

SARDAR PATEL UNIVERSITY
M.Sc (IV Semester) Examinations
Date: 28th April, (Tuesday), 2015.
Time: 10.30 am to 1.30 pm
Paper: PS04EBIC04- Plant Biotechnology

Total marks: 70

Choose the most appropriate answer:

(8x1= 8 marks)

- i) The chemicals ascorbic acid, citric acid or polyvinyl pyrrolidone are used either alone or in combination along with nutrient medium to reduce _____ from explants.
(a) Phenolic substances (b) fungal and bacterial growth
(c) secondary metabolites (d) callus formation
- ii) Which stage of the microspores is selected for anther cultures:
(a) Microspore tetrad stage (b) Uninucleate microspore stage
(c) Binucleate microspore stage (d) Microspore mother cell stage
- iii) The phenomenon of callus formation is called as...
a. Differentiation c. Redifferentiation.
b. Dedifferentiation d. All.
- iv) _____ are synthesized in plants, but not utilized by the plants for growth and development. However helps in plant protection and has economic value.
(a) Secondary metabolites (b) Primary metabolites
(c) Both (a) & (b) (d) Growth hormones
- v) The GFP reporter system is advantageous over other systems since
(a) it is a standalone system (c) it is non toxic
(b) expressed in prokaryotic and eukaryotic cells (d) all of these
- vi) *Agrobacterium tumefaciens* is often used to transform plant cells. The T-DNA of *Agrobacterium* in plant cells is found in the form of
(a) An autonomously replicating plasmid (c) a mitochondrial plasmid
(b) A chloroplast plasmid (d) integrated into the plant genome
- vii) Resistance to the herbicide glyphosphate in transgenic plants is obtained by
(a) Overexpression of EPSPS synthase gene (c) cloning a mutant pyruvate synthase gene
(b) Overexpression of shikimic acid (d) overexpression of aromatic amino acids
- viii) Induced resistance in plants against pathogens is a
(a) Energy requiring mechanism (c) both (a) and (b)
(b) gene mediated response (d) none of these

II. Write short notes on any seven:

(7x2= marks)

- (a) Why cultured anthers will permit pollen to develop into pollen embryos where as cultured isolated pollen grains may not form embryos? Give reasons.
- (b) Why *in vitro* developed plantlets need hardening before transfer to soil? Give reasons.
- (c) Protoplast fusion products
- (d) *In vitro* Androgenesis
- (e) Role of elicitors in plant defence
- (f) Advantages of somaclonal variations
- (g) Role of vir D1 and D2 in *Agrobacterium* mediated transformation
- (h) Bulk Segregation Analysis
- (i) Two important properties of Systemic Acquired Resistance (SAR)

III. Answer the following:

(4x12 = 48 marks)

- i) a) How various tissue culture systems can be used in crop improvement? Discuss the applications and limitations of each culture system
b) Discuss the cellular competence in *in vitro* morphogenesis. Write in detail the different pathways of *In vitro* morphogenesis?
OR
b) With suitable examples explain different applications of zygotic embryo cultures.
- ii) a) Explain various methods for isolation of protoplasts.
b) Define somaclonal variation. How do somaclonal variations occur *in vitro*? Explain.
OR
b) Factors controlling the biomass during the production of 2⁰ metabolites
- iii) a) Explain different strategies for *in vitro* germplasm conservation.
b) Describe the method, advantages and limitations of microinjection.
OR
b) What are reporter genes? Explain any one in detail.
- iv) a) Explain the role of Hypersensitive Response (HR) in plant defense.
b) What are QTLs? Explain how Marker Assisted Selection is used in QTL identification.
OR
b) Explain any one signal transduction pathway during plant defence against pathogens.

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