



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 5
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Vascular Plants (Pteridophytes, Gymnosperms and Taxonomy of Angiosperms)

I. Learning Objectives: By the end of this course the learner has:

1. To recognize the morphology, anatomy and reproduction in two groups of archegoniates.
2. To acquire knowledge of the taxonomic aids and classification systems.
3. To read the vegetative and floral characteristics of some forms of angiospermic families along with their economic value.
4. To study the significance of other branches of botany in relation to plant taxonomy.

II. Learning Outcomes: On completion of this course students will be able to:

1. Infer the evolution of vasculature, heterospory and seed habit in Pteridophytes.
2. Illustrate the general characteristics of Gymnosperms along with their uses
3. Discuss about some Taxonomic aids and their applications in plant systematics.
4. Compare and contrast the vegetative and floral characteristics of some angiospermic families
5. Evaluate the economic value of plant species from the families under the study.
6. Defend the utility of evidences from different branches of botany in solving the taxonomic lineages of some species.

Syllabus of theory

Unit-1: Pteridophytes

1. General characteristics of Pteridophyta; Smith (1955) classification.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of: (a) Lycopsidea: Lycopodium and (b) Filicopsida: Marsilea
3. Stelar evolution in Pteridophytes; Heterospory and seed habit.
4. Ecological and economic importance of Pteridophytes.

Unit-2: Gymnosperms

1. General characteristics of Gymnosperms; Sporne (1965) classification.
2. Occurrence, morphology, anatomy, reproduction (developmental details are not needed) and life history of:(a) Cycadopsida: Cycas and (b) Gnetopsida: Gnetum
3. Ecological and economic importance of Gymnosperms.

Unit-3: Principles of Plant Taxonomy

1. Aim and scope of taxonomy, species concept, taxonomic hierarchy-major and 4 minor categories.
2. Plant nomenclature: Binomial system, ICBN- rules for nomenclature.
3. Herbarium and its techniques, BSI herbarium and Kew herbarium; concept of digital herbaria.
4. Bentham and Hooker system of classification.
5. Phylogenetic systematics: primitive and advanced, homology and analogy, parallelism and convergence, monophyly, paraphyly, polyphyly, clades. Synapomorphy, symplesiomorphy, apomorphy. APG-IV classification.

Unit-4: Descriptive Plant Taxonomy

Systematic description and economic importance of the following families:

1. Polypetalae: (a) Annonaceae (b) Curcubitaceae
2. Gamopetalae: (a) Asteraceae (b) Asclepiadaceae
3. Monochlamydae: (a) Amaranthaceae (b) Euphorbiaceae
4. Monocotyledonae: (a) Arecaceae (b) Poaceae

Unit-5: Evidences for Plant systematics

1. Anatomy and embryology in relation to plant systematics.
2. Cytology and cytogenetics in relation to plant systematics.
3. Phytochemistry in relation to plant systematics.
4. Numerical taxonomy
5. Origin and evolution of angiosperms.

Text Books:

1. Acharya, B.C., (2019) Archchegoniates, Kalyani Publishers, New Delhi
2. Bhattacharya, K., G. Hait&Ghosh, A. K., (2011) A Text Book of Botany, VolumeII, New Central Book Agency Pvt. Ltd., Kolkata
3. Hait,G., K.Bhattacharya&A.K.Ghosh (2011) A Text Book of Botany, Volume-I, New Central Book Agency Pvt. Ltd., Kolkata
4. Pandey, B.P. (2013) College Botany, Volumes-I&II, S. Chand Publishing, New Delhi .

Reference Books:

1. Smith, G.M. (1971) CryptogamicBotanyVol. II., Tata McGraw Hill, New Delhi
2. Sharma,O.P.(2012) Pteridophyta. Tata McGraw-Hill, New Delhi
3. Sporne, K.R. (1971) The Morphology of Gymnosperms. Hutchinsons Co.Ltd., London
4. Coulter, J.M. & C.J.Chamberlain(1910) Morphology of Gymnosperms, The University of Chicago Press, Chicago, Illinois
5. Bhatnagar, S.P. &AlokMoitra (1996) Gymnosperms. New Age International, NewDelhi
6. Sambamurty, A.V.S.S. (2005) Taxonomy of Angiosperms I. K .International Pvt. Ltd., New Delhi
7. Singh, G. (2012). Plant Systematics: Theory and Practice.Oxford& IBH Pvt.Ltd., NewDelhi.
8. Simpson, M.G. (2006). Plant Systematics. Elsevier Academic Press, San Diego, CA,U.S.A.



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II B.Sc (Hon's) Botany Major - Semester – III, Course – 5
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Vascular Plants (Pteridophytes, Gymnosperms and Taxonomy of Angiosperms)
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Distinguish the Pteridophytes and Gymnosperms based on their morphological, anatomical and reproductive structures.
2. Make systematic classification of plant species using vegetative and floral characters.
3. Identify angiosperm plant species and make herbarium specimens.

Laboratory/field exercises:

I. Study/ microscopic observation of vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/specimens/ mounts:

1. Pteridophyta: Lycopodium and Marselia
2. Gymnosperms: Cycas and Gnetum

II. Technical description of locally available plant species from the following angiosperm families:

1. Annonaceae 2. Cucurbitaceae 3. Asteraceae 4. Asclepiadaceae
5. Amaranthaceae 6. Euphorbiaceae 7. Arecaceae 8. Poaceae

III. Demonstration of herbarium techniques.

IV. Field trip to a local floristic area/forest (Submission of 30 number of Herbarium sheets of wild plants with the standard system are mandatory).



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Vascular Plants (Pteridophytes, Gymnosperms and Taxonomy of Angiosperms)

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



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Vascular Plants (Pteridophytes, Gymnosperms and Taxonomy of Angiosperms)
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Marsilea Sporocarp
2. L.S of Lycopodium cone
3. Economic importance of Gymnosperms
4. Cycas Coralloid Root T.S.
5. Binomial nomenclature
6. Matter related to BSI, Kew and Digital Herbarium
7. Economic importance of Poaceae
8. Advantages and disadvantages of Numerical Taxonomy

Answer any FIVE questions , each question carries EIGHT marks. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. Describe the internal structure of Marsilea Rhizome.
10. Explain the Steelar evolution in Pteridophyta.
11. Give an illustrated account of male and female strobili in Gnetum.
12. Explain Cycas stem T.S
13. Write an essay on International Code of Botanical Nomenclature.

SECTION – III

14. Give an account on Bentham and Hooker's system of classification. Discuss its Merits and Demerits.
15. Describe the vegetative and floral characters of Annonaceae and add a note on economic importance.
16. Give the general characters and economic importance of Amaranthaceae.
17. Explain taxonomy in relation to Anatomy.
18. Explain cytology in relation to Cytology.



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Vascular Plants (Pteridophytes, Gymnosperms and Taxonomy of Angiosperms)
Practical Model Paper

Time: 3Hrs

Max. Marks: 50M

1. Take T.S. of the material 'A' (Pteridophyta) make a temporary slide and justify the identification with apt points. 10M
2. Take T.S. of the material 'B' (Gymnosperms), make a temporary slide and justify the identification with apt points. 10M
3. Describe the vegetative and floral characters of the material 'C' (Taxonomy and Angiosperms) and derive its systematic position 10M
4. Identify the specimen 'D' (Fossil Gymnosperm) and give specific reasons 4M
5. Herbarium 4M
6. Record + filed + Viva – voice 5 + 4 + 3M = 12M

Total = 50M



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 6
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Pathology and Plant Diseases

I. Learning Objectives: By the end of this course the learner has:

1. To study various plant pathogens, their survival and dispersal mechanisms.
2. To understand the processes involved in infection and pathogenesis in plants.
3. To study the common diseases of some important field and horticultural crops.

II. Learning Outcomes:

1. Identify major groups of plant pathogens and classify plant diseases.
2. Explain various stages in infection, plant pathogenesis and responsible factors.
3. Elaborate the preventive and control measures for plant diseases.
4. Discuss about some diseases of field crops and their management.
5. Discuss about some diseases of horticultural crops and their management.

Syllabus of theory

Unit-1: Plant pathogens, survival and dispersal

1. Plant pathology: definition, importance of plant diseases, important famines in world; scope and objectives of plant pathology.
2. Important plant pathogenic organisms with examples of diseases caused by them.
3. Classification of plant diseases based on important criteria.
4. A brief account on survival of plant pathogens.
5. Dispersal of plant pathogens – active and passive processes.

