R3624

Sub. Code
525301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Botany

EVOLUTION, ECOLOGY AND PHYTOGEOGRAPHY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. Lamarck's theory of evolution is based on the principle of (CO1, K1)

   (a) Natural selection

   (b) Inheritance of acquired characteristics

   (c) Genetic drift

   (d) Mutation

2. Which geological era is often referred to as the "Age of Reptiles"? (CO1, K1)

   (a) Paleozoic

   (b) Mesozoic

   (c) Cenozoic

   (d) Precambrian

3. The primary source of energy for most ecosystems is: (CO2, K1)

(a) Heat from the Earth's core

(b) Chemical energy from rocks

(c) Solar radiation

(d) Kinetic energy from wind

4. Which of the following is NOT a biotic component of an ecosystem? (CO2, K6)

(a) Plants (b) Animals

(c) Microorganisms (d) Water

5. Organisms that produce a large number of offspring with little parental care are typically classified as: (CO3, K2)

(a) K-selected

(b) r-selected

(c) Density-dependent

(d) Density-independent

6. The variety of species within a community is referred to as its: (CO3, K1)

(a) Species richness

(b) Species evenness

(c) Species diversity

(d) Species abundance

7. Species diversity in a forest ecosystem is typically measured by : (CO4, K3)

(a) Only the number of species present

(b) The relative abundance of each species

(c) Both the number of species and their relative abundance

(d) The total biomass of all species

8. Deforestation is a major human impact on forest ecology. Which of the following is NOT a consequence of deforestation? (CO4, K4)

(a) Increased biodiversity

(b) Climate change

(c) Soil erosion

(d) Loss of habitat

9. According to Lawrence's principles of phytogeography, the distribution of plants is primarily controlled by: (CO5, K2)

(a) Soil type

(b) Animal interactions

(c) Climatic conditions

(d) Human activities

10. Which of the following is NOT a phytogeographical region of India? (CO5, K2)

(a) The Deccan Plateau

(b) The Gangetic Plain

(c) The Amazon Rainforest

(d) The Western Himalayas

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Compare and contrast Lamarckism and Darwinism, highlighting their key differences. (CO1, K1)

Or

(b) Explain the role of reproductive isolation mechanisms in the process of speciation. (CO1, K5)

12. (a) Intrepret the significance of succession in ecosystem development. (CO2, K1)

Or

(b) Examine the Carbon cycle. (CO2, K6)

13. (a) Define the concept of a species. (CO3, K2)

Or

(b) Compare and contrast r-selected and K-selected species with examples. (CO3, K1)

14. (a) Describe the different stages of forest succession. (CO4, K3)

Or

(b) How does air pollution affect plant growth, species diversity, and ecosystem function. (CO4, K4)

15. (a) Define phytogeography and its key principles. (CO5, K2)

Or

(b) Differentiate between different types of endemism. (CO5, K2)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain how Neo-Darwinism integrates the concepts of natural selection with the modern understanding of genetics and molecular biology. (CO1, K1)

Or

(b) State the outline of Hardy-Weinberg equilibrium principle and its assumptions. (CO1, K5)

17. (a) Distinguish between fundamental and realized niches, providing specific examples of each. (CO2, K1)

Or

(b) Examine the role of pioneer species and climax communities in the process of succession. (CO2, K6)

18. (a) Describe how species interactions (competition, predation, mutualism, parasitism) shape community structure and dynamics? (CO3, K2)

Or

(b) Explain the factors that can limit population growth and lead to the carrying capacity of an environment. (CO3, Kl)

19. (a) Discuss potential mitigation strategies for minimizing human impacts on forest ecosystems. (CO4, K3)

Or

(b) Define forest ecology and discuss its scope and importance in understanding terrestrial ecosystems. (CO4, K4)

20. (a) Explain the conservation implications of understanding the phytogeography of India. (CO5, K2)

Or

(b) Apply the principles of island biogeography to understand the conservation challenges facing island ecosystems. (CO5, K2)

