

## M.Sc. Sem.-3 Examination

501

Bio-Technology

November-2025

Time : 2-30 Hours]

[Max. Marks : 70

- Q-1** Write a comprehensive essay on plant tissue culture, covering its fundamental principles, basic techniques, and diverse applications in modern biotechnology. 14
- OR**
- Q-1 A** What is a callus culture? Describe the process of its initiation and its major applications. 07
- B** Explain the different stages of micropropagation with suitable examples. 07
- Q-2** Write an extensive note on transgenic plants. Include suitable examples and provide a detailed account of their applications in agriculture and industry. 14
- OR**
- Q-2 A** Explain the various strategies for germplasm conservation, highlighting both short-term and long-term approaches. 07
- B** Enumerate the methodologies available for assessing the viability of isolated protoplasts. What are the key indicators to look for? 07
- Q-3** Classify secondary metabolites into their major groups. Discuss their structural diversity, biological functions in plants, and economic importance. 14
- OR**
- Q-3 A** Compare and contrast different plant bioreactor systems. 07
- B** Describe the principle of molecular marker-assisted selection (MAS) and its advantages over conventional phenotypic screening. 07
- Q-4** What is gene mapping? Explain the importance of gene and QTL mapping in plants and discuss its role in marker-assisted selection (MAS) for improving stress resistance. 14
- OR**
- Q-4 A** Discuss the different direct methods of gene transfer in plants, such as electroporation and particle bombardment. 07
- B** Write a note on DNA fingerprinting techniques and their applications in plant science. 07
- Q-5** Write the answer in brief (any seven) 14
- 1 Define micropropagation and mention one crop where it is widely used.
  - 2 Differentiate between dedifferentiation and redifferentiation.
  - 3 Enlist four different types of media used in plant tissue culture.
  - 4 What is cybridization?
  - 5 Name one enzyme commonly used for protoplast isolation.
  - 6 What is the name of the global "fail-safe" seed vault in Norway?
  - 7 What does SSR stand for in the context of molecular markers?
  - 8 Which enzyme's gene was targeted in the Flavr Savr tomato?
  - 9 What is the main disadvantage of using RAPD markers?
  - 10 Define Opines and state their significance.
  - 11 What are "bioreactors" in the context of molecular pharming?
  - 12 Define micropropagation and mention one crop where it is widely used.

