

**ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR-522 510**  
**B.Sc MICROBIOLOGY (CBCS) SYLLABUS**  
**SEMESTER- V**  
**Paper-V**

**MBT- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY**

**TOTAL HOURS: 36**

**CREDITS:**

**3**

**UNIT - I**  
**hours: 8**

**No. of**

Terrestrial Environment: Soil profile and soil microflora  
Aquatic Environment: Microflora of fresh water and marine habitats  
Atmosphere: Aeromicroflora and dispersal of microbes  
Extreme Habitats: Extremophiles: Microbes thriving at high & low temperatures, pH, high hydrostatic & osmotic pressures, salinity, & low nutrient levels.

**UNIT – II**

**No. of hours: 8**

Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus).  
Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique. Microbial interactions – mutualism, commensalism, antagonism, competition, parasitism, predation.

**UNIT – III**

**No. of hours: 6**

Outlines of Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill).  
Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.

**UNIT – IV**

**No. of hours: 7**

Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, *Azospirillum*, *Azotobacter*, *Frankia*, phosphate-solubilizers and Cyanobacteria.  
Outlines of biological nitrogen fixation (symbiotic, non-symbiotic).  
Biofertilizers - *Rhizobium*.

**UNIT – V**

**No. of hours: 7**

Concept of disease in plants. Symptoms of plant diseases caused by fungi, bacteria, and viruses. Plant diseases - groundnut rust, Citrus canker and tomato leaf curl.  
Principles of plant disease control.

## **MBP- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Analysis of soil – pH, Moisture content and water holding capacity.
2. Isolation of microbes (bacteria and fungi) from soil.
3. Study of air flora by petriplate exposure method.
4. Analysis of potable water: SPC, Presumptive, confirmed and completed test, determination of coliform count in water by MPN.
5. Determination of Biological Oxygen Demand (BOD) of waste water samples.
6. Isolation of *Rhizobium* from root nodules.
7. Staining and observation of Vesicular Arbuscular Mycorrhizal (VAM) fungi.
8. Observation of plant diseases of local importance - Citrus canker, Tikka disease of Groundnut, Bhendi yellow vein mosaic, Rusts, Smuts, Powdery mildews, Tomato leaf curl.

### **SUGGESTED READINGS**

Atlas RM and Bartha R. (2000). **Microbial Ecology: Fundamentals & Applications**. 4th edition. Benjamin/Cummings Science Publishing, USA

Barton LL & Northup DE (2011). **Microbial Ecology**. 1st edition, Wiley Blackwell, USA

Campbell RE. (1983). **Microbial Ecology**. Blackwell Scientific Publication, Oxford, England.

Coyne MS. (2001). **Soil Microbiology: An Exploratory Approach**. Delmar Thomson Learning.

Lynch JM & Hobbie JE. (1988). **Microorganisms in Action: Concepts & Application in Microbial Ecology**. Blackwell Scientific Publication, U.K.

Madigan MT, Martinko JM and Parker J. (2014). **Brock Biology of Microorganisms**. 14th edition. Pearson/ Benjamin Cummings

Maier RM, Pepper IL and Gerba CP. (2009). **Environmental Microbiology**. 2nd edition, Academic Press

Martin A. (1977). **An Introduction to Soil Microbiology**. 2<sup>nd</sup> edition. John Wiley & Sons Inc. New York & London.

Okafor, N (2011). **Environmental Microbiology of Aquatic & Waste systems**. 1st edition, Springer, New York.

Singh A, Kuhad, RC & Ward OP (2009). **Advances in Applied Bioremediation**. Volume 17, Springer-Verlag, Berlin Hedeilberg

Stolp H. (1988). **Microbial Ecology: Organisms Habitats Activities**. Cambridge University Press, Cambridge, England.

Subba Rao NS. (1999). **Soil Microbiology**. 4th edition. Oxford & IBH Publishing Co. New Delhi.

Willey JM, Sherwood LM, and Woolverton CJ. (2013). **Prescott's Microbiology**. 9th edition. McGraw Hill Higher Education.

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**SEMESTER- V**  
*Paper- VI*

**MBT- 502 FOOD AND INDUSTRIAL MICROBIOLOGY**

**TOTAL HOURS: 36**

**CREDITS: 3**

**UNIT- I**

**No. of hours: 8**

Intrinsic and extrinsic parameters that affect microbial growth in food  
Microbial spoilage of food - fruits, vegetables, milk, meat, egg, bread and canned foods  
Food intoxication (botulism).  
Food-borne diseases (salmonellosis) and their detection.

**UNIT – II**

**No. of hours: 7**

Principles of food preservation - Physical and chemical methods.  
Fermented Dairy foods – cheese and yogurt.  
Microorganisms as food – SCP, edible mushrooms (white button, oyster and paddy straw). Probiotics and their benefits.

**UNIT – III**

**No. of hours: 6**

Microorganisms of industrial importance – yeasts, moulds, bacteria, actinomycetes.  
Isolation and Screening of industrially-important microorganisms.  
Outlines of strain improvement.

**UNIT – IV**

**No. of hours: 8**

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.  
Design of fermenter.  
Ingredients of Fermentation media  
Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

**UNIT – V**

**No. of hours: 7**

Microbial production of Industrial products - Citric acid, Ethanol, amylases, penicillin, glutamic acid and vitamin B12.

**MBP- 502 FOOD AND INDUSTRIAL MICROBIOLOGY (Practical)**

**TOTAL HOURS: 36**

**CREDITS: 2**

1. Isolation of bacteria and fungi from spoiled bread/fruits/vegetables
2. Preparation of Yogurt/Dahi
3. Determination of the microbiological quality of milk sample by MBRT
4. Isolation of antagonistic microorganisms by crowded plate technique
5. Diagrammatic study of Design of Fermenter.
6. Microbial fermentation for the production and estimation of ethanol from Grapes.
7. Microbial fermentation for the production and estimation of citric acid.