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R3625

Sub. Code
525302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Botany

PLANT MOLECULAR BIOLOGY, PLANT BIOTECHNOLOGY AND IPR

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. What is the primary function of the nucleus in a eukaryotic cell? (CO1, K1)
   (a) Storing genetic material
   (b) Energy production
   (c) Protein synthesis
   (d) Lipid metabolism

2. Which of the following is true about mitochondrial expression? (CO1, K1)
   (a) Mitochondrial expression involves only nuclear DNA
   (b) Mitochondrial expression involves both nuclear and mitochondrial DNA
   (c) Mitochondrial expression occurs solely in the cytoplasm
   (d) Mitochondrial expression is unrelated to protein synthesis

3. Which of the following enzymes is responsible for joining DNA fragments during replication or repair? (CO2, K1)

(a) DNA helicase

(b) DNA polymerase

(c) DNA ligase

(d) Exonuclease

4. Which vector is commonly used for constructing a genomic library of large DNA fragments? (CO2, K1)

(a) Bacterial Artificial Chromosome (BAC)

(b) Cosmids

(c) Plasmid

(d) Yeast

5. Which of the following techniques is commonly used to introduce foreign DNA into a plant cell in genetic engineering? (CO3, K1)

(a) Gel electrophoresis

(b) PCR (Polymerase Chain Reaction)

(c) Southern blotting

(d) Agrobacterium-mediated transformation

6. Which of the following enzymes is responsible for synthesizing RNA from a DNA template? (CO3, K1)

(a) DNA polymerase

(b) RNA polymerase

(c) Reverse transcriptase

(d) Ligase

7. Which of the following is an example of a transgenic plant? (CO4, K1)

(a) Wheat

(b) Rice

(c) Bt cotton

(d) Sunflower

8. What is the purpose of introducing the Bt gene into plants? (CO4, K1)

(a) Increase flower size

(b) Pest resistance

(c) Enhance drought tolerance

(d) Improve fruit color

9. Which organization is responsible for promoting the protection of intellectual property globally? (CO5, K2)

(a) WTO

(b) WHO

(c) UNESCO

(d) WIPO

10. For how many years is a patent generally valid? (CO5, K2)

(a) 20 years

(b) 15 years

(c) 10 years

(d) 25 years

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Interpret the different types of DNA markers used in molecular genetics and their applications. (CO1, K4)

Or

(b) Simplify the process of chloroplast transformation and its significance. (CO1, K3)

12. (a) Explain the structure and significance of the plasmid pBR322. (CO2, K2)

Or

(b) Determine the steps involved in gene cloning. (CO2, K2)

13. (a) Outline the function and applications of the Ti plasmid vector in genetic engineering. (CO3, K4)

Or

(b) Express the roles of adapters and linkers in molecular cloning and their applications. (CO3, K2)

14. (a) Distinguish the application of biotechnology in germplasm conservation. (CO4, K5)

Or

(b) What is Bt Cotton? Explain its development. (CO4, K2)

15. (a) Simplify GI products in Tamil Nadu and their salient features. (CO5, K2)

Or

(b) What is IPR? Explain in detail. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Simplify the different methods of DNA sequencing and its applications. (CO1, K3)

Or

(b) Distinguish the structure, function and significance of the plastid genome in higher plants. (CO1, K4)

17. (a) Explain the construction and applications of a cDNA library. (CO2, K2)

Or

(b) Compare the types of vectors used in genetic engineering. (CO2, K2)

18. (a) Illustrate the process of gene transfer using polyethylene glycol (PEG) and its applications in genetic transformation of plant cells. (CO3, K4)

Or

(b) Summaries the role of T-DNA intransformation procedures and its applications in plant genetic engineering. (CO3, K2)

19. (a) Distinguish the development, applications, advantages, and challenges of transgenic plants. (CO4, K2)

