BIOFERTILIZERS AND BIOPESTICIDES
(BIOT 4132)

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 × 1 = 10**

(i) Acetobacter is used in
(a) rice field (b) cane sugar
(c) corn (d) none of these

(ii) Mosquitoes are killed by
(a) B.T kurastaki (b) B.T israelensis
(c) B T sandiego strains (d) any of these

(iii) Methanogens that fix nitrogen have nif genes with high degree of homology to:
(a) free-living soil bacteria (b) symbiotic bacteria
(c) nodule forming bacteria (d) all of them

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

(v) Aerobic nitrogen fixer found in soil is
(a) Rhizobia (b) Azolla
(c) Bacillus (d) Beijerinckia

(vi) Chromatium and chlorobium are
(a) Non-photosynthetic nitrogen fixing bacteria
(b) photosynthetic nitrogen fixing bacteria
(c) anaerobic nitrogen fixing bacteria
(d) symbiotic nitrogen fixing bacteria

(vii) Almus tree are benefited by
(a) Rhizobium sp (b) Azotobacter sp
(c) Frankia sp (d) none of these

(viii) The hup genes found in several diazotrophs
(a) wastes cellular ATP
(b) recycles H_2 produced by nitrogenase
(c) removes N_2 from ammonia
(d) adds H_2 to N_2

(ix) The nitrogen fixing genes in Bradyrhizobium japonicum is present in:
(a) one megaplasmid (b) two different megaplasmids
(c) bacterial chromosome (d) two similar plasmids

(x) Autophaga californica belongs to Baculovirus of
(a) C group (b) NPV group
(c) GV-group (c) none

Group – B

2. (a) Define biofertilizer. Give example. [(CO1) (Define, LOCQ)]

(b) What are bacteroids? How bacteroids protect their nitrogenase? [(CO1) (Understand, LOCQ)]

4 + 8 = 12

3. (a) Name one aerobic nitrogen fixing bacterial species and analyze the mechanism by which the organism is adapted to keep its dinitrogenase enzyme functioning under favourable aerobic condition. [(CO 1) (Analyze, IOCQ)]

(b) Illustrate two symbiotic associations involving fungi as one of the partners. **[**(CO 2) (Illustrate, IOCQ)]

6 + 6 = 12

Group – C

4. (a) Mention one mutualistic association where one of the partners is fungi. Do you think this association help to increase soil fertility? Justify your answer. [(CO 3), Remember/ Critique, LOCQ/HOCQ)]

(b) Write notes on Lichen. [(CO 3) (Discuss, LOCQ)]

(2 + 6) + 4 = 12

5. (a) What is the mechanism of protecting the nitrogenase enzyme in hetero cysts? [(CO3) (Remember, LOCQ)]

(b) What are applications of different fungi as biofertilizer? Compare the merits and demerits of the use of fungi as biofertilizer. [(CO3 (Application, IOCQ)]

6 + 6 = 12

Group – D

6. (a) What is the most modern theory for host specificity? [(CO 4) (Understand, LOCQ)]

(b) Illustrate the formation of symbiotic association between *Rhizobia* and leguminous plant. [(CO 4) (Illustrate, IOCQ)]

3 + 9 = 12

7. Write short notes on the following with an analytical view on their importance:
(a) nif gene transfer
(b) rhizosphere engineering. [CO4) (Analyze), HOCQ]

6 + 6 = 12

Group – E

8. (a) What are the sub-classes *B. thurigiensis*? Describe their applications as biopesticide. [(CO5) (Distinguish/Illustrate, IOCQ)]

(b) Illustrate their genetic make-up for toxic protein production?

[(CO5) (Illustrate, IOCQ)]

(3 + 3) + 6 = 12

9. (a) What is IDPM programme? Mention different steps of effective management of pests. [(CO5) (Illustrate, IOCQ)]

(b) What is the causative fungus for Green Muscardin disease, produced commercially as biopesticide? Describe shortly their host range and method of application on crop. [(CO6) (Apply, IOCQ)]

(2 + 4) + (3 + 3) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	24%	57%	19%

Course Outcome (CO):

After completing this course, students will be able to:
CO1: Explain the role of beneficial microbe in sustainable agriculture
CO2: Have knowledge on isolation and identification of nitrogen fixing bacteria
CO3: Role of phosphate solubilizing bacteria
CO4: Understand molecular biology of nitrogen fixation
CO5: Understand the significance of biopesticide over chemical pesticide
CO6: Isolate and identify PGPR and biopesticide for increased agricultural productivity

Department & Section	Submission Link
BT	https://classroom.google.com/c/NDI5MTI4NTA5Mjg5/a/NDU0ODk3NjQ2Mzkx/details