2025

(CBCS)

(6th Semester)

BOTANY

TWELFTH PAPER

(Plant Biotechnology and Experimental Embryology)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A—OBJECTIVE)

(*Marks* : 10)

Tick (✓) the correct answer in the brackets provided : 1×10=10

1. In cloning, restriction enzymes that produce sticky ends are used for

(a) ease of transformation ( )

(b) easy and efficient insertion of DNA segments into plasmids ( )

(c) easy identification of plasmids with antibiotic resistance ( )

(d) easy screening of plasmids having inserts ( )

2. Which of the following is not a basic requirement of PCR reaction?

(a) Two oligonucleotide primers ( )

(b) DNA segment to be amplified ( )

(c) A heat-stable DNA polymerase ( )

(d) A T4 DNA ligase ( )

3. Identify the protein that is not used as a reporter gene in plants.

(a) Green fluorescent protein ( )

(b) Luciferase ( )

(c) Taq polymerase ( )

(d) -galactosidase ( )

4. The Ti plasmid of *Agrobacterium tumefaciens* contains inverted border repeat sequences which flank the

(a) T-DNA region ( )

(b) *vir* region ( )

(c) opine biosynthesis region ( )

(d) *ori* region ( )

5. The pH of a plant tissue culture media is ideally maintained at

(a) 3·8 ( ) *(b)* 4·5 ( )

(c) 5·8 ( ) *(d)* 6·5 ( )

6. The sterilized plant part which is inoculated for plant tissue culture is called as

(a) protoplast ( ) *(b)* explant ( )

(c) cybrid ( ) *(d)* callus ( )

7. An example of insecticidal protein produced by *Bacillus thuringiensis* is

(a) MATK ( ) *(b)* EcoP1 ( )

(c) Cry1Ac ( ) *(d)* VirE2 ( )

8. Antisense RNA technology has been used in the production of

(a) Bt cotton ( )

(b) Roundup Ready cotton ( )

(c) golden rice ( )

(d) Flavr Savr tomato ( )

9. In protoplast fusion, the plasma membranes of two or more protoplasts can come in intimate contact due to the absence of

(a) nuclear membrane ( )

(b) cell wall ( )

(c) cytoplasm ( )

(d) cell membrane ( )

10. Cybrids are hybrids generated by the fusion of

(a) a nucleated cell with an enucleated cell ( )

(b) a nucleated cell with another nucleated cell ( )

(c) an enucleated cell with another enucleated cell ( )

(d) a nucleated cell with nucleus of another cell ( )

(SECTION : B—SHORT ANSWERS)

(*Marks* : 15)

Write short notes on/Answer the following : 3×5=15

UNIT—I

1. Restriction enzymes

OR

2. What is a palindrome sequence?

UNIT—II

3. Gene gun

OR

4. Importance of *Agrobacterium tumefaciens* in plant transformation

UNIT—III

5. Nutrient medium

OR

6. Heat sterilization method used in tissue culture

UNIT—IV

7. Importance of biotechnology in agriculture

OR

8. Transgenic tomato using an example

UNIT—V

9. Somatic embryos

OR

10. Cybridization

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

Answer the following : 10×5=50

UNIT—I

1. What are the characteristics of a cloning vector? Give an account on cloning vectors with special emphasis on any two. 2+8=10

OR

2. Write short notes on the following : 5+5=10

(a) DNA ligases

(b) PCR

UNIT—II

3. What are reporter genes? Write an account on any two reporter genes used in plant biotechnology. 2+8=10

OR

4. Briefly describe the following : 5+5=10

(a) *Agrobacterium*-mediated plant transformation

(b) Any two enzymes used in molecular cloning

UNIT—III

5. Describe the procedures involved in the cryopreservation of plants. 10

OR

6. Write short notes on the following : 5+5=10

(a) Synthetic seeds

(b) Totipotency

UNIT—IV

7. Give an account on genetically engineered golden rice. 10

OR

8. Briefly describe the following : 5+5=10

(a) Bt cotton

(b) Plantibodies

UNIT—V

9. What is a somatic embryogenesis? Describe the developmental pathways of a somatic embryo in culture. 2+8=10

OR

10. Write short notes on the the following : 5+5=10

(a) Protoplast fusion

(b) Micropropagation

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