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(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. EcoRI cuts its restriction site generating

- (a) blunt ends ()
- (b) sticky ends ()
- (c) both blunt and sticky ends ()
- (d) neither blunt nor sticky ends ()

2. An enzyme which plays an important role in the insertion of desired DNA into a vector is
- (a) RNA polymerase ()
 - (b) DNA ligase ()
 - (c) reverse transcriptase ()
 - (d) *Taq* polymerase ()
3. Transgenic plants can be obtained by
- (a) gene gun method ()
 - (b) *Agrobacterium*-mediated transformation ()
 - (c) microinjection of DNA ()
 - (d) All of the above ()
4. Gene gun is used for the
- (a) amplification of DNA ()
 - (b) cloning of vectors ()
 - (c) preservation of DNA ()
 - (d) transformation of plant cells ()
5. An undifferentiated proliferation of cells in tissue culture is known as
- (a) protoplast ()
 - (b) somatic embryoid ()
 - (c) callus ()
 - (d) shoot bud ()
6. The temperature of liquid nitrogen used to cryopreserve tissue is
- (a) $-196\text{ }^{\circ}\text{C}$ ()
 - (b) $-169\text{ }^{\circ}\text{C}$ ()
 - (c) $-961\text{ }^{\circ}\text{C}$ ()
 - (d) $-691\text{ }^{\circ}\text{C}$ ()

7. The carotene desaturase gene in golden rice has been sourced from

- (a) *Oryza sativa* ()
- (b) *Narcissus pseudonarcissus* ()
- (c) *Erwinia uredovora* ()
- (d) *Zea mays* ()

8. Which of the following is a widely grown transgenic crop in India?

- (a) Golden rice ()
- (b) Flavr Savr tomato ()
- (c) Bt cotton ()
- (d) Bt brinjal ()

9. Protoplast can be induced to fuse with the help of

- (a) polyethylene glycol ()
- (b) macerozyme ()
- (c) dimethyl sulphoxide ()
- (d) 70% alcohol ()

10. The *in vitro* clonal propagation of plants is also known as

- (a) genetic engineering ()
- (b) micropropagation ()
- (c) macropropagation ()
- (d) cultivation ()

(SECTION : B—SHORT ANSWER)

(Marks : 15)

Write short notes on the following :

3×5=15

UNIT—I

1. Ligase

OR

2. Methylase

UNIT—II

3. Gene gun

OR

4. Significance of *Agrobacterium tumefaciens*

UNIT—III

5. Totipotency

OR

6. Synthetic seeds

UNIT—IV

7. Golden rice

OR

8. Plant biotechnology in agriculture

UNIT—V

9. Embryo culture

OR

10. Protoplast isolation

(SECTION : C—DESCRIPTIVE)

(Marks : 50)

Answer the following questions :

10×5=50

UNIT—I

1. Give an account of plasmids and bacteriophages as cloning vectors with examples and mention the characteristics of an ideal vector. 8+2=10

OR

2. Write short notes on the following : 5+5=10
- (a) Type II restriction enzymes
- (b) Polymerase chain reaction

UNIT—II

3. What is the main role of a reporter gene? Mention some reporter genes used in plant transformation. 2+8=10

OR

4. Briefly describe the following : 5+5=10
- (a) Genetically engineered plants
- (b) Two important enzymes used in molecular cloning

UNIT—III

5. Describe the different sterilization methods used in plant tissue culture. 10

OR

6. Write short notes on the following : 5+5=10
- (a) Explants
- (b) Cryopreservation

UNIT—IV

7. Give an account of genetically modified tomato highlighting some commercially introduced varieties. 10

OR

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

(a) Bt cotton

(b) Significance of plantibodies

UNIT—V

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

OR

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

(a) Cybridization

(b) Micropropagation
