

KATHMANDU UNIVERSITY
End Semester Examination
July/August, 2024

Marks Scored:

Level : B.Sc.
Year : III

Course : BIOT 309
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

05 AUG 2024

Registration No.:

Date :

SECTION "A"

[10 Q. × 0.5 = 5 marks]

Choose and mark [X] in the most appropriate option from each set of choices

- In which pathway vegetative & generative cells contribute for multicellular pollen?
 Pathway I Pathway II
 Pathway III All of the above
- The viability of protoplast can be assessed by
 fluorescein diacetate test PCR test
 visual test nutritional test
- Another wall plays an important role in pollen embryo development because of
 anther wall factor organic compounds
 enzyme tapetum
- Maturation media of somatic embryo contains _____ mg/l concentration of auxin.
 0.5-1 1-2 0.01-0.1 0.05-0.1
- _____ is ideal for micropropagation of elite plants.
 Callus Leaf Nodal segment Bulb
- _____ induces callus development in the plants.
 2,4-D IAA BAP Kinetin
- _____ completely eradicates both PVX and PVS.
 apical meristem culture thermotherapy
 mixed therapy cryotherapy
- _____ can degrade plant cell wall.
 macerozyme amylase cellulase pectinase
- '*Geranium* variety' named 'Velvet Rose' has been developed by
 somatic hybridization protoplast culture
 somaclonal variation somatic embryogenesis
- In spring rape, herbicide resistant gene is located in
 nucleus chloroplast mitochondria centrosome

SECTION "B"

[5 Q. × 1 = 5 marks]

Fill in the blanks

11. *In vitro* development of haploid plants from totipotent pollen grains is known as _____
12. Desiccated synthetic seeds are encapsulated by _____
13. _____ is responsible for shoot elongation in the crops.
14. _____ is required for normal growth and development of somatic embryo.
15. Plant tissue is slowly frozen with a temperature decrease of _____ °C from 0°C to -1000C.

SECTION "C"

[10 Q. × 1 = 10 marks]

Define in one sentence:

16. Oxidative browning:
17. Callus culture:
18. Subculture:
19. Auxin:
20. Hardening off:
21. Micrografting:

22. Nutritional selection:

23. Biotransformation:

24. Elicitation:

25. Genetic complementation:

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SECTION "D"

[3 Q. × 7 = 21 marks]

Attempt ALL questions.

1. Briefly explain about deficiencies and limitations of the *in vitro* clonal propagation.
2. Describe the methods, origin, and applications of somaclonal variation in important horticulture crops.
3. Explain the methods used for induction of protoplast fusion leading to the production of somatic hybrids. Discuss the utility of this technique in crop breeding.

SECTION "E"

[34 marks]

4. Write short notes on:
 - a. *In vitro* pollination
 - b. Factors affecting haploid production
 - c. Filter paper raft nurse culture technique
 - d. Embryo culture
 - e. Synthetic seeds
 - f. Hairy root culture

[6 Q. × 4 = 24 Marks]

5. Give **TWO** major differences between:
 - a. Macronutrients and micronutrients
 - b. Cryopreservation and cryotherapy

[2 Q. × 2 = 4 Marks]

6. Explain **WHY/HOW** for the following:
 - a. Virus-free plants are developed from nucellus culture.
 - b. *In vivo* rooting is more efficient than *in vitro* rooting.
 - c. Multicellular pollen grain is formed during haploid production.

[3 Q. × 2 = 6 Marks]

