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.

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