Or

(b) Interpret the development of plants with biotic and abiotic stress tolerance and their significance. (CO4, K5)

20. (a) Distinguish the patent controversies surrounding neem and turmeric, highlighting their implications and significance. (CO5, K2)

Or

(b) Simplify the concept of Plant Breeder's Rights (PBR) and Farmer's Rights. (CO5, K4)

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R3626

Sub. Code
525303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Botany

PLANT TISSUE CULTURE

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which of the following plat part is free from attack of the virus? (CO1, K1)

   (a) Stem

   (b) Root

   (c) Meristem

   (d) None of the above

2. Tissue culture is a good technique to (CO1, K1)

   (a) Cross two varieties

   (b) Rapidly increase the size of a trees by strengthening the stem

   (c) Eliminate virus

   (d) Improve yield of crops

3. The term totipotency was coined by _____? (CO2, K1)

(a) Morgan, T.H

(b) Rechinger

(c) Haberlandt

(d) Duharmel du Monceau

4. Batch cultures are type of suspension culture were. (CO2, K2)

(a) Medium is continuously replaced

(b) Medium is loaded only at the beginning

(c) No depletion of medium occurs

(d) Cellular wastes are continuously removed and replaced

5. The most common solidifying agent used in micropropagation is (CO3, K2)

(a) Agar (b) Dextran

(c) Mannan (d) All of these

6. Which of the following tissue types is/are established during embryogenesis in wild-type Arabidopsis thaliana? (CO3, K3)

(a) Root apical meristem

(b) Shoot apical meristem

(c) Rosette leaf primordium

(d) Lateral root primordium

7. A technique of micropropagation is (CO4, K1)

(a) Somatic hybridisation

(b) Somatic embryogenesis

(c) Protoplast fusion

(d) Embryo rescue

8. Protoplast are the cells devoid of (CO4, K1)

(a) Cell membrane

(b) Cell wall

(c) Both cell wall and cell membrane

(d) None of the above

9. Haploid plants are produced in large numbers by ————? (CO5, K2)

(a) Anther culture (b) Ovary culture

(c) Embryo culture (d) Both (a) and (b)

10. Cryopreservation is carried out at ————————? (CO5, K1)

(a) –10 to –20°C (b) –50 to –60 °C

(c) –196 °C (d) –100 °C

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Illustrate the sterilization techniques. (CO1, K2)

Or

(b) Summaries different culture media and their components. (CO1, K2)

12. (a) Explain: cyto-differentiation. (CO2, K3)

Or

(b) Simplify the cell suspension culture. (CO2, K5)

13. (a) Explain about Micropropagation of medicinal and aromatic plants. (CO3, K3)

Or

(b) Illustrate somaclonal variation, and how can it be induced in plant populations through tissue culture techniques? (CO3, K3)

14. (a) Relate the developmental stages of somatic embryos in plants. (CO4, K3)

Or

(b) Outline the protoplasts, and how are they produced from plant cells? (CO4, K3)

15. (a) Explain the stages of androgenesis in plant tissue culture. (CO5, K3)

Or

(b) Discuss the role of cryopreservation in the conservation of plant genetic resources. (CO5, K3)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Explain the key principles involved in the design and maintenance of a plant tissue culture laboratory. (CO1, K1)

Or

(b) Express the working principle of a laminar airflow. Discuss the role it plays in preventing contamination during tissue culture procedures. (CO1, K2)

17. (a) Compare and contrast the principles, advantages, and limitations of batch culture and continuous culture in microbiology and plant cell culture. (CO2, K3)

Or

(b) Explain the methods for enhancing secondary metabolite production in plant cultures. (CO2, K3)

18. (a) Illustrate organogenesis, and how does it differ from somatic embryogenesis in plant tissue culture? (CO3, K3)

Or

(b) Explain the techniques for detection and isolation of somaclonal variants. (CO3, K3)

19. (a) Discuss the process of somatic embryogenesis in plants and its applications. (CO4, K3)

