

Total number of printed pages-4

3 (Sem-6/CBCS) BOT

2025

BOTANY

(Honours Core)

Paper : BOT-HC-6026

(Plant Biotechnology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Fill in the blanks : 1×7=7
- (a) _____ culture is used to obtain haploid plants.
- (b) _____ is an example of cloning vector.
- (c) Colony hybridization is used for _____.
- (d) _____ is an example of reporter gene.
- (e) _____ is genetically modified glyphosate-resistant soyabean.

(f) _____ is a type of hybrid plasmid that contains a Lambda phage cos sequence.

(g) Ti-plasmid is found in _____.

2. Write short notes on the following topics :
2×4=8

(a) Shuttle vector

(b) Polymerase Chain Reaction (PCR)

(c) Bt-Cotton

(d) Somatic embryogenesis

3. Answer **any three** of the following :
5×3=15

(a) What are the essential components of media used in plant tissue culture? How do variations in composition affect growth and development in cultured tissues?
3+2=5

(b) Mention various types of restriction endonucleases and briefly discuss their biological roles. Which type of restriction endonucleases are used in recombinant DNA technology and why?
3+2=5

(c) Explain the process of bacterial transformation and how it can be used to introduce recombinant DNA/plasmid into a host organism. 2+3=5

(d) Discuss about the biosafety concerns associated with genetically engineered products.

(e) What is the difference between selectable marker gene and reporter gene? Briefly describe the uses of these genes in transgenic research. 2+3=5

4. Answer **any three** of the following :
10×3=30

(a) What is totipotency? How tissue culture technique can be used for secondary metabolites production and germplasm conservation? 2+8=10

(b) Describe the structure and function of pUC18 or pUC19 plasmids. Why they are commonly used as cloning vectors? How YACs (Yeast Artificial Chromosomes) differ from BACs in terms of capacity and functionality?
4+2+4=10

(c) Define recombinant DNA. Describe the steps involved in creating a recombinant DNA molecule using PCR mediated approach. 2+8=10

(d) Describe the genetic manipulations required to develop pest resistance and herbicide resistance in crops. Mention the name of some commercialized transgenic plants having pest and herbicide resistance. $7+3=10$

(e) Describe various methods employed for gene transfer in plants. What are the advantages of *Agrobacterium* mediated gene transfer ? $6+4=10$

(f) What are the uses of cDNA and genomic libraries ? Describe the procedure of preparation of cDNA and genomic libraries. $3+7=10$