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

1. The virus mediated gene transfer using genetically modified bacteriophages is called
   a. Transfection b. transduction
   c. transformation d. Conjugation

2. Which of the following bacterium is considered as 'natural genetic engineer'
   a. Agrobacterium tumefaciens b. Agrobacterium radiobactor
   c. Pseuudomonas putida d. Thermus aquaticus

3. The injection of DNA into developing inflorescence using a hypodermic syringe is called
   a. macroinjection b. Micromanipulator mediated DNA delivery
   c. microinjection d. Microfection

4. Emasculation in coconut tree is done by
   a. Removing anthers from the male flower b. the male flowers from the inflorescence
   c. Removing anthers from the bisexual flowers Removing d. Removing anthers from the male flowers before anthesis

5. How many factors affect the Hardy Weinberg principle
   a. Five b. Seven
   c. Four d. Six

6. Elite plants of a population are selected at the time of harvest and their seeds are bilked for sowing in the next season is termed as
   a. Pureline selection b. Mass selection
   c. Linebreeding d. Recurrent selection

7. _____ is a group of individuals of same species inhabiting a specified area
   a. Niche b. habitat
   c. Population d. collection

8. The complete set of genetic information contained within the members of a population is called_____
   a. DNA b. Chromosome
   c. Gene drop d. Gene pool

9. A locus at which two or more genes contribute in the expression of complex trait and it inheritance is called
   a. Qualitative trait locus
   b. Qualitative inheritance
   c. Quantitative trait locus
   d. Quantitative inheritance

10 AFLP is a_____ marker
   a. Co-dominant
   b. PCR based
   c. Hybridized
   d. Dominant

11 Which of the following statements is true about migration of biomolecules?
   a. The rate of migration is directly proportional to the resistance of medium
   b. Rate of migration is directly proportional to current
   c. Low voltage is used for separation of high mass molecules
   d. Rate of migration is inversely proportional to current

12 Which of the following factors does not influence electrophoretic mobility?
   a. Molecular weight
   b. Shape of molecule
   c. Size of molecule
   d. Stereochemistry of molecule

13 Blotting describes the _____ of nucleic acids.
   a. Monitoring
   b. Immobilization
   c. Racing
   d. Comparison

14 Larger DNA fragments require a _____ transfer time.
   a. Longer
   b. Shorter
   c. Medium
   d. Very high

15 If two successive PCR are carried out, it is called as _____
   a. Real time PCR
   b. Reverse transcriptase PCR
   c. Combined PCR
   d. Nested PCR

16 Which device used for testing of Covid-19?
   a. Reverse transcriptase PCR
   b. Real time PCR
   c. Real time Reverse transcriptase PCR
   d. Nested PCR

17 In SDS-PAGE, protein sample is first treated with detergent sodium dodecyl sulfate (SDS), in order to
   a. Make the protein become negatively charged.
   b. Make the protein become positively charged.
   c. Renature the protein.
   d. adjust the pH of protein.

18 In an SDS-PAGE
   a. proteins are denatured by the SDS
   b. proteins have the same charge-to-mass ratio
   c. smaller proteins migrate more rapidly through the gel
   d. all of the above

19. What are somaclones?
    a. Plants chemically identical to the original plant
    b. Plants morphologically identical to the original plant
    c. Plants anatomically identical to the original plant
    d. Plants genetically identical to the original plant

20. Which of the following is not an application of tissue culture?
    a. Rapid Clonal Propagation
    b. Somaclonal Variations
    c. Embryo rescue
    d. Transgenic plants

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PART-B :Descriptive

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

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

1. a. How many A and a alleles are present in a sample of organisms consisting of 10 AA, 15 Aa, and 4 aa individual? **5+5=10**

   b. What are the allele frequencies in this sample?

2. Briefly describe the multiple factor hypothesis of polygenic inheritance. **10**

3. Define heritability and briefly describe the methods for its estimation. How does knowledge of heritability aid selection? **5+5=10**

4. Describe the technique of gene cloning. **10**

5. Describe the technique of Gel Electrophoresis. **10**

6. Write short notes on **5+5=10**
   a. PCR
   b. Somaclonal variation

7. What is micropopagation? Describe the process and benefits. **1+7+3 =10**

8. Write short notes on **5+5=10**
   a. Nuclear hybrids
   b. cybrids

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