Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(BT)/SEM-1/MBT-103/2010-11

2010-11

ADVANCED PLANT BIOTECHNOLOGY

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) Haploid plants can be made diploid by the application of

   a) digoxin b) shikonin

   c) vinblastin d) gibberellins.

   ii) Dicer is a type of

   a) protease b) cellulase

   c) ribonuclease d) polymerase.

   iii) The site of synthesis of cytokinin in a plant is/are

   a) root b) shoot apex

   c) developing seeds d) all of these.

   iv) Single-stranded *T*-DNA from *Ti* plasmid if produced by the action of which of the following gene products ?

   a) chvA and chvB b) VirD1 and VirD2

   c) VirE1 and VirE2 d) none of these.

v) The herbicidal action of Glyphosate is due to the inhibition of

a) glutamate dehydrogenase

b) EPSPS

c) glutamine synthase

d) glucose 6-P dehydrogenase.

vi) Which of the following remains the principal biotech crop occupying maximum area for cultivation ?

a) Cotton b) Canola

c) Maize d) Soybean.

vii) Which one of the following is widely used as a red pigment in various industries ?

a) Berberine b) Serpentine

c) Shikonin d) Digoxin.

viii) Manipulation of golden rice requires the introduction of the gene

a) lycopene synthase b) lycopene β-cyclase

c) lycopene desaturase d) lycopene oxidase.

ix) Introduction of designed gene constructs into plants bt homologous recombination results in

a) targeted disruption of a chosen gene

b) gene replacement

c) gene therapy

d) all of these.

x) Principal compound of Glyphosate is

a) glycine b) glutamic acid

c) alanine d) ascorbic acid.

xi) Which position India occupies in terms of growing GM crops ?

a) Third b) Fourth

c) Fifth d) Sixth.

xii) Which GM crop is most widely grown all over the world ?

a) Glyphosate-resistant soybean

b) Glyphosate-resistant canola

c) Basta-resistant soybean

d) Basta-resistant maize.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What are the different virulence genes present in the Ti plasmid. Mention the function of any two gene products involved in the transfer of T-DNA into the host plant. 2 + 3

3. Briefly describe the contribution of G. Haberlandt and F. Skoog in the development of plant tissue culture. $2\frac{1}{2} + 2\frac{1}{2}$

4. Give a brief account of DNA microarray.

5. What do you mean by reporter genes ? Describe the mode of action of any such reporter gene. 2 + 3

6. What are the oncogenes present in the T-DNA of Ti plasmid ? What are the reactions catalyzed by their products. 2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What are the tissue culture techniques you would follow for conservation of elite Germplasm ? Justify your statement.
   b) Give an outline of any such technique for germplasm conservation.
   c) Mention the importance of Androgenesis in plant breeding programme. 6 + 5 + 4
8. a) Explain the phenomenon that led to the production of white flowers due to the introduction of extra copies of chalcone synthase gene into petunia.
   b) Elaborate the role of calmodulin and IP3 in plant cell signaling process. 8 + 7
9. a) Briefly describe the gene gun method for delivery of foreign DNA into plant cells. Comment on the merits of the method.
   b) Explain how the candidate gene approach can act as a powerful tool for studying the genetic architecture of complex traits. 5 + 3 + 7
10. a) What is terminator technology ? What are the possible advantages and disadvantages of using this technology ?
    b) Describe a case study for engineering Basta-resistance in crop plant. 3 + 6 + 6
11. Write short notes on any *two* of the following : $2 \times 7\frac{1}{2}$
    a) Genetic engineering for salt resistance in plants
    b) Artificial seed
    c) Plastid engineering.