Or

(b) Describe the procedure for protoplast isolation, fusion, and culture in plant tissue culture. (CO4, K3)

20. (a) Discuss about Gynogenic haploids and factors affecting the gynogenesis. (CO5, K3)

Or

(b) What are the key techniques used in cryopreservation for the long-term storage of plant genetic material? (C05, K3)

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R3627

Sub. Code
525304

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Botany

RESEARCH METHODOLOGY, BIOTECHNIQUES AND BIOSTATISTICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. ———————— is the classical form of research. (CO1, K2)

   (a) Experiment (b) Case study

   (c) Grounded theory (d) Narrative inquiry

2. ———————— is referred to as "the father of modern research on teaching". (CO1, K1)

   (a) David Berliner (b) N. L. Gage B.

   (c) Egon Brunswik (d) Donald T. Campbell

3. What is the purpose of peer review in the research publication process? (CO2, K2)

   (a) To promote the author's work

   (b) To provide constructive feedback on research manuscripts

   (c) To establish authorship credits

   (d) To expedite the publication process

4. What does the impact factor of a journal primarily measure? (CO2, K2)

(a) The number of articles published in a journal each year

(b) The frequency with which the journal's articles are cited

(c) The total number of authors publishing in a journal

(d) The quality of peer review conducted by the journal

5. Which infrared technique can measure two spectra at once? (CO3, K3)

(a) FTIR spectroscopy

(b) FTIR-ATR spectroscopy

(c) Dispersive infrared spectroscopy

(d) UV Spectroscopy

6. Density gradient centrifugation used for _____. (CO3, K2)

(a) Purification of viruses, ribosomes, and membranes

(b) To remove small particles

(c) To remove dirt

(d) To get rid of big particles

7. Which of the following is commonly used as the mobile phase in GC-MS? (CO4, K2)

(a) CH_3CN (b) Helium

(c) H_2O (d) Air

8. Electrophoresis cannot be used to separate_____. (CO4, K3)

(a) DNA (b) RNA

(c) Lipids (d) Protein

9. Mean deviation can be computed from (CO5, K4)

(a) arithmetic mean (b) mode

(c) median (d) variance

10. Which of the following is not a measure of central tendency? (CO5, K3)

(a) mode (b) variability

(c) median (d) mean

Part B ($5 \times 5 = 25$)

Answer **all** questions not more than 500 words each.

11. (a) What are the various steps involved in Research Design? (CO1, K2)

Or

(b) Discuss about fundamentals of research. (CO1, K2)

12. (a) List out the Journals in Botanical science. (CO2, K2)

Or

(b) Write a short note on plagiarism. (CO2, K3)

13. (a) Give a brief note on centrifuge and its types. (CO3, K2)

Or

(b) Describe the working principles of TEM and its application. (CO3, K2)

14. (a) Expound the techniques of southern blotting. (CO4, K2)

Or

(b) What is HPTLC? Explain its components. (CO4, K3)

15. (a) Explain the various measures of central tendency. (CO5, K3)

Or

(b) Explicate the Null hypothesis and alternative hypothesis. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Broadly explain the classification of research. (CO1, K2)

Or

(b) Outline the steps and methods involving in research process. (CO1, K2)

17. (a) Elaborate the layout of writing a research paper. (CO2, K2)

Or

(b) Examine the ethical issues publishing manuscript. (CO2, K3)

18. (a) Compare the principle and techniques of SEM. (CO3, K2)

Or

(b) Categories the principle and applications of UV-Spectroscopy and FT-IR. (CO3, K3)

19. (a) Illustrate the principle and applications of LC-MS. (CO4, K2)

Or

(b) Summarize the principles and mechanism of 2D gel electrophoresis. (CO4, K3)

20. (a) Interpret the collection and classification of data. (CO5, K2)

Or

(b) Explain the types and applications of ANOVA. (CO5, K4)

