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**3 (Sem-6/CBCS) BOT HC 2**

**2022**

**BOTANY**

(Honours)

Paper : BOT-HC-6026

**(Plant Biotechnology)**

Full Marks : 60

Time : Three hours

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

1. Answer **any seven** of the following :

1×7=7

- (a) Who invented PCR technique in 1985 ?
- (b) Define phagemids.
- (c) Is GUS a Reporter gene ?
- (d) What is somaclonal variation ?
- (e) What kind of plant growth regulator can be used in plant tissue culture technique ?

**Contd.**

- (f) The term 'restriction endonuclease' was coined by \_\_\_ and \_\_\_ (1964) to describe the nuclease enzymes that destroy ('restrict') any foreign DNA entering the host cell. (Fill in the blanks)
- (g) \_\_\_ utilizes overlapping fragments of a particular chromosome to isolate gene of interest which may be present upstream and downstream from the original DNA fragment. (Fill in the blanks)
- (h) What do you understand by 'gene construct'?
- (i) The use of very low temperatures to preserve structurally intact living cells and tissues is known as \_\_\_\_\_. (Fill in the blanks)
- (j) Mention *at least one* feature of a type II restriction enzyme useful in recombinant DNA technology.

2. Answer very briefly **any four** of the following :

2×4=8

- (a) What are retroviruses ?
- (b) Define organogenesis.
- (c) "The plasmids are named on the basis of certain criteria." Explain by citing an example.
- (d) What are the *two* aspects that are considered while using a cosmid for gene cloning in *E.coli* ?

- (e) Why is selectable marker very essential ?
- (f) What is the role of media in plant tissue culture ?
- (g) What are shuttle vectors ?
- (h) What is the purpose of microinjection ?

3. Answer **any three** of the following :  $5 \times 3 = 15$

- (a) Advantages of germplasm storage
- (b) Role of transgenics in bio-remediation
- (c) Application of restriction endonucleases
- (d) Distinction between yeast artificial chromosomes (YACs) and bacterial artificial chromosomes (BACs) vectors.
- (e) Ti plasmid
- (f) Totipotency
- (g) cDNA library
- (h) Gene therapy

4. Answer **any three** of the following :

$10 \times 3 = 30$

- (a) What are haploid plants ? Give an account of different methodologies that could be employed for production of haploid plants. State their applications.

$2 + 6 + 2 = 10$

(b) What is protoplast fusion ? Discuss the techniques involved in protoplast isolation, purification and fusion.

2+8=10

(c) What are genetically modified crops ? Discuss their advantages and disadvantages.

2+4+4=10

(d) "Transgenic plants are plants whose DNA is modified using genetic engineering techniques." Explain the steps involved in the production of transgenic plants.

(e) Describe in detail the direct methods of gene transfer by electroporation and microprojectile bombardment.

5+5=10

(f) What is PCR ? What are the requirements of PCR ? Add a note on the applications of PCR.

2+5+3=10

(g) "Vectors are the DNA molecules that act as a vehicle for carrying a foreign DNA fragment when inserted into a host cell." Explain with the help of examples. Discuss about pUC 18, pUC 19, and pBR322.

(h) Which media is commonly used in plant tissue culture ? Describe the process involved in the preparation of tissue culture media.