Unit-2: Infection and pathogenesis in plants

1. Infection process – pre-penetration, penetration and post-penetration.
2. Role of enzymes in plant pathogenesis.
3. Role of toxins in plant pathogenesis.
4. Role of growth regulators in plant pathogenesis.
5. Defense mechanisms in plants against pathogens.

Unit-3: Plant disease management

1. Plant disease epidemiology; plant disease forecasting; remote sensing in plant pathology.
2. General principles of plant diseases management.
3. Regulatory methods, cultural methods; biological control and PGPR.
4. Physical methods, chemical methods; host plant resistance.
5. Integrated plant disease management (IDM) – Concept, advantages and importance.

Unit-4: Diseases of field crops

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- a) Rice: Blast of rice, bacterial blight and Tungro
- b) Bajra: Downy mildew and Ergot
- c) Pigeon-pea: Phytophthora blight, wilt and sterility mosaic
- d) Groundnut: Tikka leaf spot, rust and root rot

Unit-5: Diseases of horticultural crops

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- a) Brinjal: Phomopsis blight and Little leaf
- b) Okra: Powdery mildew and Yellow vein mosaic
- c) Pomegranate: Alternaria fruit spot and Anthracnose
- d) Coconut: Bud rot and Basal stem rot

Text Books:

1. P.D. Sharma (2011) Fundamentals of Plant Pathology, Tata McGraw-Hill Education, New Delhi
2. R.S. Singh and U.S. Singh (2017) Plant Pathology: An Introduction, CRC Press, Boca Raton, Florida, USA
3. R.S. Mehrotra (2008) Plant Pathology, Tata McGraw-Hill Education, New Delhi
4. M. S. Reddy and Gopal Singh (2016) Plant Pathology: Concepts and Laboratory Exercises, Scientific Publishers, Jodhpur, Indi

Reference Books:

1. Agrios, G. N. (2005). Plant Pathology (5th ed.). Academic Press, San Diego, California.
2. Dehne, H. W. (Ed.). (2012). Plant Pathology: From Molecular Biology to Biological Control. Springer, Dordrecht, Netherlands.
3. Dicklow, M. B., & Beaudry, R. M. (Eds.). (2013). Plant Pathology Concepts and Laboratory Exercises (2nd ed.). CRC Press, Boca Raton, Florida.
4. Lucas, J. A. (1998). Plant Pathology and Plant Pathogens. Blackwell Science, Oxford, UK.
5. Lucas, J. A. (1998). Plant pathology and plant pathogens. Blackwell Science, Oxford, UK.
6. Schumann, G. L., & D'Arcy, C. J. (2010). Essential Plant Pathology (2nd ed.). APS Press, St. Paul, Minnesota.
7. Schumann, G. L., and C. D'Arcy (2010). Essential plant pathology. APS Press, St. Paul, MN.
8. Singh, R. P., and U. S. Singh (2020). Plant diseases: Identification, management and challenges. Springer, Singapore.



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II B.Sc (Hon's) Botany Major - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Handle equipment and instruments in plant pathology laboratory.
2. Isolate plant pathogenic microbes.
2. Identify the plant diseases based of histopathological observations.

Laboratory/field exercises:

1. Familiarity with general plant pathological laboratory and field equipment.
2. Isolation and Identification of plant pathogenic fungi.
3. Isolation and Identification of plant pathogenic bacteria.
4. Identification of phanerogamic plant parasites.
5. Isolation and Identification of plant pathogenic nematodes.
6. Demonstration of Koch's postulates
7. Identification and histopathological studies of selected diseases of field crops.
8. Identification and histopathological studies of selected diseases of horticultural crops.



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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 6
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 6
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Write a short note on scope of Plant Pathology.
2. Write quick notes on Coffee rust.
3. Write short notes on enzymes for Cutins.
4. Explain effects of human cultural practices on development of Epidemics.
5. Write short notes on Quarantine.
6. Write a short notes on Tungro disease Transmission and Management.
7. Write a short notes on Phytophthora blight or stem blight of Pigeonpea.
8. Write a short notes on Epidemiology and management of Okra powdery mildew.

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. What is meant by Pathogen? Write down the most important plant pathogenic organisms along with examples of diseases caused by them.
10. What is Dispersal? Explain dispersal of plant pathogens through active process.
11. What is Infection process? Explain role of different factors for the success of infection process.
12. What are Biochemical defense mechanisms? Describe pre – existing chemical defenses.
13. Discuss in detail about general principles of Plant diseases management.

SECTION – III

14. Write an essay on concept of Integrated Disease Management (IDM).
15. Describe Bacterial blight of rice.
16. Write a detail note on Sterility Mosaic Disease of Pigeonapea.
17. Explain etiology, symptoms, epidemiology, mode of spread and management strategies of yellow vein mosaic disease in Okral ladies finger / bhendi (*Abelmoschus esculentus*).
18. Explain etiology, symptoms, epidemiology, mode of spread and management strategies of coconut basal stem root / Thanjavur wilt / Bole rot disease (*Cocos nuifera* L).



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Plant Pathology and Plant Diseases
Practical Model Paper

Time: 3Hrs

Max. Marks: 50

- | | |
|---|-------------|
| 1. Identify and comment on Plant Pathogenic Fungi | 2 x 5 = 10M |
| 2. Identify and comment on Plant Pathogenic Bacteria | 2 x 5 = 10M |
| 3. Identify and comment on Phanerogamic Plant Parasites | 2 x 5 = 10M |
| 4. Identify and comment on Plant Pathogenic nematode | 1 x 5 = 5M |
| 5. Identification and histopathological studies of selected diseases of field crops | 1 x 5 = 5M |
| 6. Identification and histopathological studies of selected diseases of horticultural crops | 1 x 5 = 5M |
| 7. Record + Viva – voice | 5 M |

Total = 50M



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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 7
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Plant Breeding

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Distinguish self and cross-pollinated plant species based on floral biology.
2. Perform skills related to self and cross pollination in plants.
3. Make hybridization to produce new varieties.

II. Laboratory/field exercises:

1. Floral biology in a self and a cross pollinated plant species.
2. Identification and classification of plants based on pollination mechanism.
3. Pollen viability test.
4. Observation on pollen germination.
5. Practicing emasculation technique.
6. Practicing selfing and crossing techniques.
7. Assessment of genetic variability.
8. Estimation of heterosis and inbreeding depression.
9. Studying mutant and polyploids in crop plants.

Syllabus of theory

Unit-1: Basic concepts of plant breeding

1. Definition, aim, objectives and scope of plant breeding; concepts in plant breeding: genetic variation, heritability, and selection.
2. Advantages and disadvantages of asexual and sexual reproduction; apomixis: definition, types and significance.
3. A brief account of self and cross-pollination, their genetic consequences and significance; classification of crop plants based on mode of pollination and mode of reproduction.

Unit-2: Contrivances for cross pollination

1. Self-incompatibility in plants – Definition, heteromorphic and homomorphic systems; exploitation of self-incompatibility in hybrid production.
2. Male sterility- Genetic, cytoplasmic and cytoplasmic-genetic, utilization in plant breeding.
3. Domestication of plants, centres of origin of crop plants.

Unit-3: Breeding methods in plants 9 Hrs.

1. Plant introduction – types, objectives, plant introduction agencies in India, procedure, merits and demerits; germplasm collections, genetic erosion, gene sanctuaries.
2. Selection – natural and artificial selection – basic principles of selection.
3. Self-pollinated crops: pure line selection method – procedure, advantages and disadvantages, achievements.
4. Vegetatively propagated crops: Clonal selection - procedure, advantages and disadvantages, achievements.

Unit-4: Breeding methods in cross-pollinated plants

1. Hybridization – objectives, types, procedure, advantages and disadvantages, achievements.
2. Cross-pollinated crops: back cross method - procedure, advantages and disadvantages, achievements.
3. Heterosis: definition, genetic bases of heterosis – dominance, over dominance and epistasis hypotheses; physiological bases of heterosis – commercial utilization.
4. Synthetics and composites – production procedures – merits, demerits and achievements.

