

Name :

Roll No. :

Invigilator's Signature :

CS/B.Sc (H), GENETICS/SEM-2/PGN-204/2012

2012

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)

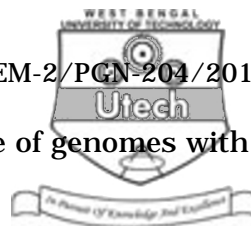
1. Choose the correct alternatives for any *ten* of the following :
 $10 \times 1 = 10$

- i) The process of taking in CO_2 by plants and releasing O_2 is termed as
 - a) transpiration
 - b) respiration
 - c) endosmosis
 - d) photosynthesis.

- ii) Totipotency is
 - a) the process of dedifferentiation and redifferentiation
 - b) the inherent capacity of an organism to carry out dedifferentiation and redifferentiation
 - c) the inherent capacity to grow isolate organs
 - d) the process of tissue culture.



- iii) In alternation of generations, the term **generation** refers to
- a) the sporophyte and gametophyte
 - b) the sperm and egg
 - c) vegetative and sexual spores
 - d) triploid and tetraploid.
- iv) The life cycles where fertilization gives rise to a multicellular diploid sporophyte, which via meiosis, produce haploid spores is called
- a) diplontic life cycle
 - b) haplodiplontic life cycle
 - c) normal life cycle
 - d) none of these.
- v) Sexual reproduction involves two alternating processes
- a) meiosis and fertilization
 - b) two phase of meiosis
 - c) two phase of mitosis
 - d) none of these.
- vi) If an endosperm of an angiosperm has 24 chromosomes what would be the number of chromosomes in the megaspore mother cell of the plant ?
- a) 16
 - b) 24
 - c) 12
 - d) 8.
- vii) At 260 nm, single stranded DNA absorbs
- a) less than duplex DNA
 - b) same as duplex DNA
 - c) more than duplex DNA
 - d) can be both (b) and (a).



- viii) Renaturation becomes quicker in case of genomes with
- a) only unique sequences
 - b) only GCs
 - c) only ATs
 - d) high repetitive DNA.
- ix) Plants having genome size less than 1.0 pg/haploid genome have
- a) short period of interspersions of repeats
 - b) more single copy sequences
 - c) long period of interspersions of repeats
 - d) no repeats.
- x) GC base pairs are more stable as they have
- a) two hydrogen bonds
 - b) three hydrogen bonds
 - c) more than three hydrogen bonds
 - d) none of these.
- xi) The combination of homeotic gene expression for flower organs is represented by
- a) sepal-petal model
 - b) stamen-carpel model
 - c) SPSC model
 - d) ABC model.
- xii) In *Arabidopsis* the *leafy* mutant stands for defining
- a) petals and sepals
 - b) petals and stamens
 - c) sepals and carpels
 - d) none of these.

GROUP - B

(Short Answer Type Questions)

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

2. What do you mean by alternation of generations ? Plants have double fertilization in their sexual life cycle — justify.
1 + 4
3. Define conserved sequence. Give an example of conserved sequence with its characteristic involvement in the transcription process in plants. Briefly explain the role of intron in gene expression.
1 + 1 + 3



4. What are the characteristic features of zein protein of maize ? Why and how zein genes are strategically utilized for nutritional improvement ? 3 + 2
5. Define transgenic plants. What are the various methods of introduction of foreign genes in plants to make a transgenic plant ? 1 + 4
6. Write short note on any *one* of the following :
 - a) Genes responsible for steps of flower development
 - b) Role of Vir genes in agrobacterium mediated gene transformation.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. Write about Chloroplast and Mitochondrial Genome organization. $7\frac{1}{2} + 7\frac{1}{2}$
8. Define molecular markers. Describe the most commonly used molecular markers (any three). Briefly discuss the procedures to detect DNA polymorphism. 1 + 6 + 8
9. Define RNA editing. What are the characteristic features of RNA editing ? How chloroplast and mitochondrial DNA codes differ from nuclear DNA ? What is promiscuous DNA ? What is sequence tagged site ? 1 + 5 + 2 + 2 + 5
10. How many types of gene regulations control gene expression in plants ? What are enhancer elements ? “Enhancers play an important role in gene expression.” — Justify the comment with experimental evidence. Define Cis-acting elements. What are the features of response elements ? Briefly discuss Trans-acting factors mentioning the structure and function of transcription factors. $2 + 1\frac{1}{2} + 2\frac{1}{2} + 1\frac{1}{2} + 3 + 4\frac{1}{2}$
11. What do you mean by rot and cot value of DNA ? “The term C-value paradox is misnomer”. Justify. MADS-Box genes contain a special domain. Explain. 4 + 6 + 5