

- (vii) From opium ..... of secondary metabolite is obtained  
 (a) steroid (b) alkaloid  
 (c) sapogenin (d) resinous matter.
- (viii) RNA editing is prevalent in the regulation of gene expression in  
 (a) mitochondrial genome (b) nuclear genome  
 (c) chloroplast genome (d) all of these.
- (ix) Plant homeodomain proteins are  
 (a) Leucine Zipper transcription factor  
 (b) Zn-finger transcription factor  
 (c) Developmental transcription factor  
 (d) Basal transcription factor.
- (x) Different strains of *Agrobacterium tumefaciens* produces  
 (a) octopine (b) nopaline  
 (c) agropine (d) none of these.

**Group – B**

2. (a) Define: micro propagation, recurrent embryogenesis.  
 (b) Mention briefly along with a suitable schematic representation, the stages of micro propagation.  
 (c) Mention the role of following factors on micro propagation: media, genotype and cultural conditions with suitable examples.  
**(2 + 2) + 4 + 4 = 12**
3. (a) "For sustenance of the plant tissue cultures both macro and micro elements play an important role" – justify the statement citing the necessity of any two elements from both categories.  
 (b) "In the media often sucrose is used as carbohydrate source instead of starch" – give suitable reasons for such use.  
 (c) Define somaclonal variation.  
 (d) Mention the possible mechanisms of somaclonal variation.  
 (e) Describe the problems associated with somaclonal variation in tissue culture for their use in agriculture.  
**(2 + 2) + 2 + 2 + 2 + 2 = 12**

**Group – C**

4. (a) What are the major differences between primary and secondary metabolites?  
 (b) Mention briefly any five factors affecting the production of secondary metabolite.  
 (c) Name the plant secondary metabolite compound with an antimalarial property and write the chemical nature and biosynthetic pathway of it.  
**2 + 5 + (1 + 2 + 2) = 12**
5. (a) "Immobilizations have benefits with respect to the production of secondary metabolites" – mention the effectiveness of this procedure with respect to plant tissue culture.  
 (b) Write any three polymers associated with immobilization.  
 (c) "Viability is an important feature for successful production of secondary metabolite" – mention how this viability can be tested in immobilized cells.  
 (d) Cite two examples of secondary metabolites in immobilized system with product and the type of immobilization.  
**2 + 3 + 3 + 4 = 12**

**Group – D**

6. (a) What is the structure and arrangement of genes in Arabidopsis genome?  
 (b) On what factors the mRNA turnover depends in plant? How mRNA turnover is important in plant genome regulation?  
**(3 + 3) + (3 + 3) = 12**
7. (a) Write short note on: different classes of chloroplast genome  
 (b) Describe the structure of basic leucine zipper class of transcription factor with a diagram.  
 (c) What is understood by C-value paradox?  
**5 + 5 + 2 = 12**

**Group – E**

8. (a) What is herbicide?  
 (b) Mention two examples of gene based herbicide resistance in plants.  
 (c) Mention any two strategies followed for engineering herbicide resistant plants citing suitable examples.

 **$2 + 2 + (4 \times 2) = 12$** 

9. (a) Mention the nature of Bt-protoxin and describe with suitable diagram how this protein is activated.  
 (b) Cite an example of disease resistant crop mentioning the name of the plant, gene and resistance to the causal agent.  
 (c) Mention briefly the 'Copy Nature' strategy followed for the development of pest resistant crops.

 **$(1 + 4) + 4 + 3 = 12$** **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:  **$10 \times 1 = 10$**
- (i) The plant part which is used for tissue culture in the medium is  
 (a) nectar (b) explant  
 (c) plastid (d) mitochondria.
- (ii) LUC is used as  
 (a) selectable marker gene (b) visible marker gene  
 (c) inducible promoter (d) transgene.
- (iii) The protein that first binds to TATA box in plant is  
 (a) TF II A (b) TF II B (c) TBP (d) TF II D.
- (iv) Which one of the following vitamin is an integrated part of plant tissue culture medium?  
 (a) Nicotinic acid (b) Myo-inositol  
 (c) Retinoic acid (d) Vitamin-C.
- (v) Histone deacetylation results in  
 (a) transcription induction (b) transcription inhibition  
 (c) genome replication (d) none of these.
- (vi) Glyphosate inhibits the activity of EPSP synthase by  
 (a) metabolizing one of the substrates of this enzyme  
 (b) binding to EPSP synthase in place of PEP  
 (c) degrading EPSP synthase  
 (d) transporting EPSP synthase to the chloroplast.