

**M.Sc. BOTANY**  
**FOURTH SEMESTER**  
**CYTOGENETICS & PLANT BREEDING**  
**MSB-403 A**

(Use separate answer scripts for Objective & Descriptive)

**Duration : 3 hrs.**

**Full Marks : 70**

**( PART-A : Objective )**

**Time : 20 min.**

**Marks : 20**

**Choose the correct answer from the following:**

**1x20=20**

- Blue eye colour is recessive to brown eye colour. A brown eyed man whose mother was blue eyed marries a blue eyed woman. The children will be:
  - All blue eyed
  - All brown eyed
  - Blue eyed and brown eyed 3:1
  - Blue eyed and brown eyed 1:1
- Direct DNA uptake by protoplast can be stimulated by:
  - Luciferin
  - PEG
  - Decanal
  - All of these
- Vir genes required for the T-DNA transfer and processing are located:
  - On the T-DNA
  - On the plant genome
  - Outside the T-DNA
  - None of these
- Which of the following is not required for PCR reaction?
  - Dd NTPs
  - A thermostable DNA polymerase
  - Primers
  - Template DNA
- Monoclonal antibodies are:
  - Heterogenous antibodies produced from single clone of plasma cells.
  - Homogenous antibodies produced from single clone of plasma cells.
  - Both a and b.
  - None of the above.
- Calculation of broad-sense heritability takes in account:
  - Additive and dominant interaction only.
  - Additive, dominant and epistatic interaction.
  - Only epistatic interactions.
  - Only environmental variability
- In a random sample of 100 plants from a population, the number of genotypes of TT is 30, Tt is 50, tt is 20. What is the allelic frequency of 'T'?
  - 0.50
  - 0.80
  - 0.30
  - 0.55
- A cybrid is:
  - A sex hybrid.
  - A hybrid formed by cell fusion.
  - A plant produced by cell culture.
  - Addition of new alleles in the population.

9. Synthetic seeds is produced by encapsulating somatic embryos:  
 a. Sodium chloride                      b. Sodium alginate  
 c. Sodium acetate                        d. Sodium nitrate
10. Part of plant used for in-vitro culture is called:  
 a. Scion                      b. Callus                      c. Explant                      d. Stock
11. An organism with one extra chromosome ( $2n + 1$ ), instead of the normal diploid ( $2n$ ) is known as:-  
 a. Monoploid                                      b. Monosomic  
 c. Trisomic                                        d. Tetrasomic
12. Polyethylene glycol is:  
 a. Fusogenic chemical                      b. Electrofusion stimulant  
 c. Callus stimulant                            d. Differentiation stimulant
13. The hybridomas are made up of:  
 a. Fusing T cells with myeloma cells.  
 b. Fusing B cells with myeloma cells.  
 c. Fusing helper T cells with myeloma cells.  
 d. Fusing B memory cells with myeloma cells.
14. Which of the following is true regarding PCR?  
 a. Denaturation involves heating at  $90-98^{\circ}\text{C}$ .  
 b. Annealing involves binding of primers between  $40-60^{\circ}\text{C}$ .  
 c. Primer extension at  $72^{\circ}\text{C}$ .  
 d. All of these.
15.  $2n - 2$  is a:  
 a. Monosomic                      b. Nullisomy                      c. Trisomy                      d. None
16. cDNA is produced from:  
 a. tRNA                      b. rRNA                      c. mRNA                      d. DNA
17. Polyploidy is induced through:  
 a. Irritation                                      b. Mutagenic chemicals  
 c. Ethylene                                        d. Colchicine
18. Which of the following is untrue about DNA sequencing method?  
 a. Purified fragments of DNA cut from plasmid/phage clones or amplified by PCR.  
 b. Clones of DNA fragment are denatured to single strands, and one of the strands is hybridized to an oligonucleotide primer.  
 c. Taq polymerase is quite heat sensitive.  
 d. New strands of DNA are synthesized from the end of the primer.
19. Which of the following blotting technique is used for study of protein?  
 a. Northern                                      b. Southern  
 c. Eastern                                        d. Western
20. Which of the following is used a model organism?  
 a. *Arabidopsis thaliana*                      b. *Hibiscus rosacynansis*  
 c. *Solanum tuberosum*                        d. *Ocimum species*

( **PART-B : Descriptive** )

Time : 2 hrs. 40 min.

Marks : 50

[ Answer question no.1 & any four (4) from the rest ]

1. Write a note on *Agrobacterium* mediated gene transfer in plants. Give diagram. 10
2. Write notes on: 5+5=10  
 a. Somaclonal variation.  
 b. Micropropagation.
3. What is DNA sequencing? Write in brief the F. Sanger's mechanism of DNA Sequencing. 2+8=10
4. What principle is involved in Blotting technique? Give an account on Southern Blotting technique. 4+6=10
5. Write notes on: 5+5=10  
 a. Model organism in molecular biology.  
 b. Polyploidy inheritance.
6. What are markers? Write note on QTL mapping citing drought resistance as example. 4+6=10
7. What is heritability? Discuss the Hardy-Weinberg law. 3+7=10
8. Write short notes on: 5+5=10  
 a. cDNA library.  
 b. Vectors.

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