BIOFERTILIZERS AND BIOPESTICIDES
(BIOT 4132)

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) Commonly used as nitrogen fixer in cane sugar production is
(a) Acetobacter (b) Azospirillum
(c) Rhizobium (d) Oscillatoria

(ii) The common endomycorrhiza is
(a) Rhizobium (b) Agaricus
(c) Glomus (d) Nostoc

(iii) Nitrogenase used a cofactor is
(a) Co (b) Mo
(c) Ni (d) None of these

(iv) Congo red is used for identification of
(a) Rhizobium (b) Azolla
(c) Azotobacter (d) None of these

(v) Photosynthetic and nitrogen fixing gene reside side by side in
(a) Alcaligens (b) Thiobacillus
(c) Rhodospirillium (d) Klebsiella

(vi) The main operon that codes for nitrogenase protein are
(a) nif ABCD (b) nif EHDF
(c) nif HEKD (d) nif HDEK

(vii) nif and fix genes are arranged in two large megaplasmids in
(a) *Rhizobium trifoli* (b) *Rhizobium meliloti*
(c) *Bradyrhizobium japonicum* (d) *Klebsiella pneumonae*

(viii) Rotenone is used as a
(a) Bioherbicide (b) Insect hormone
(c) Natural insecticide (d) Natural herbicide

(ix) The toxin protein of *Bacillus thuringiensis* is a
(a) alpha-endotoxin (b) beta-endotoxin
(c) gamma-endotoxin (d) delta-endotoxin

(x) *Autophaga californica* belongs to Baculovirus of
(a) C group (b) GV group
(c) NPV group (d) B group

Fill in the blanks with the correct word

(xi) Rhizothamnia is found in _____.

(xii) Yellow muscardine disease is caused by _____.

(xiii) _____ is the symbiotic association of algae and fungi.

(xiv) The RNA polymerase responsible for transcription of nif genes contain a sigma factor _____.

(xv) IPDM is _____.

Group - B

2. (a) Define cyanobacteria and discuss their role as microbial inoculant. *[(CO3)(Analyse/HOCQ)]*
(b) Describe briefly the role of rhizosphere. *[(CO2)(Apply/IOCQ)]*
(c) Mention one symbiotic nitrogen fixing bacteria. *[(CO2)(Apply/IOCQ)]*
(d) Mention how cyanobacteria protects their nitrogenase? *[(CO4)(Remember/LOCQ)]*
4 + 3 + 1 + 4 = 12

3. (a) Mention the role of fungi as biofertilizer. *[(CO3)(Analyse/HOCQ)]*
(b) Explain the importance of compost and vermicompost. *[(CO4)(Remember/LOCQ)]*
(c) Briefly discuss the method of isolation of Nostoc sp. *[(CO2)(Apply/IOCQ)]*
4 + 4 + 4 = 12

Group - C

4. (a) Discuss the role of organic acid for contribution of phosphorus to soil. *[(CO4)(Remember/LOCQ)]*
(b) Analyse how activity of nitrogenase is detected? *[(CO3)(Analyse/HOCQ)]*
(c) Discuss the acetylene reduction assay. *[(CO2)(Apply/IOCQ)]*
4 + 4 + 4 = 12

5. (a) Compare the mode of action of leguminous plant with non leguminous plant. *[(CO3)(Analyse/HOCQ)]*
(b) What are the associative diazotrophs? *[(CO4)(Remember/LOCQ)]*
(c) Explain the role of tyrosinase for identification of nitrogen fixing bacteria. *[(CO2)(Apply/IOCQ)]*
4 + 4 + 4 = 12

Group - D

6. (a) Discuss the lectin-mediated root hair binding theory in formation of root nodules. *[(CO3)(Analyse/HOCQ)]*

   (b) Describe the functions of different nod genes in *Klebsiella pneumoniae.* *[(CO2)(Apply/IOCQ)]*

   (c) What are hup genes? How it functions at the site of nitrogen fixation? *[(CO4)(Remember/LOCQ)]*

4 + 4 + 4 = 12

7. (a) What are nitrogen fixing genes? *[(CO3)(Analyse/HOCQ)]*

   (b) Discuss the Flavonoid theory for root hair binding. *[(CO3)(Analyse/HOCQ)]*

   (c) What protein is coded by:
   nif A, nif L, nod D, fix LJ, nod A, nif D? *[(CO3)(Analyse/HOCQ)]*

2 + 4 + 6 = 12

Group - E

8. (a) Discuss the role of *Beauveria bassisana* as pesticide. *[(CO3)(Analyse/HOCQ)]*

   (b) Discuss the role of cry gene and cyt gene. *[(CO4)(Remember/LOCQ)]*

   (c) Compare the mode of action of biopesticde over chemical pesticide. *[(CO2)(Apply/IOCQ)]*

4 + 4 + 4= 12

9. (a) Compare the methods of pest control by application of pesticide only with integrated pest management. What is advantageous and in what aspect? *[(CO3)(Analyse/HOCQ)]*

   (b) What are the different sub-classes of B. thuringiensis? How they are used as biopesticide? *[(CO4)(Remember/LOCQ)]*

   (c) What are the genetic make up for toxin production? *[(CO2)(Apply/IOCQ)]*

6 + 4 + 2 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	25	27.08	47.92