

2021

MICROBIOLOGY — GENERAL

Paper : SEC-A-1

(Biofertilizers and Biopesticides)

Full Marks : 80

The figures in the margin indicate full marks.

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

Question no. 1 is compulsory and answer **any six** questions from the rest.

1. Answer **any ten** questions : 2×10
- (a) Give examples of two free living nitrogen-fixing bacteria.
 - (b) What is leghaemoglobin?
 - (c) What do you mean by 'Rhizosphere'?
 - (d) What are diazotrophs? Give example.
 - (e) Define PSB with suitable example.
 - (f) How does oxygen inhibit nitrogen fixation?
 - (g) Briefly state the significance of VAM-Fungi.
 - (h) Define carrier based inoculants.
 - (i) Enlist the limitations of biofertilizer.
 - (j) What do you understand by ideal fertile soil?
 - (k) Name two common species of Azolla in India.
 - (l) Name two viruses which are used as bioinsecticide.
 - (m) What do you mean by 'Entomopathogenic virus'?
 - (n) What do you mean by dual inoculation?
 - (o) Define nod genes.
 - (p) What is crystal protein of Bt? How does it work?
 - (q) Define PGPR.
2. Write briefly about the following : 2½×4
- (a) Ericoid mycorrhizae
 - (b) Arbuscular mycorrhizae
 - (c) Monotropoid mycorrhizae
 - (d) Arbutoid mycorrhizae.

Please Turn Over

3. (a) Briefly describe the properties of an ideal carrier material.
(b) What are phosphate solubilising bacteria? Give a concise account of cyanobacterial biofertilizer and their applications.
(c) Define biofertilizer. Describe different types of bacterial biofertilizer. 4+3+3
4. (a) Discuss the role of heterocysts in nitrogen fixation.
(b) Discuss the process of N_2 fixation in soil.
(c) How does *Bacillus thuringiensis* serve as a bioinsecticide? 2+4+4
5. Comment on the following :
(a) Field application of nitrogen fixing microorganism like *Rhizobium* and *Azotobacter*.
(b) Isolation of *Azospirillum* in microbiology laboratory.
(c) Bt-engineered crops. 4+4+2
6. (a) Write the structure of Nitrogenase enzyme.
(b) Briefly describe the mechanism of nitrogen fixation by the nitrogenase enzyme.
(c) What are siderophores?
(d) Give one example of non-heterocystous cyanobacteria. 3+4+2+1
7. Differentiate between (**any four**) : 2½×4
(a) Ectomycorrhizae and Endomycorrhizae.
(b) Biopesticide and Chemical pesticide.
(c) Rhizobial and *Azotobacter* as biofertilizer.
(d) Root nodule and Mycorrhizae.
(e) Free living versus Symbiotic nitrogen fixation.
8. (a) What is 'Entomopathogenic nematode' (EPN)? Give example.
(b) Briefly describe the mode of action of *Baculovirus* as bioinsecticide.
(c) What is biofungicide? Give example.
(d) Mention the names of two microbes other than Bt which are used as bacterial insecticide. 2+4+2+2
9. (a) Distinguish between vesicles and arbuscules.
(b) Distinguish between hormogones and hormospores.
(c) What are the deleterious effects of cyanobacteria? 3+4+3
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