# BIOFERTILIZER AND BIOPESTICIDE
## (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) Which of the following is not biofertilizer?
(a) Nostoc (b) Rhizobium
(c) Mycorrhiza (d) Agrobacterium.

(ii) Commonly used as nitrogen fixer in paddy field
(a) Frankia (b) Azospirillum
(c) Rhizobium (d) Oscillatoria

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

(iv) Heterocysts is present in
(a) Cyanobacteria (b) Rhizobium
(c) Azotobacter (d) None of these.

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

(vi) The genes responsible for nitrogen fixing ability in *Klebsiella pneumonae* are
(a) nif genes (b) nod genes
(c) both nif and nod genes (d) none of them

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

(viii) *Bradyrhizobium japonicum* contains nif and fix genes in
(a) Two large megaplasmids (b) Chomosome
(c) One plasmid (d) One large symbiotic megaplasmid

(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) Azospirrilum is used in _____.

(xii) Mycorrhizae is a type _____association.

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

(xiv) The regulatory protein that activates nif operon is _____.

(xv) Component I of nitrogenase is a metalloprotein containing _____ metals.

## Group - B

2. (a) Define cyanobacteria and discuss their role as microbial inoculant. *[(CO3)(Analyse/HOCQ)]*
(b) Illustrate briefly the role of leghaemoglobin. *[(CO2)(Apply/IOCQ)]*
(c) Define alleopathic substance. *[(CO2)(Apply/IOCQ)]*
(d) Mention one symbiotic nitrogen fixing bacteria. *[(CO2)(Apply/IOCQ)]*
**4 + 4 + 3 + 1 = 12**

3. (a) Compare the mode of action of biofertilizer over chemical fertilizer. *[(CO3)(Analyse/HOCQ)]*
(b) Describe briefly the role of rhizosphere. *[(CO2)(Apply/IOCQ)]*
(c) Briefly discuss the method of isolation of Azospirrilum sp. *[(CO2)(Apply/IOCQ)]*
(d) Give example of phosphate solubilizing bacteria. *[(CO2)(Apply/IOCQ)]*
**4 + 3 + 4 + 1 = 12**

## Group - C

4. (a) Discuss the mass cultivation process of *Rhizobium sp.* *[(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**

5. (a) Explain how phosphorus is contributed to the soil? *[(CO2)(Apply/IOCQ)]*
(b) Discuss the acetylene reduction assay. *[(CO2)(Apply/IOCQ)]*
(c) Mention the role of PGPR towards contribution of nutrients to soil. *[(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) What nod factors are responsible for it? *[(CO2)(Apply/IOCQ)]*

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

**6 + 2 + 4 = 12**

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

(b) How nif genes are regulated in symbiotic nitrogen fixers? *[(CO2)(Apply/IOCQ)]*

**6 + 6 = 12**

## Group - E

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

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

(c) What are BT engineered crop? *[(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 cry and cyt genes? Write the mode of action of cry toxins. *[(CO3)(Analyse/HOCQ)]*

**6 + (3 + 3) = 12**

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| Cognition Level | LOCQ | IOCQ | HOCQ |
|---|---|---|---|
| Percentage distribution | 4.16 | 54.16 | 41.6 |