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
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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)   PEPC binds to
          (a) O_2 only   (b) CO_2 only   (c) none   (d) both (a) & (b).

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

   (iii) Germplasm means
          (a) A collection of genetic material   (b) A breeding method
          (d) A new disease   (e) None of the above.

   (iv)   Secondary metabolites are produced in
          (a) tropophase   (b) idiophase
          (c) lag phase   (d) none of these.

   (v)   Glutathione acts as
          (a) Preservative   (b) Antioxidant
          (c) Emulsifier   (d) None of these.

   (vi)   Gramene is a
          (a) Relational database and website for grass comparative genomics
          (b) Structural database and website for graminae family
          (c) Relational database and website for graminae family
          (d) Structural database and website for grass comparative genomics.

(vii) Special hyphal tips which absorbs nutrients from host in parasitic fungi are called
(a) Rhizoids   (b) Haustoria   (c)Mycelium   (d) Typhal.

(viii) Which of the following organisms forms a beneficial symbiotic relationship with plant roots to help the plant get Nitrogen?
(a) Rhizobium   (b) Mycorrhizae   (c) Lichen   (d) Mycelium.

(ix) In developing BT-cotton, the transgene used is
(a) Exactly of identical sequence to that of *Bacillus thuringiensis*
(b) Totally different from *Bacillus thuringiensis*
(c) Codon optimization was performed
(d) Promoter was changed.

(x) 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.

Group – B

2. (a) "Nowadays molecular markers are used in diverse studies in plant genetic resources in eQTL and genetical genomics". Justify the statement with suitable example.

(b) Show how SSR markers are advantageous over the other marker systems in crop improvement.

(4 + 4) + 4 = 12

3. (a) Mention four characteristics which an ideal DNA marker should possess.

(b) Mention in which category of marker does RAPD lie.

(c) Describe how RAPD can be useful in crop improvement, citing suitable examples.

(d) In plant biotechnology usage of RAPD is limited due to certain reasons. Explain its limitations.

4 + 1 + 4 + 3 = 12

Group – C

4. (a) Compare the traditional and transgenic approach of plant improvement.

(b) How the 'Dwarf' phenotype was successfully used to develop high yielding varieties of crop?

(c) Write the prospect for Second Green Revolution. Why at all it has become utmost necessary?

4 + 4 + 4 = 12

5. Describe the two approaches taken in increasing the shelf life of tomato, mentioning the pathways that have been genetically engineered.

(6 + 6) = 12

Group – D

6. (a) Name any two antibiotics isolated from plant with their plant source and mode of action.

(b) "Flavonoids are secondary metabolites". Explain.

8 + 4 = 12

7. (a) Briefly explain the mode of action and source of, Bromelain and Allicin.

(b) Write any one method for production of phosphoinothricine-resistant plant.

(4 + 4) + 4 = 12

Group – E

8. (a) Mention the basic steps briefly followed to achieve a successful micropropagation. Describe the usefulness of this application along with the limitations.

(b) "Cyanobacteria play an important role in maintenance and build up of soil fertility". Mention how this process is achieved.

(4 + 2 + 2) + 4 = 12

9. (a) Define mycorrrhizae.

(b) Mention briefly about the different types of mycorrrhizae.

(c) Mention the usefulness of mycorrrhizae in plant system.

(b) Cite the application of it in agriculture.

2 + 3 + 4 + 3 = 12