



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (BT-OLD)/SEM-6/BT-601/2013**

**2013**

**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 × 1 = 10
- i) Glyphosate inhibits the activity of EPSP synthase by
    - a) metabolizing one of the substrates of this enzyme
    - b) binding to EPSP synthase in place of PEP
    - c) degrading EPSP synthase
    - d) transporting EPSP synthase to the chloroplast.
  - ii) First attempt of plant tissue culture was done by
    - a) Power
    - b) Murashige & Skoog
    - c) White
    - d) Haberlandt.
  - iii) Ornithine serves as the precursor for biosynthesis of
    - a) nicotine and cocaine
    - b) quinine and morphine
    - c) nicotine and quinine
    - d) none of these.



iv) The most widespread commercially important GM trait is

- a) herbicide resistance      b) pest resistance
- c) salt resistance            d) drought resistance.

v) Different strains of *Agrobacterium tumefaciens* produces

- a) Octopine                      b) Nopaline
- c) Agropine                      d) Any of these.

vi) Shoot meristem is used for which of the following purposes ?

- a) Andogenesis                b) Micropropagation
- c) Somatic hybridization    d) None of these.

vii) Biotransformation of digitoxin to digoxin, a cardioprotectant, involves which of the following reaction types ?

- a) Hydroxylation              b) Glycosylation
- c) Acetylation                 d) Methylation.

viii) RNA editing prevalent in the regulation of gene expression in

- a) mitochondrial genome    b) nuclear genome
- c) chloroplast genome        d) all of these.



- ix) Histone acetylation results in
- a) transcription induction
  - b) transcription inhibition
  - c) genome replication
  - d) none of these.
- x) Binary vector system is used in
- a) *Agrobacterium*-mediated plant transformation
  - b) Biolistic
  - c) Chloroplast transformation
  - d) PEG-mediated plant transformation.
- xi) Ubiquitination is the signal for
- a) protein degradation
  - b) post-translational modification
  - c) mRNA degradation
  - d) protein retention.
- xii) Different forms of Rubisco activase gene is produced by
- a) alternative splicing      b) trans splicing
  - c) spliceosomal splicing    d) none of these.
- xiii) Plant homeodomain proteins are
- a) Leucine zipper transcription factor
  - b) Zn-finger transcription factor
  - c) Developmental transcription factor
  - d) Basal transcription factor.



**GROUP – B**

**( Short Answer Type Questions )**

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

2. Mention the types of somatic embryogenesis. Also mention the role of synthetic auxin in this process.
3. Mention the role of auxin and gibberellin in plant cellular activity.
4. Mention the differences between any *two* of the following topics :
  - a) Callus culture and cell suspension culture
  - b) Co-integrative vector and binary vector
  - c) Direct embryogenesis and indirect embryogenesis.
5. Describe the structure of eukaryotic core promoter. How much of it must be taken from CaMV 35S *rRNA* promoter in cloning of a transgene ?  $3 + 2$
6. Write short note on different classes of chloroplast genome.
7. Describe the non-lysosomal pathway of protein degradation in plant. Why is this of more consequence in case of plants ? Mention its importance in plant gene regulation citing one example.  $2 + 1 + 2$



**GROUP – C**

**( Long Answer Type Questions )**

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

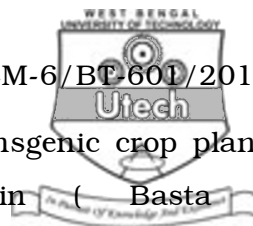
8. a) What is haploid culture ?
- b) Describe the suitable stage for androgenesis citing suitable reasons for choosing it.
- c) Briefly describe the role any four different factors which affect the *in vivo* androgenesis.
- d) Discuss any *two* applications of haploids in crop improvement.
- e) Mention the role of precursors in secondary metabolite production. Cite two suitable examples.  $1 + 2 + 4 + 4 + 4$
9. a) What is callus culture ?
- b) What are explants ?
- c) Briefly describe application of callus culture.
- d) What do you mean by “Critical Initial Cell Density” ? Mention the factors responsible for maintaining this phenomenon.  $2 + 2 + 5 + ( 2 + 4 )$

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10. a) Describe the different levels of DNA packaging into a metaphase chromosome.
- b) Conformational variation in chromatin, both chemical and sequential, plays an important role in nuclear gene regulation in plant. Justify.
- c) How *mRNA* turnover is important in plant genome regulation ?
- d) What is understood by *C*-value paradox ? 3 + 4 + 4 + 4
11. a) Mention the role of basal transcription factor in plant *mRNA* transcription stating the sequence of their arrangement in transcription initiation complex.
- b) What are the different families of plant transcription factors ? Give one example from each class.
- c) Name some important *cis*-regulatory elements that play important role to enhance plant gene transcription.

4 + 3 + 4 + 4



12. a) What is strategy for making the transgenic crop plant resistant against phosphinothricin ( Basta ) application ?
- b) Briefly describe the structure and function of Cry proteins. Mention the mode of utilization of this protein and cite two transgenic plants where this gene is transferred.
- c) What are the modifications adopted for having optimum expression level of Cry proteins in plants ? 4 + 4 + 4 + 3
13. a) What is *t*-DNA ? Discuss its structure in two different strains of *Agrobacterium*.
- b) How the transgene and selectable marker gene must be positioned in the *Ti*-plasmid ?
- c) *Agro* naturally infects dicot plants. How can it be used in monocot transformation ?
- d) Give one example of each of the following :
- Reporter gene, Inducible promoter, Chromosomal virulence gene, Superbinary vector and Supervirulent strain of *Agrobacterium*. 2 + 4 + 2 + 2 + 5
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