



Name :

Roll No. :

Invigilator's Signature :

CS/B.Sc.(H)/GEN/SEM-2/PGN-204/2013

2013

PLANT GENETICS

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) In the mitochondrial DNA, UGA codes for

a) chain termination

b) chain initiation

c) tyrosine

d) tryptophan.



- ii) Major limiting factor for photosynthesis in C_3 plants is
- a) CO_2
 - b) temperature
 - c) light
 - d) water.
- iii) Promoter sequence are present upstream of a structural gene of a
- a) transcription unit
 - b) mRNA
 - c) tRNA
 - d) none of these.
- iv) Number of male gametes in one pollen tube is
- a) 1
 - b) 2
 - c) 4
 - d) 6.
- v) Ploidy level of endosperm in angiosperm is generally
- a) n
 - b) $3n$
 - c) $6n$
 - d) $2n$.



- vi) A technique in which electricity is used to transfer DNA in a cell is called
- a) southern blotting
 - b) electrophoresis
 - c) electroporation
 - d) immunoelectrophoresis.
- vii) Genetic modification is advantageous over plant breeding as
- a) it allows genes to be introduced from any source
 - b) it allows genes transferred to be relatively precise
 - c) the safety of the genes can be tested in the laboratory
 - d) all of these.
- viii) *Agrobacterium rhizogenes* can be used to genetically engineer plants because of which of the following statements ?
- a) It contains a Ti plasmid
 - b) Infected plants produce a good root system
 - c) It infects all types of plants
 - d) It causes gene transfer to plants.



- ix) Plant transformation is
- a) when a plant grown in culture generate increased genetic variation
 - b) when plant cells in suspension cultures form individual embryos that can grow into plants
 - c) the incorporation of foreign DNA into the plant genome
 - d) when dedifferentiated callus cells develop into tissue that is different from the original source tissue.
- x) When the chromosome number is an exact multiple of the basic number (other than $2n$) it is called
- a) nullisomic
 - b) aneuploid
 - c) euploids
 - d) none of these.
- xi) Cadasteral activity is known as the
- a) competitive interaction between the genes
 - b) competitive interaction between members of different classes of genes
 - c) combinatorial interactions between members of different classes of genes
 - d) interactions between the members of same gene class.



xii) T-DNA Vir D2 and Vir E2 together makes

- a) T-DNA
- b) T-DNA complex
- c) T-strand
- d) none of these.

xiii) Octopine and Nopaline type of plasmids differ in their

- a) organization of the vir region
- b) organization of the T-DNA and vir region
- c) organization of the T-DNA
- d) all of these.

xiv) The promoter linked upto a gene coding for a cacterial ribonuclease used for male sterility in plants is named as

- a) Barnase
- b) Barstar
- c) Barcode
- d) None of these.



GROUP - B

(Short Answer Type Questions)

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

2. Totipotency is one of the unique features of plant cells — discuss.
3. Define C value. How repeats play an important role in C value paradox ? What are the effects of GC value on melting temperature in a DNA ? $1 + 2 + 2$
4. What are enhancers ? Giving one example show how enhancers work both as enhancer and silencers in plants. $2 + 3$
5. What are the features of response elements ?
6. Write a short note on zein protein in maize with emphasis on nutritional improvement.

GROUP - C

(Long Answer Type Questions)

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

7. Briefly outline the steps involved in the initiation of the T-DNA transfer process in *Agrobacterium*. Describe the major components of Ti plasmid. What do you mean by disarming of *t*-DNA ? $7 + 5 + 3$



8. Distinguish between auto and allopolyploidy. Discuss the role of autopolyploidy in crop improvement. Schematically describe the evolution of bread wheat. $2 + 7 + 6$
9. Explain with example that specific promoter sequences are necessary for gene expression regulation. What is the role of introns in gene expression ? What are the properties of trans acting factors in plants ? Name few conserved sequences in eukaryotic promoter mentioning their role. $4 + 4 + 3 + 4$
10. What are plantibodies ? What is the importance of plantibodies ? Discuss molecular pharming with reference to vaccines with examples. Why vaccines made in plants are preferred ? $2 + 4 + 6 + 3$
11. Write short notes on any *three* of the following : 3×5
- a) ABC model for development of flower
 - b) Promiscuous DNA and RNA Editing
 - c) Gene transfer in plants
 - d) Molecular markers
 - e) Role of 3' sequence in gene expression.
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