Name :	
Roll No. :	(A Annual Without States
Invigilator's Signature :	

# 2012

# **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) The first transgenic plants expressing engineered foreign genes were tobacco plants produced by the use of
  - a) Agrobacterium tumefaciens
  - b) *Bacillus thuringiensis*
  - c) Arabidopsis thaliana
  - d) Streptomyces hygroscopicus.
- ii) What are the various disadvantages of cross protection ?
  - a) Possibility of mutations in inducing mild virus stain
  - b) Possibility of synergism between inducing virus and other unrelated virus
  - c) Possibility of unnecessary spread of mild virus
  - d) All of these.

40473



- iii) Which of the following has been widely used to provide resistance against plant viruses ?
  - a) Virus resistance genes from bacteria
  - b) Expression of virus coat protein genes in transgenic plants
  - c) Expression of anti-virus genes in vectors that transmit viruses
  - d) Expression of ribonuclease (RNase) genes in host plants.
- iv) Bruise resistant tomatoes have been developed by the expression of antisense RNA against
  - a) glycerol 1 phosphate acyl transferase
  - b) polygalactouranase
  - c) ACC deaminase
  - d) sucrose phosphate synthase gene.
- v) *c*AMP and *c*GMP are derived from
  - a) ATP and GTP by the actions of adenylate cyclase and guanylate cyclase respectively
  - b) GTP and ATP by the actions of adenylate cyclase and guanylate cyclase respectively
  - c) ATP and GTP by the actions of guanylate cyclase and adenylate cyclase respectively
  - d) none of these.
- vi) Cell signalling can be classified into
  - a) three distinct types based on the distance over which the signalling molecules act
  - b) two distinct types based on the distance over which the signalling molecules act
  - c) three distinct types based on the signalling molecules
  - d) none of these.

40473



- c) replaced d) relocated.
- viii) Antisense technology
  - a) selectively blocks expression of a gene
  - b) combines genetic material from different species
  - c) combines organelles and cells
  - d) alters or transfers cells.
- ix) Which of the following is not true about the helper plasmids ?
  - a) These can replicate in Agrobacterium
  - b) These help in the mediating conjugation of intermediate vectors
  - c) These cannot replicate in Agrobacterium
  - d) All of these.
- x) Crown gall tissue
  - a) can be cultivated *in vitro* in absence of bacteria
  - b) retains tumorous properties when cultivated
  - c) both (a) and (b)
  - d) shows tumorous properties only in presence of bacteria.

40473

xi) Opines are



- a) amino acid derivatives found in tumor tissues
- b) amino acid derivatives found in normal tissues
- c) amino acid derivatives found in both normal as well as tumor tissues
- d) none of these.
- xii) Which of the following genes are constitutively expressed and control the plant induced activation of other *vir* gens ?
  - a) vir A and vir G b) vir C and vir D
  - c) vir B and vir E d) vir A and vir B.

### xiii) Integrated octopine t-DNA occurs as

a)	single segment	b)	two segments
----	----------------	----	--------------

- c) three segments d) four segments.
- xiv) Which of the following plant signal molecules regulate the expression of *vir B, C, D* and *E* in case of tobacco ?
  - a) Acetosyringone b)  $\alpha$  -hydroxy syringone
  - c) Both (a) and (b) d) None of these.
- xv) The left segment of octopine *t*-DNA (TL) is necessary for
  - a) enzymes for agropine biosynthesis
  - b) tumour formation
  - c) conjugative transfer
  - d) all of these.

40473

- xvi) Virulent strains of Agrobacterium contain large Ti-plasmids, which are responsible for the DNA transfer and subsequent disease symptoms. It has been shown that Ti-plasmids contain
  - a) one set of sequence necessary for gene transfer
  - b) two sets of sequence necessary for gene transfer
  - c) three sets of sequence necessary for gene transfer
  - d) four sets of sequence necessary for gene transfer.
- xvii) Which of the following are used as selection marker for the cells transformed with Agrobacterium ?
  - a) Neomycin phosphotransferase
  - b) Streptomycin phosphotransferase
  - c) Hygromycin phosphotransferase
  - d) Any of these.
- xviii) Auxin is chief regulatory hormone in tissue in rootshoot differentiation by
  - a) its own effect
  - b) interacting with cytokinin
  - c) interacting with gibberalin
  - d) none of these.
- xix) Epigenetic control is well established a factor in plant tissue culture involving
  - a) cell division
  - b) cell differentiation
  - c) tissue organization
  - d) somatic embryogenesis.

40473

# Utech

15

5

## GROUP – B

( Short Answer Type Questions )

Answer any three of the following

- 2. The plasma membrane contains various phospholipases that are activated by extracellular signal to cleave specific phospholipids. What is the function of phospholipase *C* in response to extracellular signals ?
- 3. Write a note on reporter genes used for plant transformation.
- 4. What is *t*-DNA ? Draw a labelled genetic map of an octopine Ti-plasmid.
- 5. Write a note on reporter genes used for plant transformation.
- Distinguish between 'Totipotent' and 'Pluripotent' state of cells in plant tissue-culture. Can it latter be changed to Totipotent ? Discuss briefly.
- 7. What is artificial seed ? Give a brief out line of the process of artificial seed production.

### **GROUP – C**

### (Long Answer Type Questions)

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

- 8. Describe the components necessary for t-DNA transfer. Name some viruses which are used for plant transformation. Describe the methods of virus mediated gene transfer in plant. 7 + 2 + 6
- 9. What is Signal transduction ? Describe the role of cyclic AMP in signal transduction. Write about the signaling pathways triggered by some plant hormones.
  2 + 8 + 5

40473

- CS/M.TECH(BT)/SEM-1/MBT-103/2012-13
- 10. What is RNA interference ? Write how it helps in gene silencing. What are the types of gene silencing in plants ? Write some strategies of gene silencing. 5+2+5+3
- 11. Define and briefly discuss the phenomenon of 'Totipotency'. State why the totipotency is not expressed in different body and tissue cells answering from anatomical regulation of differentiation to regulation at transcription-translation levels. 6+9
- 12. What is somaclonal variation, present an outline of the phenomenon with explanation on its implications and potentials to exploit in Plant Biotechnology. 4 + 11

=============

40473