R3628

Sub. Code
525505

M.Sc DEGREE EXAMINATION, NOVEMBER – 2025

Third Semester

Botany

Elective – BIODIVERSITY CONSERVATION

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. ———————— is one of the most prevalent hotspots of biodiversity in India. (CO1, K1)
   (a) Himalayas (b) Western Ghats
   (c) Ganges (d) None of the above

2. Documenting rare and endangered species of animals and plants what is established? (CO1, K1)
   (a) Green data Book (b) Blue data book
   (c) Red data book (d) None of these

3. ———————— is an example of an ex-situ conservation. (CO1, K1)
   (a) Sacred groves (b) Wildlife sanctuary
   (c) Seed bank (d) National park

4. Which one of the following is not included under in-situ conservation? (CO1, K1)
   (a) Wild-life sanctuary (b) Botanical garden
   (c) Biosphere reserve (d) National park

5. Cryopreservation technique is used for: (CO1, K1)
   (a) Protection of Environment
   (b) Protection of Biodiversity hotspots
   (c) Preservation of gametes in viable and fertile condition for long period
   (d) In- situ conservation

6. ———————— is not generally seen in biodiversity hotspots. (CO1, K1)
   (a) Endemism
   (b) Species richness
   (c) Loss of diversity
   (d) Lesser interspecific competition

7. How many National Parks are there in India as of 2015? (CO1, K1)
   (a) 88 (b) 96
   (c) 106 (d) 179

8. What the full form of JFM is with related to Forest Management? (CO1, K1)
   (a) Joint Forest Management
   (b) Junior Forest Management
   (c) Jury Forest Management
   (d) Jharkhand Forest Management

9. The Term Ethno botany Was First Coined by ————————? (CO1, K1)
   (a) Sir Alexander Fleming
   (b) John W. Hershberger
   (c) C.J. Alexocuplous
   (d) J.W.Webster

10. Ethnobotanical records are stored in ———————— database. (CO1, K1)
   (a) Planimal (b) Sepasal
   (c) Napralert (d) EMBL

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Define biodiversity and explain its different levels. (CO1, K1)

Or

(b) What are the direct and indirect use values of biodiversity? (CO1, K2)

12. (a) What is in situ conservation? Explain its importance in biodiversity conservation. (CO2, K2)

Or

(b) What is germplasm, and why is it important for biodiversity and agricultural conservation? (CO2, K2)

13. (a) What is the IUCN Red Data Book, and why is it significant for biodiversity conservation? (CO3, K3)

Or

(b) What are endangered and threatened species, and how are they different from each other? (CO3, K2)

14. (a) Write a short on Rio earth Summit and its major outcomes. (CO4, K4)

Or

(b) What is the role of the World Wildlife Fund in biodiversity conservation? (CO4, K3)

15. (a) Explain the main ethnic groups in Tamil Nadu and their cultural contributions. (CO5, K2)

Or

(b) Describe the distribution of the predominant ethnic communities of Tamil Nadu. (CO5, K3)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain the types and values of biodiversity, emphasizing both direct and indirect use values. (CO1, K2)

Or

(b) Describe the importance of biodiversity to human beings. (CO1, K2)

17. (a) What are the different approaches to biodiversity conservation of India? (CO2, K3)

Or

(b) Describe the two approaches for ex-situ conservation and in-situ conservation as a strategy for biodiversity conservation. (CO2, K1)

18. (a) Explain the concept of "bio-diversity hotspots" and discuss their significance biodiversity conservation. (CO3, K2)

Or

(b) Write the brief notes on major hotspots in India. (CO3, K2)

19. (a) Discuss the major forestry programs in India and their significance for forest conservation and management. (CO4, K2)

Or

(b) What alternative options are there for protecting biodiversity? (CO4, K3)

20. (a) What is the role of traditional knowledge in the ethno botanical practices and Ethno medicine of Tamil Nadu's ethnic communities? (CO5, K3)

Or

(b) What are the main causes of biodiversity loss? Explain. (CO5, K3)