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Printed Page:-4 **Subject Code:- BBT0502**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: V - THEORY EXAMINATION (2025 - 2026)
Subject: Plant Biotechnology

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*
1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. *Maximum marks for each question are indicated on right -hand side of each question.*
3. *Illustrate your answers with neat sketches wherever necessary.*
4. *Assume suitable data if necessary.*
5. *Preferably, write the answers in sequential order.*
6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. Meristem culture helps in developing (CO1, K1) 1

(a) hybrid plants
(b) virus free plants
(c) disease resistant plants
(d) tall plants

1-b. The unique feature of callus is (CO1, K1) 1

(a) it gives rise to cells only
(b) it can give rise to zygotic embryos
(c) it can give rise to root, shoot and embryoids
(d) it can give rise to flowers directly

1-c. A group of genetically similar organisms obtained by asexual reproduction is called (CO2, K1) 1

(a) Clone
(b) Population
(c) Assembly
(d) None

1-d. A gene produced for recombinant DNA technology contains a gene from one organism joined to the regulatory sequence of another gene. Such a gene is called (CO2, K1) 1

(a) oncogene
(b) junk gene
(c) chimeric gene

(d) None

1-e. Pure line breed refers to [AIIMS 2002] (CO3, K1) 1

(a) Heterozygosity only
(b) Homozygosity only
(c) Heterozygosity and linkage
(d) Homozygosity and self-assortment

1-f. Haploid plants can be obtained by culturing [BVP 2001, 02] (CO3, K1) 1

(a) Young leaves
(b) Endosperm
(c) Pollen grains
(d) Root tips

1-g. The genes introduced through somatic cell gene therapy are (CO4, K1) 1

(a) heritable
(b) non-heritable
(c) partially heritable
(d) none of these

1-h. In somatic cell gene therapy, the functional genes can be introduced into (CO4, K1) 1

(a) sperm
(b) egg
(c) any body cells
(d) germinal cells

1-i. Transgenic organisms are (CO5, K1) 1

(a) produced by gene transfer technology
(b) extinct organisms
(c) naturally occurring and endemic
(d) produced by traditional plant breeding technique

1-j. An ideal plasmid to be used for recombinant DNA technology must have (CO5, K1) 1

(a) minimum amount of DNA
(b) relaxed replication control
(c) one recognition site for one restriction endonuclease
(d) all of these

2. Attempt all parts:-

2.a. What Commercial Crops Are Propagated through Plant Tissue Culture/Micro-propagation? (CO1, K1) 2

2.b. What is gene silencing ? (CO2, K1) 2

2.c. Name any two benefits of green revolution? (CO3, K1) 2

2.d. What is cryopreservation? (CO4, K2) 2

2.e. How the genome editing can help in conservation of biodiversity. (CO5, K1) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	What is hardeninig and acclimatization? (CO1, K2)	6
3.a.(ii)	Apply the principles of plant cell culture to describe the sequential steps for establishing a cell suspension culture. (CO1, K3)	6

3.b. Answer any one of the following:-

3.b.(i)	Are de-differentiation and a higher degree of success attained in plant tissue culture experiment related to each other? (CO2, K2)	6
3.b.(ii)	What is the utility of plants that are raised through clones of the parent plant? (CO2, K2)	6

3.c. Answer any one of the following:-

3.c.(i)	What are some examples of plant tissue that can be used to regenerate adventitious shoots? (CO3, K2)	6
3.c.(ii)	What do dedifferentiation, differentiation, competency, and determination have to do with organogenesis? (CO3, K2)	6

3.d. Answer any one of the following:-

3.d.(i)	Which plant part is used for mutation treatment? (CO4, K2)	6
3.d.(ii)	How does a mutation affect plant growth? (CO4, K2)	6

3.e. Answer any one of the following:-

3.e.(i)	Write a comparative note on the transgenic and genome editing approaches in plant improvement. (CO5, K2)	6
3.e.(ii)	What are the applications of genome editing in plant science ? (CO5, K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Analyze the environmental factors that influence in-vitro plant growth and evaluate their effects on morphogenesis. (CO1, K3)	10
4-b.	Examine how plant-growth regulators influence morphogenesis in culture by analyzing hormonal interactions.(CO1, K3)	10

5. Answer any one of the following:-

5-a.	Analyze strategies to remove marker genes from plant genomes and evaluate why marker-free plants are essential. (CO2, K3)	10
5-b.	Analyze the concept of marker-free transgenics and evaluate the techniques used to produce such plants. (CO2, K3)	10

6. Answer any one of the following:-

6-a.	Differentiate hybridization breeding and mutation breeding by analyzing their procedures, objectives, and applications. (CO3, K2)	10
6-b.	Analyze the concept of mutation breeding and break down the procedural steps involved in generating useful mutants. (CO3, K2)	10

7. Answer any one of the following:-

7-a.	Examine the strategies used to prevent cryopreservation damage and analyze the role of vitrification in enhancing cryopreservation success. (CO4,K2)	10
7-b.	Analyze the concept of cryopreservation in plants and evaluate which crop species	10

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are most suitable for this technique. (CO4,K2)

8. Answer any <u>one</u> of the following:-

8-a.	Analyze the diverse applications of genome editing in plant biotechnology by breaking down how these technologies influence different plant traits.(CO5,K2)	10
8-b.	Evaluate the applications of CRISPR in plant biology and agriculture by analyzing its role in trait development and crop improvement. (CO5,K3)	10