M.TECH/BT/1ST SEM/BIOT 5141/2021

AGRICULTURAL BIOTECHNOLOGY
(BIOT 5141)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Rubisco binds to
(a) O_2 only (b) CO_2 only
(c) none (d) both

(ii) Germplasm means
(a) breeding method (b) A collection of genetic material
(c) A new disease (d) None of the above

(iii) Genome markers
(a) Must occur as multiple alleles (b) Must be repeat DNA sequences
(c) Can be any unique DNA sequence (d) Are only used in genetic maps

(iv) When fungal hyphae extends into soil and penetrate outer cells of plant root while forming branches are type of
(a) mycorrhizae (b) exomycorrhizae
(c) endomycorrhizae (d) ploromycorrhizae

(v) Cryopreservation is a technique used for
(a) Crystallization of food
(b) Food packing
(c) Seed saving
(d) Preservation of excess production of vegetables

(vi) The technology used to develop transgenic tomato is
(a) Antisense RNA (b) RNAi
(c) Sense RNA (d) none of these

(vii) Which of the following organisms forms a beneficial symbiotic relationship with plant roots to help the plant get nitrogen?
(a) Viroid (b) Mycorrhizae (c) Lichen (d) Rhizobium

(viii) The following is not a plant growth regulator
(a) Acetic acid (b) Auxins (c) Gibberellins (d) Ethylene

(ix) The BT gene was taken from:
(a) *Bacillus thuringiensis*
(b) Artificially synthesized by codon optimization
(c) Promoter region of BT-gene
(d) cotton BT gene

(x) Molecular markers are used to construct
(a) chromosome maps (b) cytogenic maps
(c) physical maps (d) all of those

Group – B

2. (a) Define molecular marker. [(CO4)(Describe/LOCQ)]
(b) Can all types of markers be called as molecular maker-justify your answer citing suitable reasons. [(CO4)(Evaluate/HOCQ)]
(c) Mention the limitations of RAPD markers. [(CO4)(Understand/IOCQ)]
(d) Mention the advantages of AFLP. [(CO4)(Understand/IOCQ)]

2 + 4 + 3 + 3 = 12

3. (a) Mention four characteristics which an ideal DNA marker should posses [(CO3)(Describe/HOCQ)]
(b) Mention in which category RAPD lies and evaluate its usefulness in crop improvement. [(CO4)(Evaluate/HOCQ)]
(c) Explain how RAPD is useful in plant biotechnology mention is limitations in plant biotechnology. [(CO4)(Analyze/IOCQ)]

4 + (1 + 3) + (2 + 2) = 12

Group – C

4. (a) Compare and contrast: breeding vs. Transgenic technology. [(CO1)(Compare/IOCQ)]
(b) How high yielding winter wheat variety was developed? [(CO1)(Evaluate/HOCQ)]
(c) Write the prospect for Second Green Revolution. Why at all it has become utmost necessary? [(CO1,2)(Analyse/HOCQ)]

4 + 4 + 4 = 12

5. (a) What is meant by photosynthetic efficiency and dry matter partitioning? [(CO2)(Remember /LOCQ)]
(b) How photosynthetic efficiency can be improved? [(CO2)(Analyze/IOCQ)]

(3 + 3) + 6 = 12

Group – D

6. (a) What are alkaloids? Give examples of two active alkaloids with their plant source and mode of action. [(CO6)(Remember/LOCQ)]
   (b) Terpenoids are secondary metabolites. Justify the statement. [(CO6)(Analyze/IOCQ)]

(2 + 3 + 3) + 4 = 12

7. (a) What are phytochemicals? Write their mode of action. [(CO2)(Describe/IOCQ)]
   (b) Write any two techniques for developing herbicide resistant plant. [(CO2)(Describe/IOCQ)]

(2 + 4) + 6 = 12

Group – E

8. (a) Mention the basic steps briefly followed to achieve a successful cryopreservation in crop protection and its precautions. [(CO1)(Describe/IOCQ)]
   (b) Describe the usefulness of haploid culture in plant tissue culture and its application. [(CO1)(Describe/IOCQ)]

(5 + 2) + (3 + 2) = 12

9. (a) Justify the role of germplasm in crop-protection. [(CO1)(Justify HOCQ)]
   (b) Cryopreservation can be done by several ways. Discuss briefly. Which of this method is better justify your choice. [(CO1)(Evaluate/HOCQ)]

4 + (6 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	21%	54%	25%

Course Outcomes (CO):

At the end of the course the student will be able to:

1. Explain the different techniques of plant tissue culture for bio-resource production.
2. Impart knowledge on all recent biotechnological developments related to the quality improvement of crops.
3. Understand role of plant along with microorganisms in agro-industry.
4. Analyze the role different molecular markers for different characters related to agronomic importance.
5. Understand the role of plants as bioresources by virtue of their secondary metabolites.

Department & Section	Submission Link
BT	https://classroom.google.com/c/NDU3NjI5NzUxNDIz/a/NDc1MTU2ODIxMzYx/details