M. Sc. BOTANY
SECOND SEMESTER
CYTOGENETICS & PLANT BREEDING
MSB – 203

(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: ***1×20=20***

1. Which method is suitable for specific gene transfer?
   a. Bulk method
   b. Back cross method
   c. Pedigree method
   d. Both A and B

2. A variety which is a mixture of several single cross hybrids is
   a. Hybrid variety
   b. Synthetic variety
   c. Back cross variety
   d. Pedigree Variety

3. Which method is suitable for transferring cytoplasm
   a. Bulk method
   b. Back cross
   c. Pedigree method
   d. Both A and B

4. Which of the following compounds is functionally similar to Thymine and pairs with Adenine?
   a. Keto form of 5-Bromo Uracil
   b. Enol form of 5-Bromo Uracil
   c. 7-Ethyl Guanine
   d. 2-Amino Purine

5. Exchange of chromosomal segments between two non-homologous chromosomes is known as
   a. Robertsonian translocation
   b. Reciprocal Translocation
   c. Insertion
   d. Duplication

6. Which second messenger signals the release of Ca++ from the endoplasmic reticulum
   a. Cyclic AMP
   b. Cyclic GMP
   c. 1,2 Diacylglycerol
   d. Inositol triphosphate

7. Cri du chat is caused due to:
   a. Duplication
   b. Translocation
   c. Inversion
   d. Deletion

8. 2n-2 is associated with
   a. Monosomy
   b. Trisomy
   c. Nullisomy
   d. Triploidy

9. In a family, father is having a disease and mother is normal. The disease is inherited to only daughters and not to the sons. What type of disease is this?
   a. Sex linked dominant
   b. Sex linked recessive
   c. Autosomal dominant
   d. Autosomal recessive

10. A women with one gene for haemophilia and one gene for colour blindness on one of the X chromosome marries a normal man. How will the progeny be
    a. Haemophilic and colour blind daughter
    b. All sons and daughter are haemophilic and colour blind
    c. 50% haemophilic and colour blind sons and 50% normal sons
    d. 50% haemophilic colour blind sons and 50% colour blind daughters

11. Muller was first to produce induced mutations in ____ by exposing them to X rays
    a. *Paramecium* b. *Arabidopsis*
    c. *Drosophila* d. *Xenopus*

12. The genetic marker development technique that uses both restriction enzymes and PCR is
    a. RAPD b.AFLP c. SSR d. RFLP

13. Which of the following hormones use cAMP second messenger
    a. Insulin b.Thyroxin c. Glucagon d. Aldosteron

14. Which of the following statements about G protein is **False**
    a. They are involved in signaling cascade
    b. They bind to and are regulated by guanine nucleotides
    c. They become activated when bound to GDP
    d. They must be active before the cell can make needed cAMP

15. Simple nerve reflexes use signaling molecules called
    a. Neurotransmitters b. Thyroxine
    c. Nitric oxide d. Proteases

16. Which of the following is not ionizing radiation
    a. X rays b. UV rays
    c. Cosmic rays d. Alpha rays

17. If half offspring are recessive, this means that individual was a
    a. homozygous dominant b. heterozygous dominant
    c. homozygous recessive d. heterozygous recessive

18. Test cross involves breeding of a phenotypically dominant individual with a phenotypically
    a. recessive individual b. dominant individual
    c. can be with any individual d. none of above

19. *Mirabilis jalapa* is a good example of
    a. Complete dominance b. Plastid inheritance
    c. Both (a) and (b) d. None of the above

20. What is the other name for "incomplete dominance"
    a. Blending inheritance b. Co-dominance
    c. Pseudo-dominance d. All the above

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Contd....

(PART-B : Descriptive)

Time : 2 hrs. 40 min. **Marks : 50**

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

1. Construct a linkage map showing the correct order of the three genes, the map distance and calculate the interference value for the following data 10

x y +/x y z	366
+ + z/ x y z	380
x y z/ x y z	24
+ y z/ x y z	89
+ + +/ x y z	30
x + +/ x y z	105
x + z/ x y z	2
+ y +/ x y z	4

2. **Write short notes on:** 5+5=10
    a. Molecular mechanism of mutation
    b. Aberration in chromosomal Number

3. What are molecular markers? Explain the technique of DNA fingerprinting. Write the applications of DNA fingerprinting. 2+5+3 =10

4. What is the difference between dominance and epistasis? Discuss the genetical and biochemical aspects of duplicate recessive epistasis with proper example. 2+8 =10

5. What are X-linked genes? Discuss the inheritance pattern of haemophilia-A gene. 2+8=10

6. What is progeny test? Describe the pureline theory of Jahannsen. 2+8 =10

7. Write very short notes on: 2.5x4=10
    a. Procedure of Pedigree method
    b. Application of Bulk method
    c. 5 merits of synthetic variety
    d. Demerits of Back cross method

8. **Write notes on:** 3+3+4 =10
    a. Second messenger
    b. G-protein mediated signalling pathway

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