Name : .....

Roll No. : .....

Invigilator's Signature : .....

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.

iii) Which of the following characteristics makes bacteria ideal organisms for many types of genetic studies ?

a) 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 +

vi) Organic farmers conduct ..... to produce organic foods.

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.

x) "Genetic engineering" means

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.

GROUP – B

(Short Answer Type Questions)

Answer any *three* 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 *three* of the following. 3 × 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.

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. 3 + 12

10. What is clone ? How did Ian Wilmut make Dolly ? What are the advantages and disadvantages of Cloning ? 2 + 7 + 6