Unit-5: Modern methods in plant breeding

1. Mutation breeding: spontaneous and induced mutations – characteristic features of mutations – procedure of mutation breeding – applications – advantages, limitations and achievements.
2. Polyploidy breeding: auto-polyploids and allopolyploids – applications in crop improvement and limitations.
3. DNA markers and their applications in plant breeding: RFLP, SSR, and SNP
4. Marker Assisted Selection (MAS) and its applications in plant breeding.

Text Books:

1. Singh, B. D. (2001) Plant breeding: Principles and methods. Kalyani Publishers, New Delhi, India.
2. Poehlman, J. M. and Sleper, D. A. (1995) Breeding field crops, 4th ed. Iowa State University Press, Ames, Iowa, USA.
3. Patil, J.V., S.S. Patil, and R.A. Balikai (2019) Principles and Methods in Plant Breeding, Scientific Publishers (India), Jodhpur
4. Purohit, S.S. (2014) Plant Breeding: Principles and Methods, Agrobios (India), Jodhpur

Reference Books:

1. Acquaah, G. 2012. Principles of plant genetics and breeding, 2nd ed. Wiley-Blackwell, Ames, Iowa, USA.
2. Allard, R. W. 1999. Principles of plant breeding. John Wiley & Sons, New York, USA.
3. Stuber, C. W., Edwards, M. D. and Wendel, J. F. 1987. Molecular markers in plant breeding: Applications and potential. Science 238: 1659-1664.
4. Hayes, H. K., R. E. Kirk, and R. H. Jones (1951). Methods for the Statistical Analysis of Plant Breeding Experiments. Iowa State College Press, Ames, IA.
5. Simmonds, N. W. (1979). Principles of Crop Improvement (2nd ed.). Longman, Harlow, UK.



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Plant Breeding
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Distinguish self and cross-pollinated plant species based on floral biology.
2. Perform skills related to self and cross pollination in plants.
3. Make hybridization to produce new varieties.

Laboratory/field exercises:

1. Floral biology in a self and a cross pollinated plant species.
2. Identification and classification of plants based on pollination mechanism.
3. Pollen viability test.
4. Observation on pollen germination.
5. Practicing emasculation technique.
6. Practicing selfing and crossing techniques.
7. Assessment of genetic variability.
8. Estimation of heterosis and inbreeding depression.
9. Studying mutant and polyploids in crop plants.



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Plant Breeding

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Plant Breeding
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Genetic consequences of Self pollination.
2. Concepts of Plant Breeding.
3. What is Self – incompatibility?
4. What is Male – sterility?
5. Germplasm collection.
6. Natural and artificial selection.
7. Emasculation – Methods.
8. Characteristics of Mutation.

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. Explain aim and objectives of Plant Breeding.
10. What is Apomixis? What are it types ? Write the advantages of Apomixis.
11. Describe SI in Hybrid Breeding.
12. What is Cytoplasmic – Genetic Male Sterility?
13. Write about the procedure, merits and demerits of Plant introduction.

SECTION – III

14. Vegetativity propagated crops : Clonal selection – procedure, advantages and disadvantages, achievements.
15. Write about the types of Hybridization.
16. Explain cross – pollinated crops : back cross method procedure, advantages and disadvantages, achievements.
17. Describe Restriction Fragment Length Polymorphism (RFLP).
18. Explain polyploidy breeding : Autopolids and allopolyploids applications in crop improvement.



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Plant Breeding
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

1. Write aim, principle, procedure and requirements of Pollen viability test (Major) ‘A’
15M
2. Aim, Principle, Procedure on Emasculation technique 10M
3. ‘B’ Identify the following photograph / chart / slide / specimen 3 x 5 = 15M
C)
D)
E)
4. Record + Viva - voice 7 + 3 = 10M

Total Marks = 50M



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Biotechnology

I. Learning Objectives: By the end of this course the learner has:

1. To acquire knowledge of sterilization techniques used in plant tissue culture.
2. To learn about various types of plant tissue culture practices.
3. To know the applications of plant biotechnology in production of novel plants.

II. Learning Outcomes: Students at the successful completion of the course will be able to:

1. Explain the scientific techniques and tools used in plant tissue culture laboratories.
2. Appraise the applications of plant tissue culture in agriculture and horticulture sectors.
3. Acquire skills related to various aspects in plant tissue culture.
4. Evaluate the role of transgenic plants in solving certain plant related beneficiary issues.
5. Justify the role of plant biotechnology in bioenergy and phytoremediation.
6. Judge the biosafety and bioethics related to plant biotechnology

Syllabus of theory

UNIT-1: Basic techniques in plant tissue culture

1. Plant tissue culture: Definition, scope and significance; infrastructure and equipment required to establish a tissue culture laboratory.
2. Sterilization techniques; formulation of media for plant tissue culture.
3. Concept of totipotency, initiation and maintenance of callus cultures; induction of morphogenesis in vitro.
4. Somatic embryogenesis and organogenesis; factors affecting somatic embryogenesis and organogenesis synthetic seeds and their applications.

UNIT-2: Organ and haploid culture techniques

1. Importance and applications of meristem culture, zygotic embryo culture, endosperm culture.
2. Micropropagation and its uses, commercial exploitation of micropropagation.
3. Production of haploids using anther, pollen and unfertilized ovule cultures – characterization and applications.

UNIT-3: Cell and protoplast cultures 12 Hrs.

1. Cell suspensions – continuous and batch cultures; mass cultivation of plant cells using bioreactors.
2. Production of secondary metabolites from cell cultures, strategies used for enhanced production of secondary metabolites. Biotransformation using plant cell cultures.
3. Isolation, purification and culture of protoplasts; methods used for protoplast fusion.
4. Somatic hybridization/cybridization –selection systems for somatic hybrids/cybrids, their characterization and applications.

UNIT-4: Transgenic plants 8 Hrs.

1. Transgenic plants – definition, biosafety and ethical issues associated with transgenic plants.
2. Herbicide resistance (glyphosphate), insect resistance (alpha amylase inhibitor).
3. Virus resistance (coat protein mediated, nucleocapsid gene), disease resistance (antifungal proteins, PR proteins).
4. Quality improvement (Golden rice), Shelf-life enhancement (Flavr savr tomato).

UNIT-5: Advances in plant biotechnology

1. Plant synthetic biology and its applications; plant-based vaccines and therapeutics.
2. Biofortification and genetically modified foods.
3. Biodegradable plastics, polyhydroxybutyrate.
4. Applications of plant biotechnology in bioenergy production and environmental remediation.

Text Books:

1. Ignacimuthu, S., (2003) Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Kalyan Kumar De., (1997) Plant Tissue Culture – New Central Book Agency (P) \ Ltd., Calcutta.
3. Mascarenhas A.F., (1991) Hand book of Plant Tissue Culture. Indian Council of Agricultural Research. New Delhi.
4. Narayanaswamy, S (1994) Plant Cell and Tissue Culture, Tata –Mc Graw Hill Publishing Co., Ltd., New Delhi.

Reference Books:

1. C. Neal Stewart Jr. (2018) Plant Biotechnology and Genetics: Principles, Techniques, and Applications John Wiley & Sons, Inc. in Hoboken, New Jersey, USA.
2. Adrian Slater, Nigel W. Scott, and Mark R. Fowler (2008) Plant Biotechnology: The Genetic Manipulation of Plants Oxford University Press in Oxford, UK.
3. S. Mohan Jain and Pramod K. Gupta (2010) Plant Biotechnology: Methods and Applications CRC Press, Taylor & Francis Group in Boca Raton, Florida, USA.
4. Ram Lakhan Singh (2017) Plant Biotechnology: Recent Advances and Future Prospects Springer International Publishing AG in Cham, Switzerland.
5. Altman and P.M. Hasegawa (2013) Plant Biotechnology and Agriculture: Prospects for the 21st Century Elsevier Inc. in Amsterdam, Netherlands.



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Biotechnology
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Operate all the equipment and instruments in a plant tissue culture laboratory.
2. Establish callus and organ culture.
3. Obtain quality plants using micro-propagation techniques.

Laboratory/field exercises:

1. Equipment used in plant tissue culture.
2. Sterilization techniques in plant tissue culture laboratory.
3. Preparation of culture media
4. Callus induction and subculturing.
5. Organogenesis using PGRs'
6. Demonstration of cell and protoplast culture.
7. Demonstration of organ cultures.
8. Demonstration of anther and pollen cultures.



