

M.Sc. BOTANY  
FOURTH SEMESTER  
CYTOLOGY, GENETICS & PLANT BREEDING  
MSB - 402A

( Use Separate Answer Scripts for Objective & Descriptive )

Duration: 3 hrs.

Full Marks: 70

Time: 20 min.

( PART-A: Objective )

Marks: 20

*Choose the correct answer from the following:*

*1X20=20*

- Which phrase is not true about backcross breeding
  - It is a practice that has been used by plant breeders for decades
  - Backcross breeding is repeated until the offspring has 99+% elite genes and the transgene
  - Backcross breeding is a new technique developed for genetically engineered plants
  - Backcross breeding is often used to reduce yield drag
- If the somatic chromosome number for an organism is  $2n = 16$ , the hexaploid number would be
  - 16
  - 32
  - 48
  - 64
- Which of the following does not belong to factors affecting the Hardy Weinberg principle?
  - Gene migration
  - Genetic drop
  - Genetic drift
  - Mutation
- The ability to produce superior hybrids as a result of hybridization is called
  - Combining ability
  - Compound ability
  - Matching ability
  - Pairing ability
- Which of the following does not belong to the Hardy-Weinberg principle
  - Allele frequency varies from species
  - Used algebraic equations
  - Frequency remained fixed through generations
  - Gene pool remains a constant
- It is known that the total sum of all the frequencies of the allele is \_\_\_\_\_
  - Two
  - four
  - Three
  - one
- The study of chromosomes and genomic structure, function, and variation and their role in human disease and heredity is known as
  - Karyotype
  - Cytogenetics
  - Ploidy
  - Idiogram
- The genotypic ratio of a monohybrid cross is?
  - 3:1
  - 2:1:1
  - 1:2:1
  - 9:3:3:1

9. The crossing of F1 to either of the parent is known as?
  - a. Test cross
  - b. Back cross
  - c. F1 cross
  - d. All of these
10. Homozygosity and heterozygosity of an individual can be determined by?
  - a. Backcross
  - b. Self-fertilization
  - c. F1 cross
  - d. Test cross
11. Duplication of Centrosomes takes place in which of the following phase?
  - a. S phase
  - b. G0 Phase
  - c. G1 Phase
  - d. None of these
12. Which of the following checkpoint is considered a restriction point?
  - a. M Checkpoint
  - b. G1 Checkpoint
  - c. G2 Checkpoint
  - d. None of the above
13. Which of the following groups of proteins associate with kinases and are synthesized and degraded at specific points during the cell cycle?
  - a. Cyclins
  - b. Growth factors
  - c. Cyclin dependent kinases
  - d. Survival factors
14. What is the other name of DSB repair pathway?
  - a. RecBAD pathway
  - b. RecBCD pathway
  - c. RecABD pathway
  - d. RecDCB pathway
15. What is branch migration?
  - a. Break and reformation of identical base pairs
  - b. Resolution
  - c. Formation of heteroduplex DNA
  - d. Dissolution occurs
16. What does the structural gene ( $\gamma$ ) of a lac operon code for?
  - a.  $\beta$ -galactosidase
  - b. Transacetylase
  - c. Permease
  - d. Glucagon
17. The splice site is found in \_\_\_\_\_
  - a. 3' end of exon
  - b. 5' end of intron
  - c. Within the exon
  - d. Within the intron
18. In how many steps protein biosynthesis takes place?
  - a. 2
  - b. 3
  - c. 4
  - d. 5
19. The eukaryotic mRNA binding to the ribosomes is facilitated by \_\_\_\_\_
  - a. T-RNA
  - b. Poly-A tail
  - c. Shine Dalgarno sequence
  - d. 7-methyl guanosine cap
20. Which enzyme is not used in mismatch repair
  - a. Mut S
  - b. Mut L
  - c. Mut M
  - d. Mut H

**( PART-B :Descriptive )**

Time : 2 hrs. 40 min.

Marks : 50

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

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|--|--------|
| 1. Describe the procedure of backcross method for the transfer of a recessive gene. Discuss the merits and demerits of the backcross method of breeding. | 5+5=10 |
| 2. Explain the Hardy-Weinberg law in detail with the help of suitable formulae   | 10     |
| 3. Give the detail account of structural and functional analysis of plant genome in relation to crop improvement   | 5+5=10 |
| 4. Write short notes on (a) structure of chromosome (b) polyploidy   | 5+5=10 |
| 5. Describe different methods used for DNA repair  | 10     |
| 6. Describe briefly about regulation of cell cycle   | 10     |
| 7. Describe briefly about expression of gene in prokaryotes  | 10     |
| 8. Write the mechanism of molecular recombination.   | 10     |

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