

M.Sc. BOTANY
SEMESTER III EXAMINATION DECEMBER 2024

Paper Title: **Plant Tissue Culture and Genetic Engineering** Paper Code: **MBODCE301**
Time: **2½ hours** Maximum Marks: **60**

Note: This paper has 3 sections A, B, and C.

Section A: Attempt **ALL** the questions. **Section B:** Attempt any **FOUR** questions.

Section C: Attempt any **TWO** questions.

CLO 1: relate basic concepts of plant tissue culture with their applications (understand); CLO 2: improve their knowledge of various forms of plant tissue culture (understand); CLO 3: analyze principles, tools and techniques of genetic engineering (analyze); and CLO 4: summarize various application of genetic engineering (evaluate). BTL-Bloom’s Taxonomy Levels 1- Remembering, 2-Understanding, 3-Applying, 4-Analyzing, 5-Evaluating, 6-Creating
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SECTION A

Very Short Answer Questions (Attempt **ALL** the questions)

(15 x 1 = 15 marks)

Q.No.	Questions	Marks	CLO	BTL
1	Skoog and Miller’s Contribution	1	1	2
2	Cybrids	1	2	2
3	Fusogens	1	2	2
4	Parasexual hybridisation	1	1	2
5	Double haploid (DH) plants	1	2	3
6	Somaclonal variation	1	2	3
7	Secondary metabolites	1	2	3
8	What are the components of a YAC?	1	3	2
9	Name a method of genetic transformation common to bacteria, fungi and plants.	1	3	4
10	What is the role of terminal transferase in genetic engineering?	1	3	4
11	Name a transgenic crop developed in India (based on pollination control system) and yet to be approved for commercial release.	1	4	1
12	Differentiate between symmetric and asymmetric PCR giving ONE example of each.	1	3	2
13	Give TWO characteristic features of a typical siRNA.	1	3	2
14	What is Bollgard cotton?	1	4	2
15	Name the dominant transgenic trait, globally.	1	4	2

Please turn over

SECTION B

Short Answer Questions (Attempt any **FOUR** of the following)

(4 x 5 = 20 marks)

Q.No.	Question	Marks	CLO	BTL
1	Meristem culture and its applications	5	1	3
2	Callus vs.suspension culture.	5	2	4
3	Comment upon the terms: a) direct- and indirect embryogenesis; b) hydrated – and desiccated synthetic seeds.	5	1	4
4	Starting with a random, sequence independent and non-reproducible marker, how will you develop a unilocus, sequence-specific and reproducible marker?	5	3	5
5	How will you confirm the transgenicity/transgenic nature of a given transgenic plant?	5	3	4
6	What are some of the key strategies in engineering plants for producing biofuels?	5	4	3

SECTION C

Long Answer Questions (Attempt any **TWO** of the following)

(2 x 12.5 = 25 marks)

Q.No.	Question	Marks	CLO	BTL
1	What is protoplast? How is protoplast isolated from tissues? Differentiate ‘mixed and sequential’ method of protoplast isolation. Briefly discuss one important protoplast fusion method which you think to be the most useful.	12.5	2	3
2 a.	Briefly describe the role of auxins in plant tissue culture.	6.25	1	3
b.	With the help of a neat labelled diagram(s), explain the biogenesis of siRNA and miRNA. Bring out significant differences between the two.	6.25	3	3
3 a.	List all the candidate genes/proteins which can be used to engineer insect resistance in crop plants.	4.00	4	3
b.	With the help of neat labelled diagrams, explain how <i>Agrobacterium tumefaciens</i> mediates gene transfer in plants. Give the merits and demerits of this method/approach of gene transfer.	8.50	3	4