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Biotechnology

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Biotechnology
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Totipotency
2. Factors influencing somatic Embryogenesis.
3. Application of Invitro ovule culture.
4. Advantages and disadvantages of Micropropagation.
5. Determination of growth of cells in suspension culture.
6. Protoplast culture method.
7. Golden rice
8. Applications of Poly Hydroxyl Butyrate (PHB)

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. Explain the equipments required to establish a tissue culture laboratory.
10. What are Synthetic Seeds? Explain types of Synthetic Seeds. Write its advantages and disadvantages.
11. Explain Micro propagation and various types of Micro propagation.
12. Write an essay on Pollen culture (or) androgenic haploid production.
13. Describe the mass cultivation of plant cells using bioreactors.

SECTION – III

14. Describe various aspects of Somatic hybridization.
15. Give an account of introduction to insect resistance alpha anylase inhibitor.
16. Describe biosafety and ethical issues associated with transgenic plants.
17. Give an account of Biodegradable plastics.
18. Write an essay on Plant based vaccines.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – III, Course – 8
For 2023 – 2026 batch (w.e.f. 2024 – 2025)
Plant Biotechnology
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

- | | |
|---|-------------|
| 1. Write Aim, Principle and procedure of 'A'(Major) | 15M |
| 2. Write Aim, Principle and procedure of experiment 'B' (Minor) | 10M |
| 3. Identify the following photograph / slides / specimens | 3 x 5 = 15M |
| C) | |
| D) | |
| E) | |
| 4. Record + Viva - voice | 7 + 3 = 10M |

Total Marks = 50M



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 6
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Pathology and Plant Diseases

I. Learning Objectives: By the end of this course the learner has:

1. To study various plant pathogens, their survival and dispersal mechanisms.
2. To understand the processes involved in infection and pathogenesis in plants.
3. To study the common diseases of some important field and horticultural crops.

II. Learning Outcomes:

1. Identify major groups of plant pathogens and classify plant diseases.
2. Explain various stages in infection, plant pathogenesis and responsible factors.
3. Elaborate the preventive and control measures for plant diseases.
4. Discuss about some diseases of field crops and their management.
5. Discuss about some diseases of horticultural crops and their management.

Syllabus of theory

Unit-1: Plant pathogens, survival and dispersal

1. Plant pathology: definition, importance of plant diseases, important famines in world; scope and objectives of plant pathology.
2. Important plant pathogenic organisms with examples of diseases caused by them.
3. Classification of plant diseases based on important criteria.
4. A brief account on survival of plant pathogens.
5. Dispersal of plant pathogens – active and passive processes.

Unit-2: Infection and pathogenesis in plants

1. Infection process – pre-penetration, penetration and post-penetration.
2. Role of enzymes in plant pathogenesis.
3. Role of toxins in plant pathogenesis.
4. Role of growth regulators in plant pathogenesis.
5. Defense mechanisms in plants against pathogens.

Unit-3: Plant disease management

1. Plant disease epidemiology; plant disease forecasting; remote sensing in plant pathology.
2. General principles of plant diseases management.
3. Regulatory methods, cultural methods; biological control and PGPR.
4. Physical methods, chemical methods; host plant resistance.
5. Integrated plant disease management (IDM) – Concept, advantages and importance.

Unit-4: Diseases of field crops

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- a) Rice: Blast of rice, bacterial blight and Tungro
- b) Bajra: Downy mildew and Ergot
- c) Pigeon-pea: Phytophthora blight, wilt and sterility mosaic
- d) Groundnut: Tikka leaf spot, rust and root rot

Unit-5: Diseases of horticultural crops

Symptoms, etiology, disease cycle and management of major diseases of following crops:

- a) Brinjal: Phomopsis blight and Little leaf
- b) Okra: Powdery mildew and Yellow vein mosaic
- c) Pomegranate: Alternaria fruit spot and Anthracnose
- d) Coconut: Bud rot and Basal stem rot

Text Books:

1. P.D. Sharma (2011) Fundamentals of Plant Pathology, Tata McGraw-Hill Education, New Delhi
2. R.S. Singh and U.S. Singh (2017) Plant Pathology: An Introduction, CRC Press, Boca Raton, Florida, USA
3. R.S. Mehrotra (2008) Plant Pathology, Tata McGraw-Hill Education, New Delhi
4. M. S. Reddy and Gopal Singh (2016) Plant Pathology: Concepts and Laboratory Exercises, Scientific Publishers, Jodhpur, Indi

Reference Books:

1. Agrios, G. N. (2005). Plant Pathology (5th ed.). Academic Press, San Diego, California.
2. Dehne, H. W. (Ed.). (2012). Plant Pathology: From Molecular Biology to Biological Control. Springer, Dordrecht, Netherlands.
3. Dicklow, M. B., & Beaudry, R. M. (Eds.). (2013). Plant Pathology Concepts and Laboratory Exercises (2nd ed.). CRC Press, Boca Raton, Florida.
4. Lucas, J. A. (1998). Plant Pathology and Plant Pathogens. Blackwell Science, Oxford, UK.
5. Lucas, J. A. (1998). Plant pathology and plant pathogens. Blackwell Science, Oxford, UK.
6. Schumann, G. L., & D'Arcy, C. J. (2010). Essential Plant Pathology (2nd ed.). APS Press, St. Paul, Minnesota.
7. Schumann, G. L., and C. D'Arcy (2010). Essential plant pathology. APS Press, St. Paul, MN.
8. Singh, R. P., and U. S. Singh (2020). Plant diseases: Identification, management and challenges. Springer, Singapore.



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II B.Sc (Hon's) Botany Major - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Handle equipment and instruments in plant pathology laboratory.
2. Isolate plant pathogenic microbes.
2. Identify the plant diseases based of histopathological observations.

Laboratory/field exercises:

1. Familiarity with general plant pathological laboratory and field equipment.
2. Isolation and Identification of plant pathogenic fungi.
3. Isolation and Identification of plant pathogenic bacteria.
4. Identification of phanerogamic plant parasites.
5. Isolation and Identification of plant pathogenic nematodes.
6. Demonstration of Koch's postulates
7. Identification and histopathological studies of selected diseases of field crops.
8. Identification and histopathological studies of selected diseases of horticultural crops.



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 6
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 6
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Write a short note on scope of Plant Pathology.
2. Write quick notes on Coffee rust.
3. Write short notes on enzymes for Cutins.
4. Explain effects of human cultural practices on development of Epidemics.
5. Write short notes on Quarantine.
6. Write a short notes on Tungro disease Transmission and Management.
7. Write a short notes on Phytophthora blight or stem blight of Pigeonpea.
8. Write a short notes on Epidemiology and management of Okra powdery mildew.

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. What is meant by Pathogen? Write down the most important plant pathogenic organisms along with examples of diseases caused by them.
10. What is Dispersal? Explain dispersal of plant pathogens through active process.
11. What is Infection process? Explain role of different factors for the success of infection process.
12. What are Biochemical defense mechanisms? Describe pre – existing chemical defenses.
13. Discuss in detail about general principles of Plant diseases management.

SECTION – III

14. Write an essay on concept of Integrated Disease Management (IDM).
15. Describe Bacterial blight of rice.
16. Write a detail note on Sterility Mosaic Disease of Pigeonapea.
17. Explain etiology, symptoms, epidemiology, mode of spread and management strategies of yellow vein mosaic disease in Okral ladies finger / bhendi (*Abelmoschus esculentus*).
18. Explain etiology, symptoms, epidemiology, mode of spread and management strategies of coconut basal stem root / Thanjavur wilt / Bole rot disease (*Cocos nuifera* L).



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Pathology and Plant Diseases
Practical Model Paper

Time: 3Hrs

Max. Marks: 50

- | | |
|---|-------------|
| 1. Identify and comment on Plant Pathogenic Fungi | 2 x 5 = 10M |
| 2. Identify and comment on Plant Pathogenic Bacteria | 2 x 5 = 10M |
| 3. Identify and comment on Phanerogamic Plant Parasites | 2 x 5 = 10M |
| 4. Identify and comment on Plant Pathogenic nematode | 1 x 5 = 5M |
| 5. Identification and histopathological studies of selected diseases of field crops | 1 x 5 = 5M |
| 6. Identification and histopathological studies of selected diseases of horticultural crops | 1 x 5 = 5M |
| 7. Record + Viva – voice | 5 M |

Total = 50M



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Breeding

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Distinguish self and cross-pollinated plant species based on floral biology.
2. Perform skills related to self and cross pollination in plants.
3. Make hybridization to produce new varieties.

