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BRAINWARE UNIVERSITY

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Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

Term End Examination 2025-2026
Programme – M.Sc.(BT)-2025
Course Name – Advances in Plant Biotechnology
Course Code - MBT10401
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) What is the role of the Ti plasmid in Agrobacterium-mediated transformation?
a) It acts as a selectable marker
b) It integrates the transgene into the plant genome
c) It produces toxins for plant defense
d) It helps in plant growth

(ii) Which method is NOT used for detecting transgenes?
a) PCR
b) Southern blotting
c) ELISA
d) NMR spectroscopy

(iii) How do transposons contribute to mutagenesis?
a) By inserting randomly into genes
b) By deleting genes
c) By silencing genes
d) By overexpressing genes

(iv) What is a promoter trap used for?
a) Identifying functional promoters
b) Silencing genes
c) Gene overexpression
d) Protein detection

(v) Which method is best for identifying gene function in a mutant plant?
a) Southern blotting
b) PCR
c) T-DNA mutagenesis
d) Mass spectrometry

(vi) Which technique helps identify transgene location in chromosomes?
a) Chromosome walking
b) ELISA
c) SDS-PAGE
d) qRT-PCR

(vii) Self-incompatibility in plants prevents which type of pollination?
a) Cross-pollination
b) Self-pollination
c) Wind pollination
d) Insect pollination

(viii) What is hybrid vigor also known as?
a) Epistasis
b) Genetic drift
c) Heterosis
d) Linkage disequilibrium

(ix) CAPS markers are developed using which technique?

a) PCR and restriction digestion
b) Southern blotting
c) qRT-PCR
d) RNA sequencing

(x) Why are SSR markers widely used in plant breeding?

a) Highly polymorphic and easy to analyze
b) Require high DNA concentration
c) Limited to dicots
d) Only work in forward genetics

(xi) Compare shoot tip culture and meristem culture in virus elimination.

a) Both eliminate viruses equally
b) Shoot tip culture is more effective
c) Meristem culture eliminates viruses better
d) Neither eliminates viruses

(xii) Compare embryogenesis and organogenesis in vitro.

a) Both require similar hormones
b) Organogenesis forms shoots and roots, embryogenesis forms embryos
c) Embryogenesis is a slower process
d) Organogenesis needs more auxins than embryogenesis

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(xiii) Assess the challenges of haploid culture in commercial agriculture.

a) Difficult to produce viable plants
b) No limitations exist
c) Haploids are always sterile
d) Haploid plants grow faster than diploids

(xiv) Assess how labeling of GM foods affects consumer choice.

a) Provides informed decision-making
b) Reduces food quality
c) Has no impact on purchasing behavior
d) Only affects organic food sales

(xv) Analyze why some environmentalists oppose GM crops.

a) Concerned about ecological risks
b) Always against technological advancements
c) Do not understand biotechnology
d) Support transgenic research

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Recommend a brief protocol for embryo culture. (3)
3. Apply a strategy to select mutants from a random mutagenesis library. (3)
4. Apply the concept of virus-induced gene silencing (VIGS) in functional genomics. (3)
5. Analyze the advantages and limitations of somatic embryogenesis in plant propagation. (3)
6. Evaluate the benefits and potential risks of transgenic crops for improved nutritional quality. (3)

OR

Assess the impact of delayed fruit ripening technology in transgenic crops. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Analyze the role of transgenic crops in mitigating abiotic stress (drought, salinity, extreme temperatures). (5)
8. Create a strategic model for sustainable transgenic crop adoption in developing countries. (5)
9. Analyze the techniques and significance of diplodization in haploid plants. (5)
10. Explain the concept of plants as bioreactors and their significance. (5)
11. Compare the advantages and limitations of different plant transformation methods. (5)
12. Evaluate the effectiveness of GM plants in combating biotic stress (pests and diseases). (5)

OR

Assess the ethical and societal concerns surrounding genetically modified (GM) crops. (5)

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