

ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVARAM
B.Sc MICROBIOLOGY (CBCS) SYLLABUS
THIRD YEAR – SEMESTER- V

MBT- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

TOTAL HOURS: 36

CREDITS: 3

UNIT - I

No. of hours: 8

Terrestrial Environment: Soil profile and soil microflora
 Aquatic Environment: Microflora of fresh water and marine habitats
 Atmosphere: Aeromicroflora and dispersal of microbes

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.

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1. Preparation of soil extract agar and any one culture media for algal growth
2. Isolation of microbes (bacteria and fungi) from soil.
3. Study of air micro flora by petriplate exposure method.
4. Microbiological Analysis of potable water Standard Plate Count

5. Determination of Dissolved Oxygen (DO) of water samples.
6. Isolation of *Rhizobium* from root nodules.
7. Isolation of actinomycetes on I.S.P. media (International Streptomyces project media)
8. Observation of photo micrographs of plant diseases of local importance - Citrus canker, Tikka disease of Groundnut, Bhandi 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**. 2nd 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.

B.Sc MICROBIOLOGY (CBCS) SYLLABUS
ADIKAVI NANNAYA UNIVERSITY, RAJAMAHENDRAVARAM
THIRD YEAR – SEMESTER -V

MBT- 601: 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, (*Saccharomyces cerevisiae*) moulds, (*Aspergillus niger*)
Bacteria (*E.coli*), actinomycetes (*Streptomyces griseus*).
Outlines of Isolation and Screening and strain improvement of industrially-important microorganisms.

UNIT – IV

No. of hours: 8

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous.
Basic concepts of 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- 601 : FOOD AND INDUSTRIAL MICROBIOLOGY

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. Design of Fermenter(identification of diagrams of various types of Fermentors and labelling of parts)
6. Microbial fermentation for the production and estimation of ethanol from Grapes.
7. Microbial fermentation for the production and estimation of citric acid.

SUGGESTED READING

Adams MR and Moss MO. (1995). **Food Microbiology**. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.

Banwart JM. (1987). **Basic Food Microbiology**. 1st edition. CBS Publishers and Distributors, Delhi, India.

Casida LE. (1991). **Industrial Microbiology**. 1st edition. Wiley Eastern Limited.

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