II. Laboratory/field exercises:

1. Floral biology in a self and a cross pollinated plant species.
2. Identification and classification of plants based on pollination mechanism.
3. Pollen viability test.
4. Observation on pollen germination.
5. Practicing emasculation technique.
6. Practicing selfing and crossing techniques.
7. Assessment of genetic variability.
8. Estimation of heterosis and inbreeding depression.
9. Studying mutant and polyploids in crop plants.

Syllabus of theory

Unit-1: Basic concepts of plant breeding

1. Definition, aim, objectives and scope of plant breeding; concepts in plant breeding: genetic variation, heritability, and selection.
2. Advantages and disadvantages of asexual and sexual reproduction; apomixis: definition, types and significance.
3. A brief account of self and cross-pollination, their genetic consequences and significance; classification of crop plants based on mode of pollination and mode of reproduction.

Unit-2: Contrivances for cross pollination

1. Self-incompatibility in plants – Definition, heteromorphic and homomorphic systems; exploitation of self-incompatibility in hybrid production.
2. Male sterility- Genetic, cytoplasmic and cytoplasmic-genetic, utilization in plant breeding.
3. Domestication of plants, centres of origin of crop plants.

Unit-3: Breeding methods in plants 9 Hrs.

1. Plant introduction – types, objectives, plant introduction agencies in India, procedure, merits and demerits; germplasm collections, genetic erosion, gene sanctuaries.
2. Selection – natural and artificial selection – basic principles of selection.
3. Self-pollinated crops: pure line selection method – procedure, advantages and disadvantages, achievements.
4. Vegetatively propagated crops: Clonal selection - procedure, advantages and disadvantages, achievements.

Unit-4: Breeding methods in cross-pollinated plants

1. Hybridization – objectives, types, procedure, advantages and disadvantages, achievements.
2. Cross-pollinated crops: back cross method - procedure, advantages and disadvantages, achievements.
3. Heterosis: definition, genetic bases of heterosis – dominance, over dominance and epistasis hypotheses; physiological bases of heterosis – commercial utilization.
4. Synthetics and composites – production procedures – merits, demerits and achievements.

Unit-5: Modern methods in plant breeding

1. Mutation breeding: spontaneous and induced mutations – characteristic features of mutations – procedure of mutation breeding – applications – advantages, limitations and achievements.
2. Polyploidy breeding: auto-polyploids and allopolyploids – applications in crop improvement and limitations.
3. DNA markers and their applications in plant breeding: RFLP, SSR, and SNP
4. Marker Assisted Selection (MAS) and its applications in plant breeding.

Text Books:

1. Singh, B. D. (2001) Plant breeding: Principles and methods. Kalyani Publishers, New Delhi, India.
2. Poehlman, J. M. and Sleper, D. A. (1995) Breeding field crops, 4th ed. Iowa State University Press, Ames, Iowa, USA.
3. Patil, J.V., S.S. Patil, and R.A. Balikai (2019) Principles and Methods in Plant Breeding, Scientific Publishers (India), Jodhpur
4. Purohit, S.S. (2014) Plant Breeding: Principles and Methods, Agrobios (India), Jodhpur

Reference Books:

1. Acquaah, G. 2012. Principles of plant genetics and breeding, 2nd ed. Wiley-Blackwell, Ames, Iowa, USA.
2. Allard, R. W. 1999. Principles of plant breeding. John Wiley & Sons, New York, USA.
3. Stuber, C. W., Edwards, M. D. and Wendel, J. F. 1987. Molecular markers in plant breeding: Applications and potential. Science 238: 1659-1664.
4. Hayes, H. K., R. E. Kirk, and R. H. Jones (1951). Methods for the Statistical Analysis of Plant Breeding Experiments. Iowa State College Press, Ames, IA.
5. Simmonds, N. W. (1979). Principles of Crop Improvement (2nd ed.). Longman, Harlow, UK.



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II B.Sc Botany Major - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Breeding
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Distinguish self and cross-pollinated plant species based on floral biology.
2. Perform skills related to self and cross pollination in plants.
3. Make hybridization to produce new varieties.

Laboratory/field exercises:

1. Floral biology in a self and a cross pollinated plant species.
2. Identification and classification of plants based on pollination mechanism.
3. Pollen viability test.
4. Observation on pollen germination.
5. Practicing emasculation technique.
6. Practicing selfing and crossing techniques.
7. Assessment of genetic variability.
8. Estimation of heterosis and inbreeding depression.
9. Studying mutant and polyploids in crop plants.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Breeding

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Breeding
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Genetic consequences of Self pollination.
2. Concepts of Plant Breeding.
3. What is Self – incompatibility?
4. What is Male – sterility?
5. Germplasm collection.
6. Natural and artificial selection.
7. Emasculation – Methods.
8. Characteristics of Mutation.

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. Explain aim and objectives of Plant Breeding.
10. What is Apomixis? What are it types ? Write the advantages of Apomixis.
11. Describe SI in Hybrid Breeding.
12. What is Cytoplasmic – Genetic Male Sterility?
13. Write about the procedure, merits and demerits of Plant introduction.

SECTION – III

14. Vegetativity propagated crops : Clonal selection – procedure, advantages and disadvantages, achievements.
15. Write about the types of Hybridization.
16. Explain cross – pollinated crops : back cross method procedure, advantages and disadvantages, achievements.
17. Describe Restriction Fragment Length Polymorphism (RFLP).
18. Explain polyploidy breeding : Autopolids and allopolyploids applications in crop improvement.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc Botany Major - Semester – III, Course – 7
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Breeding
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

1. Write aim, principle, procedure and requirements of Pollen viability test (Major) ‘A’
15M
2. Aim, Principle, Procedure on Emasculation technique 10M
3. ‘B’ Identify the following photograph / chart / slide / specimen 3 x 5 = 15M
C)
D)
E)
4. Record + Viva - voice 7 + 3 = 10M

Total Marks = 50M



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Biotechnology

I. Learning Objectives: By the end of this course the learner has:

1. To acquire knowledge of sterilization techniques used in plant tissue culture.
2. To learn about various types of plant tissue culture practices.
3. To know the applications of plant biotechnology in production of novel plants.

II. Learning Outcomes: Students at the successful completion of the course will be able to:

1. Explain the scientific techniques and tools used in plant tissue culture laboratories.
2. Appraise the applications of plant tissue culture in agriculture and horticulture sectors.
3. Acquire skills related to various aspects in plant tissue culture.
4. Evaluate the role of transgenic plants in solving certain plant related beneficiary issues.
5. Justify the role of plant biotechnology in bioenergy and phytoremediation.
6. Judge the biosafety and bioethics related to plant biotechnology

Syllabus of theory

UNIT-1: Basic techniques in plant tissue culture

1. Plant tissue culture: Definition, scope and significance; infrastructure and equipment required to establish a tissue culture laboratory.
2. Sterilization techniques; formulation of media for plant tissue culture.
3. Concept of totipotency, initiation and maintenance of callus cultures; induction of morphogenesis in vitro.
4. Somatic embryogenesis and organogenesis; factors affecting somatic embryogenesis and organogenesis synthetic seeds and their applications.

UNIT-2: Organ and haploid culture techniques

1. Importance and applications of meristem culture, zygotic embryo culture, endosperm culture.
2. Micropropagation and its uses, commercial exploitation of micropropagation.
3. Production of haploids using anther, pollen and unfertilized ovule cultures – characterization and applications.

UNIT-3: Cell and protoplast cultures 12 Hrs.

1. Cell suspensions – continuous and batch cultures; mass cultivation of plant cells using bioreactors.
2. Production of secondary metabolites from cell cultures, strategies used for enhanced production of secondary metabolites. Biotransformation using plant cell cultures.
3. Isolation, purification and culture of protoplasts; methods used for protoplast fusion.
4. Somatic hybridization/cybridization –selection systems for somatic hybrids/cybrids, their characterization and applications.

UNIT-4: Transgenic plants 8 Hrs.

1. Transgenic plants – definition, biosafety and ethical issues associated with transgenic plants.
2. Herbicide resistance (glyphosphate), insect resistance (alpha amylase inhibitor).
3. Virus resistance (coat protein mediated, nucleocapsid gene), disease resistance (antifungal proteins, PR proteins).
4. Quality improvement (Golden rice), Shelf-life enhancement (Flavr savr tomato).

