagation, techniques and propagation environment, methods and techniques of cutting, layering, grafting and budding. Advanced techniques : micro propagation , Role of growth regulators in propagation. Green house techniques : Glass house, poly house and shaded net house Nursery techniques: structures including mist chamber, humidifiers.	15 hrs
UNIT II	Plant Breeding : History, objective and methods of plant breeding Hybridization (Intergeneric and Interspecific), selection and mutation breeding Maintenance of germplasm, pollen banks and quarantine methods Crop improvement and breeding: Role of mutations in crop improvement. Applications and limitations of plant breeding, Polyploidy Distant hybridization and role of biotechnology on crop improvement. Heterosis and Hybrid vigour.	15 hrs
UNIT III	Seed technology: Introduction to seed science and technology and its roles. International seed science and technology organisations. General principles of seed production in self and cross pollinated crops. Seed processing: Harvesting, seed drying, cleaning and grading. Seed storage and factors affecting seed storage. Seed deterioration and seed treatment. Seed quality testing: devices and tools used in seed testing. ISTA and its role in seed testing, Seed sampling: physical purity and heterogeneity test. Viability and vigour testing Seed certification: seed certification purpose and procedure State and National seed corporation agencies in seed production and supply of quality Seeds.	15 hrs

References:

1. Agarawal, P. K. 2005. Principles of Seed Technology. 2nd edn. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Basra, A. S. 2006. Handbook of Seed Science and Technology, The Haworth Press, USA.
3. Bijendra Kumar Singh Nidhika Thakur Om Prakash Anand Singh ,2024. Plant Propagation and Nursery Management . Banda University of Agriculture and Technology Banda, Uttar Pradesh

4. Chahal, G. S. & Gosal, S. S. (2002). *Principles and procedures of plant breeding*. Alpha Science International Ltd.
5. Copeland, L. O. and McDonald, M. B. 2001. *Principles of Seed Science and Technology*. 4th edn. Chapman & Hall.
6. Hartmann, H.T. & Kester, D.E. 2017. *Plant Propagation – Principles and Practices*. 9th Edition Prentice Hall of India.
7. Malavika Dadlani and Devendra K. Yadava, 2023. *Seed Science and Technology: Biology, Production, Quality* springer
8. Sadhu, M.K. 2024. *Plant propagation*, New Age International.
9. Shabir H Wani and Malik, C. P. . (2021). *New plant breeding techniques*. Avishkar Publishers.
10. Singh, B. D. (2019). *Plant breeding: Principles and methods* (11th ed.). Kalyani Publishers.

Internal Assessment	Marks
Attendance	5 marks
Assignment/Seminar	5 marks
Two test	10 marks
Total	20 marks

COURSE ARTICULATION MATRIX MAPPING OF POs V/S CO's*

	Programme Outcomes (Plant breeding)											
Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	-	-	1	2	2	1	1	-	-
CO2	1	2	3	2	-	2	-	2	-	1	-	-
CO3	-	-	3	2	2	3	-	-	-	1	2	2
CO4	1	-	-	-	-	2	2	-	-	3	1	2
CO5	-	-	-	-	2	2	2	-	-	2	3	2

***Low correlate -1; Moderate correlate – 2: High (Substantial) correlate-3**

VI SEMESTER- DISCIPLINE SPECIFIC SKILL BASED PRACTICALS

BOTSK-604: PHYTOTECHNOLOGY

(Practical / Skill)

Skill-VI : BOTSK – 604	PHYTOTECHNOLOGY
Teaching Hours: 4 hours/week	Credits: 2
Duration of Exam: 3 hours	Maximum Marks: 50 (Exam 40 + IA 10)

Course Outcomes:

Upon completion of this course, students will be able to:

- CO1.** Develop Skills in Nursery Setup and Management
- CO2.** Learn Seed and Propagative Techniques
- CO3.** Identify and Control Plant Pests and Diseases of outdoor and indoor plants
- CO4.** Demonstrate Modern Gardening and Landscaping Concepts
- CO5.** Produce Organic Inputs, cultivate and Process Specialized Crops (Spirulina) and Microgreens.

LIST OF EXPERIMENTS

Sl. No.	Experiments
1	Preparation of different potting mixtures and soil sterilization techniques
2	Seed sowing methods (tray, bed and pots), germination, observation, recording
3	Methods of preparation of nursery beds and sowing seeds
4	Demonstration of different composting methods (Aerobic, Anaerobic, Vermicomposting)
5	Preparation of Biofertilizers and its application to plants
6	Study and practice of different propagation methods viz. cutting, grafting and layering
7	Determination of seed germination by paper towel method
8	Seed viability test using TTC method
9	Detection and identification of seed borne fungi
10	Diseases and pest management strategies of Nursery plants

11	Study of vertical gardening, terrarium and terrace gardening, miniature garden.
12	Identification, cultivation and maintenance of indoor and outdoor ornamental plants (2 each)
13	Preparation and application of different herbal pesticides
14	Preparation of culture media and inoculation of spirulina for single cell protein
15	Cultivation of Spirulina in open pond system, harvesting, process and packaging
16	Microgreen production and study of their nutritional value

