## Paper: MDC Paper Code: UPOCMDC24050 Paper Level: 200 ENVIRONMENTAL MICROBIOOGY

#### (Paper Type: Theory) Semester –IV

#### Lecture Hours : 60 h Marks: 60 Credits: 4

#### **Unit 1 Microorganisms and their Habitats**

Structure and function of ecosystems 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 2 Microbial Interactions**

Microbe interactions: Mutualism, synergism, commensalism, competition, amensalism, parasitism, Predation

#### **Unit 3 Biogeochemical Cycling**

Carbon cycle: Microbial degradation of cellulose, Nitrogen cycle: Nitrogen fixation, ammonification, nitrification, denitrification and nitrate reduction Phosphorus cycle: Phosphate immobilization and solubilisation Sulphur cycle: Microbes involved in sulphur cycle

#### **Unit 4 Liquid Waste Management**

Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiarysewage treatment

#### **Unit 5 Microbial Bioremediation**

Principles and degradation of common pesticides (2,4, -D), organic (aliphatic hydrocarbons,) and inroganic(Mercury) matter,

### **Unit 6 Water Potability**

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

#### SUGGESTED READINGS

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

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

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

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

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

6. Barton LL & Northup DE (2011). Microbial Ecology. 1st edition, Wiley Blackwell, USA Campbell RE.(1983). Microbial Ecology.Blackwell Scientific Publication, Oxford, England.

7. Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. Delmar Thomson Learning. 8. Lynch JM & Hobbie JE. (1988). Microorganisms in Action: Concepts & Application in MicrobialEcology. Blackwell Scientific Publication, U.K.

9. Martin A. (1977). An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. NewYork & London.

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

# No. of Hours: 12

No. of Hours: 14

No. of Hours: 12

No. of Hours: 12

#### No. of Hours: 5

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11. Subba Rao NS.(1999). Soil Microbiology.4th edition. Oxford & IBH Publishing Co. New Delhi. 12. Willey JM, Sherwood LM, and Woolverton CJ.(2013). Prescott's Microbiology.9th edition. McGraw Hill Higher Education.