AGRICULTURAL BIOTECHNOLOGY
(BTC5141)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Which of statements regarding RFLP analysis is correct?
(a) RFLP analysis requires Southern blotting for detection of fragments.
(b) RFLPs can identify single base pair changes at any site in the chromosome.
(c) An RFLP typically produces several different alleles.
(d) All of these are correct.

(ii) Cross between semi-dwarf japonica and high-yielding india lines is
(a) A successful cross between wheat varieties
(b) A successful cross between rice varieties
(c) An unsuccessful cross between rice varieties
(d) An un successful cross between wheat varieties

(iii) Idiolites are
(a) Primary metabolites (b) Secondary metabolites
(c) Both (a) and (b) (d) None of these

(iv) Which of the following issued as a biocontrol agent against caterpillars of butterflies?
(a) Trichoderma (b) Streptococcus
(c) Bacillus thuringiensis (d) Saccharomyces cerevisiae

(v) Golden rice was developed by introducing
(a) One gene from *Erwiniauredovora* and two genes from daffodil into rice
(b) Three genes from *Erwiniauredovora* into rice
(c) One gene from *Erwiniauredovora* and one gene from daffodil into rice
(d) Two genes from *Erwiniauredovora* and one gene from daffodil into rice

(vi) Biologically active tripeptide is
(a) Glutathione (b) Urea (c) Proline (d) None of these

(vii) Which of the following is not a typical step in the micropropagation process?
(a) Sterilization of explants (b) Formation of callus
(c) Inbreeding of plants (d) Adventitious shoot formation

(viii) Which of the following is a major advantage of using biofertilizers over chemical fertilizers?
(a) Biofertilizers provide instant nutrient release
(b) Biofertilizers are environmentally friendly and sustainable
(c) Biofertilizers are cheaper to produce and use
(d) Biofertilizers can be applied in excessive amounts without harm

(ix) Harvest Index is defined as
(a) Fraction of weight allocated to harvested part of a plant
(b) Fraction of dry matter allocated to harvested part of a plant
(c) Fraction of glucose synthesised allocated to harvested part of a plant
(d) Fraction of dry matter allocated to seed of a plant

(x) MISA is a public domain developed for recognition of
(a) SSR patterns in the sequence files
(b) ESTs in the sequence files
(c) SNPs in the sequence files
(d) Marker patterns in the sequence files

Fill in the blanks with the correct word

(xi) Common sugar acts as compatible solute is _____.

(xii) Frozen storage is generally operated at _____ temperature.

(xiii) RAPD (Random Amplified Polymorphic DNA) is a technique used to detect genetic _____ by amplifying random segments.

(xiv) _____ is a symbiotic relationship between fungi and plant roots.

(xv) Second Green Revolution is based on _____ technology.

Group - B

2. (a) Mention the classes of marker. *[(CO3)(Analyse/HOCQ)]*
(b) State the type of marker and cite reasons that prove better for the plant improvement purpose. *[(CO4)(Remember/LOCQ)]*
(c) Mention their disadvantages. *[(CO2)(Apply/IOCQ)]*
(d) Write some plant sample where for the said purpose this method is followed. *[(CO2)(Apply/IOCQ)]*

3 + 1 + 3 + 3 + 2 = 12

3. Write short notes on any two markers:
(i) RFLP (ii) AFLP (iii) SSR (iv) CAPS *[(CO4)(Remember/IOCQ)]*

(6 + 6) = 12

Group - C

4. (a) What are C3 and C4 plants? How C3 plants can be converted to C4 plants by genetic manipulation? *[(CO3)(Analyse/HOCQ)]*

(b) Discuss the ethylene biosynthetic pathway by a flow chart. *[(CO2)(Apply/IOCQ)]*

2 + 4 + 6 = 12

5. (a) Write a short note on: Engineering PEPC gene. *[(CO3)(Analyse/HOCQ)]*

(b) How photosynthetic light reaction can be genetically manipulated? *[(CO2)(Apply/IOCQ)]*

6 + 6 = 12

Group - D

6. (a) Analyse the mode of action of antioxidants for elimination of abiotic stress. *[(CO3)(Analyse/HOCQ)]*

(b) Briefly explain the terpenoid compounds production. *[(CO4)(Remember/LOCQ)]*

(c) Distinguish between protoalkaloids and true alkaloids. *[(CO2)(Apply/IOCQ)]*

6 + 3 + 3 = 12

7. (a) Analyse the method of elimination of ROS. *[(CO3)(Analyse/HOCQ)]*

(b) Mention the mode of action plant amylase and protease and their sources. *[(CO4)(Remember/LOCQ)]*

(c) Briefly explain how alkaloid compounds are prepared. *[(CO2)(Apply/IOCQ)]*

6 + 3 + 3 = 12

Group - E

8. (a) Write briefly on the following citing suitable reason and examples:
(i) cyanobacteria as potential biofertilizer.
(ii) Use of algae as medicine and food. *[(CO3)(Explain/IOCQ)]*

(b) Mention the different types of mycorrrhizae mention the usefulness of this in plant system. Cite the application of it in agriculture. *[(CO3)(Explain/IOCQ)]*

2 + 3 + 4 + 3 = 12

9. (a) For a successful conservation of germplasm what are the steps can be mention the precautions *[(CO1)(Apply/IOCQ)]*

(b) Describe the usefulness of micropropagation in plant tissue culture and its application. *[(CO1)(Apply/IOCQ)]*

(5 + 3) + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	9.37	61.45	29.16