UNIT-5: Advances in plant biotechnology

1. Plant synthetic biology and its applications; plant-based vaccines and therapeutics.
2. Biofortification and genetically modified foods.
3. Biodegradable plastics, polyhydroxybutyrate.
4. Applications of plant biotechnology in bioenergy production and environmental remediation.

Text Books:

1. Ignacimuthu, S., (2003) Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Kalyan Kumar De., (1997) Plant Tissue Culture – New Central Book Agency (P) \ Ltd., Calcutta.
3. Mascarenhas A.F., (1991) Hand book of Plant Tissue Culture. Indian Council of Agricultural Research. New Delhi.
4. Narayanaswamy, S (1994) Plant Cell and Tissue Culture, Tata –Mc Graw Hill Publishing Co., Ltd., New Delhi.

Reference Books:

1. C. Neal Stewart Jr. (2018) Plant Biotechnology and Genetics: Principles, Techniques, and Applications John Wiley & Sons, Inc. in Hoboken, New Jersey, USA.
2. Adrian Slater, Nigel W. Scott, and Mark R. Fowler (2008) Plant Biotechnology: The Genetic Manipulation of Plants Oxford University Press in Oxford, UK.
3. S. Mohan Jain and Pramod K. Gupta (2010) Plant Biotechnology: Methods and Applications CRC Press, Taylor & Francis Group in Boca Raton, Florida, USA.
4. Ram Lakhan Singh (2017) Plant Biotechnology: Recent Advances and Future Prospects Springer International Publishing AG in Cham, Switzerland.
5. Altman and P.M. Hasegawa (2013) Plant Biotechnology and Agriculture: Prospects for the 21st Century Elsevier Inc. in Amsterdam, Netherlands.



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II B.Sc (Hon's) Botany Major - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Biotechnology
Practical Syllabus

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Operate all the equipment and instruments in a plant tissue culture laboratory.
2. Establish callus and organ culture.
3. Obtain quality plants using micro-propagation techniques.

Laboratory/field exercises:

1. Equipment used in plant tissue culture.
2. Sterilization techniques in plant tissue culture laboratory.
3. Preparation of culture media
4. Callus induction and subculturing.
5. Organogenesis using PGRs'
6. Demonstration of cell and protoplast culture.
7. Demonstration of organ cultures.
8. Demonstration of anther and pollen cultures.



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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Biotechnology

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major Syllabus - Semester – III, Course – 8
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Biotechnology
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Totipotency
2. Factors influencing somatic Embryogenesis.
3. Application of Invitro ovule culture.
4. Advantages and disadvantages of Micropropagation.
5. Determination of growth of cells in suspension culture.
6. Protoplast culture method.
7. Golden rice
8. Applications of Poly Hydroxyl Butyrate (PHB)

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. Explain the equipments required to establish a tissue culture laboratory.
10. What are Synthetic Seeds? Explain types of Synthetic Seeds. Write its advantages and disadvantages.
11. Explain Micro propagation and various types of Micro propagation.
12. Write an essay on Pollen culture (or) androgenic haploid production.
13. Describe the mass cultivation of plant cells using bioreactors.

SECTION – III

14. Describe various aspects of Somatic hybridization.
15. Give an account of introduction to insect resistance alpha anylase inhibitor.
16. Describe biosafety and ethical issues associated with transgenic plants.
17. Give an account of Biodegradable plastics.
18. Write an essay on Plant based vaccines.



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major - Semester – III, Course – 8
For 2023 – 2026 batch (w.e.f. 2024 – 2025)
Plant Biotechnology
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

- | | |
|---|-------------|
| 1. Write Aim, Principle and procedure of 'A'(Major) | 15M |
| 2. Write Aim, Principle and procedure of experiment 'B' (Minor) | 10M |
| 3. Identify the following photograph / slides / specimens | 3 x 5 = 15M |
| C) | |
| D) | |
| E) | |
| 4. Record + Viva - voice | 7 + 3 = 10M |

Total Marks = 50M



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – IV, Course – 9
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Anatomy and Embryology of Angiosperms

I. Learning Objectives: By the end of this course the learner has:

1. To know about various types of tissues in plants and their organization.
2. To obtain awareness on anomalous secondary growth in plants and economic value of woods.
3. To acquire knowledge on development of male and female gametophytes in plants.
4. To probe into embryogenesis in angiosperms.

II. Learning Outcomes: On completion of this course students will be able to:

1. Categorize various tissues and evaluate their role in plants.
2. Explain anomalous secondary growth in some plants and justify the value of timber plants.
3. Summarize the events in micro-sporogenesis and development of male gametophyte.
4. Discuss the events in mega-sporogenesis and development of female gametophyte.
5. Propose the incidents in embryogenesis of an angiospermic plant species.
6. Compile the aspects of developmental and reproductive biology in plants.

Syllabus of theory

Unit – 1: Tissues in plants

1. Meristematic tissues: Definition, classification, structure and functions.
2. Apical meristems: Generalised structure of shoot apex, theories on organization of Shoot Apical Meristem (SAM) - Apical cell theory, Tunica-Corpus theory and Histogen theory.
3. Permanent tissues (simple and complex).
4. A brief account of plant secretory tissues/cells.

Unit-2: Anomalous growth in plants

1. Tissue systems–Epidermal, ground and vascular.
2. Anomalous secondary growth in root of *Beta vulgaris*
3. Anomalous secondary growth in stems of *Boerhaavia* and *Dracaena*
4. Study of timbers of economic importance - Teak, Red-sanders and Rosewood.
5. Applications of anatomy in plant systematics, forensics and pharmacognosy.

Unit-3: Anther and pollen

1. Anther: Structure and functions of anther wall, micro-sporogenesis, callose deposition and its significance.
2. Pollen wall structure, MGU (male germ unit) structure, NPC system; a brief account of Palynology and its scope; development of male gametophyte.
3. Pollen wall proteins; Pollen viability, storage and germination; Abnormal features: pseudomonads, polyads, massulae, pollinia.

Unit-4: Ovules, fertilization and endosperm

1. Structure and types of ovules, megasporogenesis; monosporic (*Polygonum*), bisporic (*Allium*) and tetrasporic (*Peperomia*) types of embryo sacs.
2. Outlines of pollination; self-incompatibility- basic concepts; methods to overcome self- incompatibility (mixed pollination, bud pollination, stub pollination).
3. Double fertilization in angiosperms – process and consequences.
4. Perisperm; endosperm – types (free nuclear, cellular, helobial and ruminant) and biological importance.

Unit-5: Embryogeny and seeds

1. Embryogeny in dicot (*Capsella bursa-pastoris*)
2. Embryogeny in monocot (*Sagittaria sagittifolia*).
3. Seed structure in monocot and dicot.
4. Importance of seed and seed dispersal mechanisms.
5. Polyembryony and apomixis: Introduction, classification, causes and applications.

IV. Text Books:

1. Pandey, B.P. (2013) College Botany, Volumes-II& III, S. Chand Publishing, New Delhi
2. Bhattacharya, K., G. Hait & Ghosh, A. K., (2011) A Text Book of Botany, Volume-II, New Central Book Agency Pvt. Ltd., Kolkata

V. Reference Books:

1. Esau, K. (1971) Anatomy of Seed Plants. John Wiley and Son, USA.
2. Fahn, A. (1990) Plant Anatomy, Pergamon Press, Oxford.
3. Cutler, D.F., T. Botha & D. Wm. Stevenson (2008) Plant Anatomy: An Applied Approach, Wiley, USA
4. Paula Rudall (1987) Anatomy of Flowering Plants: An Introduction to Structure and Development. Cambridge University Press, London
5. Bhojwani, S. S. and S. P. Bhatnagar (2000) The Embryology of Angiosperms (4th Ed.), Vikas Publishing House, Delhi.
6. Pandey, A. K. (2000) Introduction to Embryology of Angiosperms. CBS Publishers & Distributors Pvt. Ltd., New Delhi
7. Maheswari, P. (1971) An Introduction to Embryology of Angiosperms. McGraw Hill Book Co., London.
8. Johri, B.M. (2011) Embryology of Angiosperms. Springer-Verlag, Berlin



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major - Semester – IV, Course – 9
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Anatomy and Embryology of Angiosperms
Practical Syllabus

I. Course Outcomes:

On successful completion of this practical course, student shall be able to:

1. Conduct dissections of various plant organs and study the internal structures by staining.
2. Look into the embryological characteristics from sex organs to seeds in angiosperms.

