M.Sc. BIOTECHNOLOGY
THIRD SEMESTER
PLANT & ANIMAL BIOTECHNOLOGY
MBT-302

(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. In plant tissue culture which one shows totipotency?
   a. Meristem b. Sieve cells
   c. Xylem vessels d. Phloem

2. The technique that uses electric pulses for fusion of protoplast:
   a. High pH and high calcium b. PEG treatment
   c. Electrofusion d. All of the above

3. The embryo like structures formed from the mass of callus is called:
   a. Androgenic embryo b. Parthenogenic embryo
   c. Somatic embryo d. None of the above

4. What is de-differentiation?
   a. Meristem to differentiated cell b. Differentiated cell to meristem
   c. Meristem to embryo d. Embryo to plantlets

5. In plant tissue culture which one is used as growth factor?
   a. 2,4-D b. Zeatin
   c. BAP d. All of the above

6. Virus free plant can be obtained by which of the following method?
   a. Bud culture b. Callus culture
   c. Meristem culture d. Ovary culture

7. Molecular techniques used for the isolation of somatic hybrids is/are:
   a. Isoenzyme analysis b. RAPD
   c. Microsatellite d. All of the above

8. Batch cultures are type of suspension culture where:
   a. Medium is continuously replaced.
   b. Medium is loaded only at the beginning.
   c. No depletion of medium occurs.
   d. Cellular wastes are continuously removed and replaced.

9. What is usually the chromosomal constitution of a hybrid plant?
   a. Half b. Same
   c. Double d. None of the above

10. Artificial seeds are:
    a. Seeds produced in laboratory condition b. Seeds encapsulated in a gel
    c. Somatic embryos encapsulated in a gel d. Zygotic embryos encapsulated in a gel

11. T-DNA part of the Ti plasmid has the following genes:
    a. Auxin production
    b. Cytokine production
    c. Opine synthesis
    d. All of the above

12. Hairy root cultures are induced by transforming plant cells with:
    a. Virus
    b. *Agrobacterium tumifeciens*
    c. *Agrobacterium rhizogenes*
    d. *Bacillus thuringenesis*

13. In biolistic method the DNA molecules are bound to:
    a. Tungsten particles
    b. Gold particles
    c. Both (a) and (b)
    d. None of the above

14. Which of the following is **incorrect** in regard to binary vector?
    a. Donor vector.
    b. Multiple cloning sites.
    c. Selectable marker genes for both plant and bacteria.
    d. Broad host range.

15. An example of fusogenic agent:
    a. Methanol
    b. Polyethylene ethanol
    c. Polyethylene glycol
    d. Ethyl alcohol

16. In animal cell cultures, the addition of serum to media is essential for providing:
    a. Growth factors
    b. Amino acid for protein synthesis
    c. Nucleotide for DNA synthesis
    d. All of these

17. Animal cell cultures are used widely for the production of:
    a. Insulin
    b. Renin
    c. Monoclonal antibodies
    d. Antibacterial antibody

18. Disaggregating of cells can be achieved by:
    a. Physical disruption
    b. Enzymatic digestion
    c. Treating with chelating agents
    d. All of the above

19. In a developing embryo, stem cells can differentiate into:
    a. Ectodermm
    b. Mesoderm
    c. Endoderm
    d. All of the above

20. Animal biotechnology involves:
    a. Production of valuable products in animals using rDNA technology.
    b. Rapid multiplication of animals of desired genotypes.
    c. Alteration of genes to make it more desirable.
    d. All of the above.

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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. Define somatic hybridization. Explain the process of isolation and fusion of protoplasts. 2+4+4=10

2. What is micropropagation? Explain the process of micropropagation with the help of meristem culture. Differentiate between redifferentition and dedifferentiation. 2+6+2=10

3. Define haploid and cybrids. Describe the process of anther culture. Explain how we can achieve chromosome doubling in Haploid plants. What is the significance and uses of haploid plant production? 2+6+2=10

4. What are marker genes and reporter genes? Draw and explain the organization of Ti plasmid. Write the properties of Ti plasmid. 2+6+2=10

5. Define callus culture and suspension culture. Differentiate between batch culture and continuous culture. Add a note on the components of a plant tissue culture media. 2+3+5=10

6. Explain the process of organogenesis via callus formation. Explain the methods of identification and selection of somatic hybrids. 4+6=10

7. Write short notes on: 5+5=10
    a) Particle bombardment
    b) Binary vector

8. Define stem cells and *invitro* fertilization. Explain the types of stem cells and their origin. 3+7=10

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