

MBH-502: Environmental Microbiology (52 h)

UNIT- I (13 h)

Interactions of microbes with their living and non-living **environment**, microbial habitats and functions, Roles and regulation of microbes in natural and man-made environments, from cellular to community level. Microbial ecology and environmental microbiology to explore the functional ubiquity and diversity of microorganisms

UNIT- II (13 h)

Introduction to microbial ecology: overview, motivation, history, applications etc. Aut- and synecology of macro and microorganisms: definitions, terminology, concepts. Individuals and populations: productivity, growth, distribution, activity. Communities: colonization, succession, diversity, structure. Microbial functions in ecosystems and global cycles, Methods in microbial ecology, Habitat characterization

UNIT- I II (13 h)

Interactions of microorganisms with their physical and chemical **environment**, Microbial guilds and biogeochemical cycles. Interactions with the biotic environment: symbiosis, competition, parasitism, predation. Interactions within microbial communities: quorum sensing, syntrophy, antibiotics. Interactions of microorganisms with algae and plants, Interactions of microorganisms with animals and humans. Ecology of natural and engineered microbial habitats

UNIT- IV (13 h)

Marine ecosystems: ocean surface, tidal flats, deep-sea, methane seeps, estuaries, anoxic basins. Freshwater ecosystems: lakes, rivers, swamps, bogs, Terrestrial ecosystems: rocks and soil, prairie, forest, tundra, Extreme **environments**: deserts, hot springs, glaciers, deep subsurface, mine drainage, Landfills, wastewater treatment reactors, bioremediation Culture collections, food ecosystems, agricultural systems, aquaculture.