*** Industrial / Nursery visits to study the above technologies is Compulsory**

References :

1. Aaqib Ayub, sandeep Chopra & Shivanjali Sarswat, Eshanee . 2024. Greens in Miniature: a comprehensive Guide to cultivation, nutrition & innovation.
2. ACAR 2013.Handbook of Horticulture ,Indian Council of Agricultural Research ,New Delhi.
3. Agarwak.P.K.2005. Principles of seed Technology 2nd edition. Oxford and IBH Publishing Co.Pvt.Ltd.New Delhi
4. Agarwal.R.C . Seed Technology A Practical Hand Book on seed quality testing.
5. Ahmed Mohammed Mursalin .2025 . The complete Spirulina Guide: nutrition, Cultivation, reccipes & Busiiness oppurtunities
6. De.P.C. 2015 (Revised Edition). *Plant Propagation and Nursery Management*. Useful for understanding both propagation techniques and nursery practices.
7. Dodia.D.A , I. S. Patel & G. M. Patel.,2010. Botanical Pesticides for pest management. Scientific publishers
8. Ekta Chaudhary . 2022 Garden Up – Your one-shop guide to growing plants at home. Penguin publisher.
9. Essentials of plant Nursery management, 2nd Edition. P. K. Ray.2020. Scientific Publishers.
10. International Seed testing association (ISTA) Hand books. 2004.

11. Nigel Carlson. 2020. Microgreens: The Practical Guide to Grow Microgreens Indoors and Outdoors for Fun or Business.USA.
12. Pradeep kumar Bairawa, Sachin kihor, Mala Rathore & Subhash verma., 2025. Plant Propagation & Nursery management . The Pustakaya publishers.
13. Prince Mahore., Dr. Dwarka., Dr. Sakshi Saxena & Dr. Shivani Suman.2024 practical Manual on Biopesticides & Biofertilizes. Crop Protection by Botanical Pesticides.
14. Ratha Krishnan Rajwant K. Kalia J.C. Tewari M.M. Roy . 2014 Plant Nursery management: Principles and Practices. Central Arid Zone Research Institute. Jodhpur – 342 003 (Raj.) INDIA .
15. Ron kemprai & dr. Ajith kumar Tamali . 2023.A complete practical manual of plant breeding. ARB Publications.
16. Ruth Padua ,2025. Vertical Gardens Unveiled- The ultimate guide to growing Upwards.
17. Shweta Sharma, Satish Kumar. 2026 Microgreen production, processing & utilization. Springer publications.
18. Subbarao. N.S 2020. SOIL MICROBIOLOGY 5TH EDITION, Medtech Publications.
19. Sueko katsuji., Kazuto kihara, Motoko Suzuki., Yuya Ohyama . 2021 . A Beginner's Guide to terrarium Gardening: succulents, air plants , cacti, Moss 7 more. Turttle publishing house.

COURSE ARTICULATI ON MATRIX MAPPING OF POs V/S CO's*

	Programme Outcomes (Phytotechnology)											
Course outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	-	-	2	2	3	-	2	3	2	1
CO2	2	3	3	1	-	2	2	3	1	1	-	-
CO3	2	2	2	-	3	2	3	-	2	2	-	1
CO4	3	3	2	2	2	1	2	-	1	2	1	-
CO5	2	3	-	3	3	3	2	2	3	2	2	1

***Low correlate -1; Moderate correlate – 2: High (Substantial) correlate-3**

Practical Question Paper
BOTSK-604 : PHYTOTECHNOLOGY

Max Marks- 40

- | | |
|---|-------|
| 1. Perform the experiment “A” | 5x1=5 |
| 2. Perform experiment “B” | 5x1=5 |
| 3. Identify the given ornamental plant and comment on their propagation methods | 3x3=6 |
| 4. Conduct seed viability test for the given seed sample | 5x1=5 |
| 5. Identify the given seed borne fungi with its diagnostic features | 5x1=5 |
| 6. Identify and comment on given spotters/Photographs | 2x2=4 |
| 7. Submission of Record and report on visit to Nurseries | 10 |

Internal Assessment	Marks
Attendance/continuous assessment	5 marks
Test	5 marks
Total	10 marks

Scheme of evaluation

1. Nursery bed preparation and conducting experiment and procedure writing 3M
Potting mixture preparation (2M)
2. Cutting/layering/grafting/gootee Demonstration (3M) and procedure writing (2M)
3. Identification (1M) Comment (2M)
4. Conducting the experiment (2M) , procedure (2M) , Result (1M)
5. Identification (1M) , Diagram (1M) , Diagnostic feature (3M)
6. Identification (1M) , Comment (1M)
7. Record submission (5M) and Report submission (5M)

Pedagogy:

Teaching Strategies: Use of Digital tools and platforms for teaching, Lecture method ,Experimental method , learning and research/ dissertation analysis. group discussions, Interactive Lectures, quiz, group work, Field –oriented studies, Study trip and debates, hands on training. Continuous Assessment and Evaluation: Formative and Summative Assessments, Feedback and oral examinations