

**LMDQ/D-23****AGRICULTURE MICROBIOLOGY**

Paper : MMB-304 A

Time : Three Hours]

[Maximum Marks : 80

**Note :** Attempt *five* questions in all, selecting at least *one* question from each unit. Question No. 1 is compulsory. All questions carry equal marks.

**Compulsory Question**

1. (a) Fill in the blanks (attempt any *eight*) : (8)
- (i) A soil containing humus is rich in \_\_\_\_\_ matter.
  - (ii) Leghemoglobin is responsible for \_\_\_\_\_ conditions in nodules.
  - (iii) The full form of VAM is \_\_\_\_\_.
  - (iv) The solubilized phosphorous is \_\_\_\_\_ in nature.
  - (v) Gram positive and Gram negative bacteria differ with respect to \_\_\_\_\_.
  - (vi) The production phase in the life cycle of a bacterial culture is \_\_\_\_\_.
  - (vii) A microorganisms using inorganic compounds as electron donor and chemical compounds for energy is known as \_\_\_\_\_.

- (viii) *Bacillus thuringiensis* produces \_\_\_\_\_ proteins which make it a bioinsecticide.
- (ix) Bacterial soft rot is caused by \_\_\_\_\_.
- (x) Lignocellulosics contain \_\_\_\_\_ as primary carbon source.
- (b) Select the right choice : (8)
- (i) What is not an agriculturally beneficial microbe?
- A. Cyanobacteria
  - B. Mycoplasmas
  - C. Bacillus
  - D. Rhizobium
- (ii) Which of the following characteristics occur in prokaryotic cells?
- A. Cellular organization
  - B. Thylakoid membranes within chloroplasts
  - C. Oxygenic photosynthesis
  - D. Several circular chromosomes
- (iii) The membrane of gas vesicles is composed of:
- A. Triglycerides
  - B. Phospholipids
  - C. Proteins
  - D. Lipopolysaccharide

- (iv) Which of the following are not found in Cyanobacteria?
- A. Thylakoids
  - B. Gas vesicles
  - C. Chloroplasts
  - D. Endospores
- (v) Phagocytosis is a characteristic of which group?
- A. Protozoans
  - B. Algae
  - C. Fungi
  - D. *Bacteria*
- (vi) Which group(s) of fungi do not generally produce sexual reproductive structures and are also sometimes known as imperfect fungi?
- A. Ascomycetes
  - B. Deuteromycetes
  - C. Zygomycetes
  - D. Hyphochridiomycetes
- (vii) The process responsible for loss of nitrogen from soil is called
- A. Nitrification
  - B. Denitrification
  - C. Ammonification
  - D. Deamination

(viii) Symbiotic nitrogen fixation does not occur between :

- A. Rhizobium-Pea
- B. Rhizobium-wheat
- C. Azotobacter-wheat
- D. Azotobacter-Pea

## UNIT I

2. (a) How will you classify microbes on the basis of their carbon sources and temperature? Give examples. (4)
- (b) What do you know about plant microbe interactions? Discuss in brief destructive associations. (4)
- (c) Describe extrinsic and intrinsic factors affecting soil microflora. (8)
3. (a) What is microbial niche? How does it differ from habitat? (3)
- (b) What are rhizosphere and rhizoplane regions? Why do these regions possess enhanced microbial activity? (5)
- (c) What are PGPRs? Discuss mechanisms of plant growth promotion by PGPR. (8)

## UNIT-II

4. (a) Define biofertilizer. Give examples of symbiotic and asymbiotic nitrogen fixation. How does it differ from bioenzyme? (4)
- (b) Discuss mass production of biofertilizers describing role of carriers in commercial biofertilizers. (6)
- (c) Define cyanobacteria. Discuss 5 orders of cyanobacteria and their reproductive structures. (6)
5. (a) What is biological nitrogen fixation? Discuss steps involved in fixing atmospheric nitrogen to nitrate describing the microorganisms involved in each step. (8)
- (b) How do rhizobia enter plants for nodule formation? Discuss the mechanism of nitrogen fixation in nodules. (8)

## UNIT-III

6. (a) What is organic matter? Write different processes of decomposition with special emphasis on lignocellulosic degradation. (8)
- (b) What is biogeochemical cycling? Discuss carbon and nitrogen cycles. (8)

7. Write short notes on the following :
- (i) Recalcitrant compounds and their mineralization.
  - (ii) Vermicomposting.
  - (iii) Cellulases.
  - (iv) Biogas production. (4×4=16)

#### UNIT-IV

8. (a) What are antagonistic fungi? Write an extended note on different types of antagonistic mechanisms with suitable examples. (8)
- (b) Write notes on the following :
- (i) Ti plasmid and its application in agriculture.
  - (ii) Wheat brown rust-etiology and infection mechanism. (8)
9. (a) What is integrated pest management? Discuss the role of biological agents in it and their scope in sustainable agriculture. (8)
- (b) Discuss the classification and advantages of biopesticides. Write an extended note on *Bacillus thuringiensis* as a biocontrol agent. (8)
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