(b) Give one examples of Selectable marker gene, Reporter gene, Inducible promoter, Chromosomal virulence gene, Superbinary vector and Supervirulent strain of *Agrobacterium*.

(3 + 3) + 6 = 12

9. (a) Why pro vitamin A is important for health?

(b) What health problems are linked to a vitamin A deficiency?

(c) How golden rice is different from white rice?

(d) How golden rice was developed?

(e) Mention sources of the genes which are important for the creation of golden rice?

2 + 2 + 1 + 3 + 4 = 12

PLANT BIOTECHNOLOGY
(BIOT 3202)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) LUC is used as
(a) selectable marker gene (b) visible marker gene
(c) inducible promoter (d) transgene.

(ii) Vir D is a/an
(a) autophosphorylating kinase (b) ssDNA binding protein
(c) transcriptional activator of *vir* operon (d) endonuclease.

(iii) Which of the following gene detoxifies herbicide phosphinothricin?
(a) Glutathione S-transferase (GST) (b) Nitrilase
(c) Phosphinothricin acetyl transferase (d) Catalase.

(iv) Synthetic seed is produced by encapsulating somatic embryos with
(a) sodium alginate (b) sodium nitrate
(c) sodium acetate (d) sodium sulphate.

(v) Starch content of potatoes can be increased by using the following bacterial gene
(a) sucrose phosphate synthase gene
(b) ADP glucose pyrophophorylase gene
(c) polygalactouronase gene
(d) ethylene biosynthetic gene.

(vi) Ac/Ds element in Maize is a
(a) insertion element (b) dissociation element
(c) transposable element (d) retrotransposon.

(vii) ABRE - 35S CaMV (upto - 40) chimera is used as
(a) selectable marker gene (b) visible marker gene
(c) inducible promoter (d) transgene.

(viii) Ribozyme is
(a) RNA with enzyme activity (b) Self - replicating RNA
(c) RNase (d) Rnase H.

(ix) CAAT box in plants is a
(a) core promoter element (b) -70 box
(c) involved in basal transcription (d) all of these.

(x) SUMOylation results into
(a) recruitment of DNA polymerase (b) recuitment of HAT
(c) recruitment of RNA polymerase (d) recruitment of HDAC.

Group - B

2. (a) Mention the mode of action of auxin in plant cells.

(b) Write differences between organogenesis and embryogenesis.

(c) Relate cytodifferentiation and xylogenesis with respect to plant tissue culture.

4 + 4 + 4 = 12

3. (a) In media preparation, often activated charcoal is added for better callus induction. Discuss the reason of inclusion of activated charcoal in media with suitable explanation.

(b) Name the scientist who have reported cytokinin for the first time.

(c) Mention the characteristics of the movement of Cytokinin in plant cells.

(d) Name two synthetic cytokinins used in plant tissue culture.

(e) Analyze with suitable reasons why production of haploids is encouraged in plant breeding.

(f) Name one economically important plant which has been obtained from haploid culture.

3 + 1 + 1 + 2 + 4 + 1 = 12

Group - C

4. (a) State the phase in which the synthesis of secondary metabolite is highest.

(b) Discuss the relationship between primary metabolite and secondary metabolite.

(c) Mention the role of the following along with suitable example in production of secondary metabolite production: light, temperature, phosphate salt and carbon.

(d) Write two polymers associated with immobilization and examples of the plant cells.

1 + 1 + (4 ×1.5) +(2 × 2) = 12

5. (a) Describe briefly how the following approach 'hairy root culture development' is utilized for production of secondary metabolite. State the benefits of this approach.

(b) Mention two examples citing the plant names with the secondary metabolite compounds developed through this approach

(c) Mention the precursors of flavanoid biosynthesis.

(d) Mention the biological functions of alkaloids.

(2 + 2) + 4 + 2 + 2 = 12

Group - D

6. (a) Describe the structure of eukaryotic core promoter. How much of it must be taken from CaMV 35S rRNA promoter in cloning of a transgene?

(b) Write short note on different classes of chloroplast genome.

(c) Define C-value. What is understood by C-value paradox?

(3 + 2) + 3 + 4 = 12

7. (a) What is the nature of plant repetitive DNA?

(b) What is the hypothesis put forward to explain the effect of chromatin conformation on nuclear gene regulation in plant? Explain the importance of each biochemical change with example.

2 + (2 × 5) = 12

Group - E

8. (a) What is binary vector and Shuttle vector?