Laboratory/field exercises:

1. Observation of meristems in dicot and monocot plants.
2. Tissue organization in shoot apices using permanent slides.
3. Anomalous secondary growth in root of *Beta vulgaris*
4. Anomalous secondary growth in stems of *Boerhaavia* and *Dracaena*.
5. Study of anther and ovules using permanent slides/photographs.
6. Study of pollen germination and pollen viability.
7. Dissection and observation of embryo sac haustoria in *Santalum* or *Argemone*.
8. Structure of endosperm (nuclear and cellular) using permanent slides/photographs.
9. Dissection and observation of Endosperm haustoria in *Crotalaria* or *Coccinia*.
10. Developmental stages of dicot and monocot embryos using permanent slides /photographs.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 9
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Anatomy and Embryology of Angiosperms

BLUE PRINT

Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major - Semester – IV, Course – 9
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Anatomy and Embryology of Angiosperms
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Histogen theory
2. Classification of Meristematic tissues
3. Rose wood economic importance
4. Applications of anatomy in Pharmacognosy
5. Anther wall structure
6. Pollen viability
7. Types of Ovules
8. Apomixis

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. describe a brief account on meristamatic theories with the help of neat labelled diagrams.
10. Write a brief account on permanent tissues with the help of labelled diagrams.
11. Describe the process of Dnamolous secondary growth in Dracena.
12. Describe the characters of Tectona grandis (Teak) Wood with suitable diagrams. Give any four economic uses.
13. Write a note on Microsporogenesis.

SECTION – III

14. Describe the structure and functions of Pollen wall.
15. Describe the development of different types of Embryosacs.
16. Write a note on process and consequences of double fertilization in Angiosperms.
17. Write an account on Embryogeny in Dicots.
18. Write a note on seed structure of Monocot.



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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 9
For 2023 – 2026 batch (w.e.f. 2024 – 2025)
Anatomy and Embryology of Angiosperms
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

1. Take T.S of the material 'A' (Anatomy) prepare a temporary slide and justify the identification with specific reasons 10M
2. Identify the following slides / photographs / permanent and justify reasons 10M
3. Identify the following photograph / slides / permanent slides and justify reasons 10M
4. Identify the following with specific reasons 4 x 3 = 12M
D)
E)
F)
G)
5. Record + Viva - voice 5 + 3 = 08M

Total Marks = 50M



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – IV, Course – 10
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Ecology, Biodiversity and Phytogeography

I. Learning Objectives: By the end of this course the learner has:

1. To figure-out the components of ecosystem and energy flow among different trophic levels.
2. To apprise the characteristics of autecology and synecology.
3. To understand the climatic change and associated impacts on biotic components.
4. To discern the value of biodiversity, threats and conservation strategies.
5. To know the distribution of various plant groups in different geographical areas.

II. Learning Outcomes: On completion of this course students will be able to:

1. Explain the interactions among the biotic and abiotic components in an ecosystem.
2. Summarize the characteristics of a population and a community.
3. Anticipate the environmental problems arising due to climate change.
4. Assess the value of biodiversity and choose appropriate conservation strategy.
5. Make a survey on the distribution of various plant groups in a specified geographical area.

Syllabus of theory

Unit 1 : Basic concepts in ecology

1. Ecology: definition, branches and significance; relation with other sciences.
2. Structure and functions of ecosystems- abiotic and biotic components; flow of energy.
3. Cycling of materials: water, carbon, nitrogen and phosphorus; trophic pyramids, food chains and food webs.
4. Plants and environment: Climatic (light and temperature) and edaphic.
5. Interactions among plants; interactions between plants and animals.

Unit-2: Population and community ecology

1. Population ecology: definition, characteristics -natality, mortality, growth curves, ecotypes, ecads.
2. Community ecology: characteristics -frequency, density, cover, life forms, competition, biological spectrum.
3. Ecological succession: Hydrosere and Xerosere.
4. Concepts of productivity: GPP, NPP and Community Respiration
5. Secondary production, P/R ratio and Ecosystems.

Unit-3: Climate change-impacts

1. Soil degradation – causes, consequences and management strategies.
2. Deforestation, forest fires – causes, consequences and management strategies.
3. Global warming, ozone layer depletion, acid rains, ocean acidification – causes and effects.
4. Carbon foot prints and carbon credits; The Montreal and the Kyoto protocol.
5. Plant indicators and their role in environmental monitoring.

Unit-4: Concepts of Biodiversity

1. Biodiversity: Basic concepts, Convention on Biodiversity - Earth Summit.
2. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity
3. Biodiversity Hot spots in India: North Eastern Himalayas and Western Ghats.
4. Principles of conservation: IUCN threat-categories, RED data book
5. Role of NBPGR and NBA in the conservation of Biodiversity.

Unit-5: Phytogeography

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

IV. Text Books:

1. Pandey, B.P. (2013) College Botany, Volumes- II & III, S. Chand Publishing, New Delhi
2. Bhattacharya, K., G. Hait & Ghosh, A. K., (2011) A Text Book of Botany, Volume II, New Central Book Agency Pvt. Ltd., Kolkata
3. N.S.Subrahmanyam & A.V.S.S. Sambamurty (2008) Ecology Narosa Publishing House, New Delhi
4. Sharma, P.D. (2012) Ecology and Environment. Rastogi Publications, Meerut, India.
5. U. Kumar (2007) Biodiversity: Principles & Conservation, Agrobios (India), Jodhpur
6. Mani, M.S (1974) Ecology & Biogeography of India Dr. W. Junk Publishers, The Hague

V. Reference Books:

1. Kormondy, Edward J. (1996) Concepts of Ecology, Prentice-Hall of India Private Limited, New Delhi
2. Begon, M., J.L. Harper & C.R. Townsend (2003) Ecology, Blackwell Science Ltd., U.S.A.
3. Eugene P. Odum (1996) Fundamentals of Ecology, Natraj Publishers, Dehradun
4. Kumar, H.D. (1992) Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
5. Newman, E.I. (2000): Applied Ecology Blackwell Scientific Publisher, U.K.
6. Chapman, J.L & M.J. Reiss (1992): Ecology - Principles & Applications. Cambridge University Press, U.K.
7. Kumar H.D. (2000) Biodiversity & Sustainable Conservation Oxford & IBH Publishing Co Ltd. New Delhi.
8. Cain, S.A . (1944) Foundations of Plant Geography Harper & Brothers, N.Y.
9. Good, R. (1997) The Geography of flowering Plants (2nd Edn.) Longmans, Green & Co., Inc., London & Allied Science Publishers, New Delhi



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major - Semester – IV, Course – 10
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Ecology, Biodiversity and Phytogeography
Practical Syllabus

Course Outcomes:

On successful completion of this practical course, student shall be able to:

1. Handle instruments used in ecological studies.
2. Perform experiments and collect data on autecology and synecology.
3. Identify various plant groups based on their morphological and anatomical adaptations.
4. Collect data on biodiversity and phytogeography.

Laboratory/field exercises:

1. Study of instruments used to measure microclimatic variables; a. Soil thermometer,
b. Maximum and minimum thermometer,
c. Anemometer,
d. Rain gauge
e. Lux meter.
2. Visit to the nearest/local meteorology station where the data is being collected regularly and record the field visit summary for the submission in the practical.
3. Study of morphological and anatomical adaptations of any two hydrophytes.
4. Study of morphological and anatomical adaptations of any two xerophytes.
5. Quantitative analysis of herbaceous vegetation in the college campus for frequency, density and abundance
6. Identification of vegetation/various plants in college campus and comparison with Raunkiaer's frequency distribution law.
7. Find out the alpha-diversity of plants in an area
8. Mapping of biodiversity hotspots of the world and India.
9. Mapping of phytogeographical regions of the globe and India



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 10
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Ecology, Biodiversity and Phytogeography

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)
II B.Sc (Hon's) Botany Major - Semester – IV, Course – 10
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Ecology, Biodiversity and Phytogeography
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Food Web
2. Edaphic factors
3. Xerosere
4. P/R Ratio
5. Kyoto Protocol
6. Acid rains
7. Red Data Book
8. Invasive Plants

Answer any FIVE questions , each question carries EIGHT mars. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. Explain Biotic and Abiotic components of an Ecosystem.
10. Explain in detail about Food Chains, food web, trophic pyramids.
11. Explain about community ecology and discuss about competition and biological spectrum.
12. What is Ecological succession and explain in the case of hydrosphere.
13. What is Deforestation and explain the different management strategies.

