

M.Sc. BOTANY
Third Semester
Biophysical instrumentation, Biotechnology and Developmental Botany

(MSB-12)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20

Part-B (Descriptive)=50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

1. Answer the following questions (any five)

2×5=10

- a) Write the theoretical basis of centrifugation.
- b) How secondary metabolites differ from primary metabolites?
- c) What is somaclonal variation? Mention its major causes.
- d) How will you generate gametoclonal variation?
- e) Define recombinant DNA and mention the enzymes involved in its development.
- f) What are the important features of the plasmid pBR322?
- g) Write a short note on double fertilization.

2. Answer the following questions (any five)

3 × 5=15

- a) Write the process of separation of plant pigments through TLC and its principles.
- b) Differentiate between transmittance and absorbance in spectrophotometry.
- c) What is somatic hybridization? Write its applications.
- d) Write briefly about the techniques of sterilization in plant tissue culture.
- e) Discuss the role of acetosyringone in *Agrobacterium* based gene transfer.
- f) Write the basic processes involved in gene cloning.
- g) Write about the different types of pollination mechanism you have studied.

OR

Describe the development of male gametophyte in Angiosperm.

3. Answer the following questions (any five)

5 × 5=25

- a) Elaborate enzyme linked immunosorbant assay (ELISA) and the important steps involved in it.
- b) Describe micropropagation. Enumerate its several usages.
- c) Differentiate between organogenesis and somatic embryogenesis.
- d) Discuss the role of biotechnology in industry and agriculture.
- e) Assume that you are going to clone a gene of your interest; which vector you will choose and what are the essential properties a cloning vector must have?
- f) Describe the functions of tapetum in microsporogenesis.
- g) Discuss different types of ovules with the help of neat diagrams.

OR

Describe different types of female gametophytes with diagrams

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(The figures in the margin indicate full marks for the questions)

Duration: 20 minutes

Marks – 20

PART A- Objective Type

Mark the correct answer of the following questions

1 × 20 =20

1. In an SDS-PAGE, which of the following tertiary interaction of a protein molecule is **NOT** affected by SDS?
 - a) Hydrophobic interactions
 - b) Disulfide bonds
 - c) Electrostatic interaction
 - d) All
2. Centrifugation separates particles based on their
 - a) Charge
 - b) Both
 - c) Sedimentation rate
 - d) None
3. UV/Vis spectroscopy is used
 - a) to detect molecular content
 - b) both
 - c) to determine structural information
 - d) none
4. Which of the following statements is **NOT** true for Thin Layer Chromatography (TLC)?
 - a) It can be used to monitored the progress of a reaction
 - b) It can be used to detect pesticides and insecticides in food and water
 - c) The principle is same to that of paper chromatography
 - d) Silica gel can be used as the mobile phase
5. Arrangement of atoms within a crystal can be identified with
 - a) Absorption spectroscopy
 - b) Thin layer chromatography
 - c) X-ray crystallography
 - d) None
6. The first androgenic haploid plants from *Datura* was produced by
 - a) Smith and Nathans
 - b) Horsh *et al*
 - c) Guha and Maheshwari
 - d) Gottlieb Haberlandt
7. Who was the first to isolate protoplast by enzyme degradation method
 - a) Cocking
 - b) Nirenberg
 - c) Kanta and Maheshwari
 - d) None
8. Polymerase chain reaction was invented by
 - a) Skoog and Miller
 - b) Kary Mullis
 - c) Robertson
 - d) None

9. Shoot bud differentiation from callus is stimulated by
 a) IAA
 b) Auxin
 c) Cytokinin
 d) All
10. Choose the odd one:- industrial biotechnology
 a) Alcohol and antibiotics
 b) Protein engineering
 c) Immobilized enzyme
 d) Bt cotton
11. Restriction endonuclease enzymes cleave
 a) Phosphodiester bonds
 b) Both
 c) Ionic bonds
 d) None
12. The first recombinant DNA using SV-40 and *E coli* was developed by
 a) Cocking
 b) Paul Berg
 c) Murashige & Skoog
 d) Zenin *et al.*
13. The recognition site of *EcoRI* is
 a) 5'AAGCTT3'
 b) 5'TCGA3'
 c) 5'GAATTC3'
 d) none
14. Which of the following genes is used as a marker gene in transformation experiments
 a) *Lac Z*
 b) *PstI*
 c) *Vir*
 d) None
15. Which of the following restriction endonucleases does not require ATP
 a) Type-I
 b) Type-III
 c) Type-II
 d) None
16. During microsporogenesis, pro-Ubisch bodies are released by
 a) Tapetum
 b) Middle layer
 c) Endothelium
 d) All
17. The two gametes in a male gametophyte is differentiated from
 a) Central cell
 b) Generative cell
 c) Vegetative cell
 d) None
18. Which of the following statements is not true for pollenkitt
 a) Found in insect pollinated species
 b) Protect pollen from ultraviolet radiation
 c) Involved in sporophytic incompatibility
 d) Forms a watery layer
19. Number of cells usually found in a mature embryo sac in most of the plants is
 a) Seven
 b) Eight
 c) Four
 d) Six
20. Circinotropous ovule is a characteristic of the family
 a) Cactaceae
 b) Rutaceae
 c) Acanthaceae
 d) None
