SEC: 4 BIOFERTILIZERS AND BIOPESTICIDES (composite)
SEMESTER –IV

HMBSE4022T

THEORY **Marks 50**

TOTAL HOURS: 13 **CREDITS: 1**

Unit 1 Biofertilizers **No of Hours: 4**

General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers. Symbiotic N2 fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants. Cyanobacteria, *Azolla* - Isolation, characterization, mass multiplication, Role in rice cultivation, Crop response, field application.

Unit 2 Mycorrhizal Biofertilizers **No of Hours: 2**

Importance of mycorrizal inoculum, types of mycorrhizae and associated plants, Mass inoculums production of VAM, field applications of Ectomycorrhizae and VAM.

Unit 3 Non - Symbiotic Nitrogen Fixers **No of Hours: 2**

Free living *Azospirillum*, *Azotobacter* - free isolation, characteristics, mass inoculums, production and field application.

Unit 4 Phosphate Solubilizers **No of Hours: 2**

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application

Unit 5 Bioinsecticides **No of Hours: 3**

General account of microbes used as bioinsecticides and their advantages over synthetic pesticides,
Commercial formulation, development and application in field - *Bacillus thuringiensis*, *Pseudomonas fluorescence*, *Trichoderma viridae.*

PRACTICALS **HMBSE4022P** **CREDITS: 1**

No. of Hours: 26

1. Preparation of biofertilizers
2. Producton of nitrogen fixer formulation (liquid and solid)
3. Production of biological growth promoter and increasing reproduction efficiency
4. Isolation and characterisation of bacteria based pesticide

5. Use of novel fungal antifungal formulation and their application

Suggested Readings

1. Kannaiyan, S. (2003). Bioetchnology of Biofertilizers, CHIPS, Texas.
2. Mahendra K. Rai (2005). Hand book of Microbial biofertilizers, The Haworth Press, Inc. New York.
3. Reddy, S.M. et. al. (2002). Bioinoculants for sustainable agriculture and forestry, Scientific Publishers. 4. Subba Rao N.S (1995) Soil microorganisms and plant growth Oxford and IBH publishing co. Pvt. Ltd. NewDelhi.
5. Saleem F and Shakoori AR (2012) Development of Bioinsecticide, Lap Lambert Academic Publishing GmbH KG
6. Aggarwal SK (2005) Advanced Environmental Biotechnology, APH publication.