



HERITAGE INSTITUTE OF TECHNOLOGY

M.Tech. 1st year 1st semester Examination. 2014 Session : 2014-2015

Discipline : BIOTECHNOLOGY

Paper Code : BIOT5131 Paper Name : Agricultural Biotechnology

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 x 1=10
- (i) The enzyme that first fixes CO₂ in C4 plants is:
(a) Rubisco (b) PEPC
(c) Either of the two (d) none
- (ii) The technology used to develop FLAVR SAVR tomato is:
(a) Antisense RNA technology (b) Sense RNA technology
(c) RNAi technology (d) Antisense DNA technology
- (iii) Most of the phytoalexins are a type of:
(a) terpenoid (b) alkaloid
(c) flavonoid (d) none of these
- (iv) Phenolic phytochemicals have antioxidant property due to presence of :
(a) only phenolic ring (b) only hydroxyl ring
(c) both (a) and (b) (d) none of these
- (v) Which one is not a single loci marker:
(a) RFLP (b) STS
(c) RAPD (d) Microsatellite
- (vi) Essential oil belong to the group----of secondary metabolites,
(a) Terpenoids (b) Alkaloids
(c) Resinous (d) Sapogenins
- (vii) In developing BT-cotton, the transgene used is:
a) Exactly of identical sequence to that of *Bacillus thuringiensis*
b) Totally different from *Bacillus thuringiensis*
c) Codon optimization was performed
d) Promoter was changed



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(viii) In which phase of growth curve of callus / cell suspension culture of plant secondary metabolites accumulate:

- a) Stationary phase
- b) Lag phase
- c) log phase
- d) lag and stationary phase.

(ix) The method for DNA delivery used to develop Golden Rice is:

- a) *Agrobacterium*-mediated gene delivery
- b) Biolistic method
- c) PEG-mediated
- d) LASER-mediated

(x) HMG CoA reductase is required for the synthesis of:

- a) IPP
- b) flavonoid
- c) gibberellin
- d) none of these

Group - B

- 2. a) Mention the characteristics of a genetic marker?
 - b) Mention different categories of molecular marker with suitable example.
 - c) What are SSRs and how do they arise in genomes?
 - d) Mention the advantages of SSR markers over the other marker system. 3+3+3+3=12
3. Write short notes on (attempt any three):
- a) Quantitative Trait Loci.
 - b) Positional cloning
 - c) AFLP
 - d) HPTLC Fingerprint Profile. (3x4=12)

Group - C

- 4 a) Compare the two ways of plant improvement: breeding and transgenic.
- b) Why the 'Dwarf' character has been such a useful trait for development of high yielding varieties of crop?
- c) Write short note on: Green Revolution. 4+4+4 = 12



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5. Describe the detailed mechanism of development of Golden Rice with the help of a flow chart. 12

Group - D

6. a) Name two physiologically active alkaloids with their plant source and mode of action.
- b) Alkaloids are secondary metabolites– explain. 6+6 = 12
7. a) What is herbicide?
- b) Give one example of herbicide with mode of action.
- c) Write any one method for production of herbicide resistant plant. 2+6+4 = 12

Group - E

8. a) Secondary metabolites are clearly derived by biosynthesis from primary metabolites- justify the statement with showing inter relationship among them citing suitable examples.
- b) What are different high valued metabolites obtained from cyanobacteria ?
- c) What are different potential antiviral, antituberculosis and anti inflammatory compounds have been isolated from cyanobacteria? 4 + 4+ 4= 12
9. a) Briefly describe the different factors affecting *in vivo* androgenesis.
- b) Mention the application of haploid culture in plant biotechnology.
- c) Write short notes : germplasm, artificial seed. 2+4+6=12