3 (Sem–6/CBCS) BOT HC 2

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
