

CS/B.Sc (H)/Genetics, Mol. Bio./SEM-5/GEM-504/2012-13

2012 GENETIC MODIFICATION IN AGRICULTURE, FOOD & INDUSTRY

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) Which of the following is used as the vector for gene therapy ?
 - a) Retroviruses
 - b) Adenoviruses
 - c) Adeno-associated viruses
 - d) All of these.
 - ii) SCID occurs due to mutation in
 - a) T-lymphocyte producing gene
 - b) Adenosine deaminase gene
 - c) Ornithine transcarbamylase gene
 - d) B-lymphocyte producing gene.

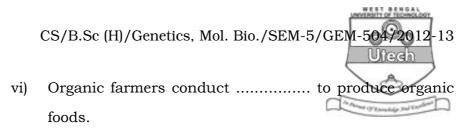
5365

[Turn over

CS/B.Sc (H)/Genetics, Mol. Bio./SEM-5/GEM-504/2012

- iii) Which of the following characteristics makes bacteria ideal organisms for many types of genetic studies ?
 - Reproduction is rapid, asexual, and produces lots of progeny.
 - b) Their genomes are small and they are easy to grow in the laboratory
 - c) Techniques are available for isolating and manipulating their genes
 - d) All of these.
- iv) Cells that have lost a plasmid during cell division are called
 - a) copy number b) plasmid curing
 - c) incompatible d) none of these.
- v) Which of the following strains is auxotrophic only for proline and methionine ?
 - a) pro + thi leu met –
 - b) pro + thi + leu + met +
 - c) pro thi + leu + met –
 - d) pro thi leu met +

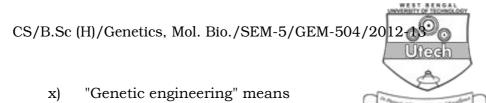
5365



- a) chemical weed killing
- b) sophisticated crop rotations
- c) genetic modification
- d) all of these.
- vii) The insecticidal crystalline protein from *B. thuringiensis* were originally classified as
 - a) α endotoxin b) δ endotoxin
 - c) β endotoxin d) γ endotoxin.
- viii) 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.
- ix) Plants are used for human vaccine production as
 - a) overall economy of production
 - b) lack of risk of contamination with human pathogens
 - c) proprietary gene expression technology in plants for achieving high concentration of foreign proteins
 - d) all of these.

5365

[Turn over



- a) where the genome of an organism is modified using artificial techniques
- b) where the whole genome has been naturally mutated
- c) can be both (a) and (b)
- d) none of these.
- xi) Novel foods are
 - a) foods which can be assigned to special types of foods such as genetic modified foods
 - b) genetic modified organism and their products
 - c) new molecular structures
 - d) all of these.
- xii) Golden Rice contains
 - a) increased gluten
 - b) increased carbohydrate
 - c) increased vitamin A content
 - d) increased fat content.

5365

	CS/B.Sc (H)/Genetics, Mol. Bio./SEM-5/GEM-50472012-13 GROUP – B (Short Answer Type Questions)	
	Answer any <i>three</i> of the following.	
	3 × 5 = 15	
2.	What are the common methods of gene transfer in plants ?	
	Define Transgene and genetic engineering. 3 + 2	
3.	a) It is often desirable to maintain two different plasmids	
	in a single cell. What are two important considerations	
	when choosing the plasmids to use ?	
	b) What is horizontal gene transfer and how might it	
	occur ? 2 + 3	
4.	Write a short note on the process and uses of SMaRT	
	technique in Gene therapy. 5	
5.	What is antisense approach of gene therapy ? 5	
6.	Write a short note on golden rice. 5	
GROUP – C		
(Long Answer Type Questions)		
	Answer any <i>three</i> of the following. $3 \times 15 = 45$	
7.	Write short notes on any three of the following : 3×5	
	a) Antisense approach in transgenic plants.	
	b) General mechanism of action of Bt.	

- c) Difference between organic food and GM food.
- d) Novel food.
- e) Plant made pharmaceuticals.

5365

[Turn over

CS/B.Sc (H)/Genetics, Mol. Bio./SEM-5/GEM-504/2012-19-00-Utech

8. Rarely, conjugation of Hfr and F cells produces two Hfr cells. Explain how this occurs. Briefly explain the differences between Hfr, F⁺, F⁻ and F' cells. DNA from a strain of *Bacillus subtilis* with the genotype trp⁺ tyr⁺ is used to transform a recipient strain with the genotype trp⁻ tyr⁻. The following numbers of transformed cells were recovered :

Genotype	Number of transformed cells
trp ⁺ tyr ⁻	154
$trp^{-}tyr^{+}$	312
trp ⁺ tyr ⁺	354

What do these results suggest about the linkage of the trp and tyr genes ? 3+8+4

9. What are the reasons for making herbicide resistant plants ? Discuss in brief the principles involved in the production of glyphosate- resistant transgenic plants citing examples from success already achieved.

5365