SECTION – III

14. What are Carbon foot prints and Carbon credits? Briefly explain the Montrail and the Kyoto protocol.
15. What is Biodiversity? Explain the biodiversity hotspots on India.
16. Explain about role of NBPGR and NBA in the conversation of Biodiversity.
17. What is Endemism and explain the types and the causes.
18. What are the different phytogeographic regions in India and explain about them.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 10
For 2023 – 2026 batch (w.e.f. 2024 – 2025)
Plant Ecology, Biodiversity and Phytogeography
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

1. Study project of a surrounding ecosystem(terrestrial or aquatic) plant diversity, animal diversity, human activity, pollution levels, restoration efforts under supervision
15M
2. Write the procedure and determination of soil porosity / pH / percolation / retaining capacity – A
10M
3. Identify the following with specific hotspot
3 x 5 = 15M
 - B) Ecology instrument
 - C) Mapping of Biodiversity hotspot
 - D) Xerophyte / Huidrophyte anatomical adaptations
4. Record + Viva - voice
5 + 5 = 10M

Total Marks = 50M



SRI YN COLLEGE(A) – NARSAPUR
(Affiliated to Adikavi Nannaya University)

II B.Sc (Hon's) Botany Major Syllabus - Semester – IV, Course – 11
For 2023 – 2027 batch (w.e.f. 2024 – 2025)

Plant Resources and Utilization

I. Learning Objectives: By the end of this course the learner has:

1. To know different plants domesticated by humans and utility of their products.
2. To gain knowledge on commercial and timber products obtained from plants.
3. To know the facts on economic value of plants products in relation to human welfare.

II. Learning Outcomes: Students at the successful completion of the course will be able to:

1. Explain the significance of plants in human nutrition.
2. List out different plant products used by human beings.
3. Evaluate the commercial plant products and their utilization
4. Discuss the uses of medicinal and aromatic plants for human health care.
5. Appraise the importance of timber and non-timber products for value added products.

Syllabus of theory

UNIT-1: Food plants

1. Centres of diversity of plants, origin of crop plants.
2. Domestication and introduction of crop plants; concepts of sustainable development.
3. Cultivation, production, and uses of cereals (rice and wheat), major (jowar and bajra) and minor millets (finger millet, fox tail millet), pulse crops (red gram and black gram) and sugarcane.

UNIT-2: Other economic plant products

1. A general account of oil seed crops and vegetable oils.
2. A general account of fruit and vegetable yielding plants.
3. Plant sources and economic importance of rubber, latex, gums, resins, dyes, alkaloids and tannins.
4. A general account of major fibre crops in India; textile production from plant fibres.

UNIT-3: Commercial plant products 8 Hrs.

1. A general account and economic potential of spices and condiments.
2. Plant sources and economic importance of flavouring products, beverages, fumitories and masticatories and narcotics.
3. Utilization of some important ornamentals, flowering plants and orchids.

UNIT-4: Medicinal and aromatic plant products

1. Traditional and modern uses of some medicinal plants of India.
2. Active compounds in medicinal plants and their pharmacological effects.
3. Essential oils and their uses; aromatic plants in perfumery and cosmetics.
4. Phytochemicals and their potential health benefits.

UNIT-5: Timber products and energy crops

1. Important timber yielding plants of India; wood as a construction and manufacturing material.
2. Other uses of wood products, such as paper and fuel.
3. Energy crops, biofuels and bioplastics.
4. /Bamboos, Eucalyptus, Casuarina - generation of paper industry raw material.

IV. Textbooks:

1. S. K. Jain and R. A. Jain, (2015) Handbook of Plant Resources, Springer, New York.
2. H. Panda and A. K. Padhi, (2017) Medicinal Plants and Their Utilization, Springer, Singapore.
3. G.E. Wickens (1998) Economic Botany: Principles and Practices, Chapman & Hall, London.
4. S.L. Kochhar (1990) The Economic Botany of the Tropics, Macmillan, London.

V. Reference Books:

1. K. V. Peter, (2004) Handbook of Herbs and Spices, CRC Press, Boca Raton.
2. J. E. Simon, J. A. Duke, and E. A. L. Bobilya, (1990) Handbook of Edible Weeds, CRC Press, Boca Raton.
3. J. Smartt and N. Haq, (2016) Handbook of Industrial Crops, Springer, New York.
4. P. N. Ravindran, (2017) The Encyclopaedia of Herbs and Spices, CABI, Wallingford.
5. Beryl B. Simpson (2010) Economic Botany: Plants in Our World, Academic Press, London.
6. Michael J. Balick and Paul Alan Cox (1996) Plants, People, and Culture: The Science of Ethnobotany, Scientific American Library, New York.
7. Ben-Erik van Wyk (2016) Food Plants of the World: An Illustrated Guide, Timber Press, Portland.
8. Jo Homan (2012) Plants That Changed History, Chartwell Books, New York.
9. Gary J. Martin (2004) Ethnobotany: A Methods Manual, Earthscan Publications, London.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 11
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Resources and Utilization
Practical Syllabus

Course Outcomes:

On successful completion of this practical course, student shall be able to:

1. Characterize various plant products based on morphological and microscopic observations.
2. Identify economically valuable plants and their products.
3. Categorize distinct plant products utilized by humans.

Laboratory/field exercises:

1. Study of morphology and micro-chemical test for stored material of any 3 food crops.
2. Study of morphology and microscopic study anatomy of some plant fibres (cotton, jute, hemp, ramie, sisal).
3. Study of morphology, medicinal and aromatic plants and their useful parts.
4. Study of some oil yielding crops and properties of their oils.
5. Study of some gum, resin, tannin, dye yielding plants.
6. Study of firewood, biofuel and timber yielding plants.



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 11
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Resources and Utilization

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Note: The question paper setters are requested to adhere to the format given below.

Unit	Essay questions	Short questions	Marks allotted to the unit
Unit - 1	2	2	24
Unit – II	2	2	24
Unit – III	2	2	24
Unit – IV	2	1	20
Unit – V	2	1	20



SRI YN COLLEGE(A) – NARSAPUR
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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 11
For 2023 – 2027 batch (w.e.f. 2024 – 2025)
Plant Resources and Utilization
Model Question Paper

Time: 3Hrs

Max. Marks: 60M

SECTION – I

Answer any FIVE questions, each question carries FOUR marks. Draw diagrams wherever necessary.

5 x 4M = 20M

1. Sustainable development
2. Types of Millets / Millet varieties
3. Oil seed crops
4. Vegetable yielding plants
5. Fumitarsis
6. Masticatories
7. Essential oils
8. Timber yielding plants

Answer any FIVE questions , each question carries EIGHT marks. Draw diagrams wherever necessary.

5 x 8M = 40M

SECTION – II

9. What is Domestication and explain the introduction of Crop plants.
10. Write briefly about cultivation, production and uses of Rice and Wheat plants.
11. What are Vegetable Oils and give an account of Oil seed crops.
12. Explain about the different types of fruits and vegetable yielding plants.
13. Explain about different spices and condiments.

SECTION – III

14. Explain briefly about some important ornamentals flowering plants and orchids.
15. Write about different phyto chemicals and their uses in human health.
16. What are different active compounds in medicinal plants and their pharmacological effects?
17. Explain about Bio fuels and Bio plastics.
18. Write briefly about timber yielding plants in India.



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II B.Sc (Hon's) Botany Major - Semester – IV, Course – 11
For 2023 – 2026 batch (w.e.f. 2024 – 2025)
Plant Resources and Utilization
Practical Model Question Paper

Time: 3Hrs

Max. Marks: 50

1. Study the Morphology and Micro chemical test for the following food crops
2 x 5 = 10M
 - A)
 - B)
2. Study of Morphology and Microscopic study of Anatomy of some plant fibers
2 x 5 = 10M
 - C)
 - D)
3. Study of Morphology, Medicinal and Aromatic plants and their useful parts
2 x 5 = 10M
 - E)
 - F)
4. Study of the following Oil yielding crops
2 x 5 = 10M
 - F)
 - G)
5. Record + Viva - voice
5 + 5 = 10M

Total Marks = 50M
