

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Master of Environmental Engineering

Subject Name ENVIRONMENTAL MICROBIOLOGY

Sr.No	Course content
1	Introduction to Microbiology The scope of microbiology The history of microbiology. The characterization, classification and identification of microorganisms.
2	The Microscopic Examination of Micro Organisms :Types of microscopes and microscopy like Bright field, Dark field, Fluorescence, Phase contract, Transmission and scanning electron microscopy, preparations for Light microscope examination – wet mount and fixed stained smears.
3	The Microscopic Examination of Micro Organisms :Types of microscopes and microscopy like Bright field, Dark field, Fluorescence, Phase contract, Transmission and scanning electron microscopy, preparations for Light microscope examination – wet mount and fixed stained smears.
4	The Cultivation of Bacteria Nutritional types of bacteria, Bacteriological media, Physical conditions required for growth of bacteria, Cultivation of bacteria.
5	The Reproduction and Growth of Bacteria Binary fission, Growth, Normal growth cycle of bacteria, Synchronous growth, Continuous culture, quantitative measurement of bacterial growth.
6	Enzymes and their Regulation Types, Characteristics, Chemical and physical properties of enzymes, Nomenclature of enzymes. The nature and mechanism of enzyme action, Conditions affecting enzyme activity, Inhibition of enzyme activity, Conditions affecting enzyme formation, Determination of enzyme activity, Regulation of enzymes, Regulation of enzyme synthesis.
7	Microbial Metabolism Energy production, principles of bio energetics, Oxidation, Reduction reaction, Glycolysis, The pentose phosphate path way, Fermentation, Energy production by anaerobic and aerobic processes, TCA cycle, Energy production by photo synthesis, Cyclic, Non-cyclic photo phosphorylation. DNA, RNA, Transcription and Translation of genetic information. The process of protein synthesis.
8	The World of Bacteria Gram Negative and Gram positive bacteria, Bacteria with unusual properties, Gram positive filamentous bacteria etc.
9	The Other Types of Microorganisms: Fungi, Algae, Protozoa and viruses, Bacteriophages, Replication of phages
10	Control of Microorganisms: Control of microorganisms by physical, chemical agents.
11	Environmental Microbiology: Microbiology of soil, Aquatic microbiology, Microbiology of domestic water and wastewater, microbiology of air.

12	Microorganism and Communicable Diseases :Epidemiology of infectious diseases, Microbial agents, Transmission and control of diseases, Bacteria and viruses, Protozoa, Fungi etc..
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List of Experiments:

- 1.Exercise on type of Microbes
- 2 Practical demonstration of Microscope and Microbes
- 3 Experiment on Testing of culture media and microbial growth
- 4 Experiment on Use of Membrane filter for microorganism testing
- 6 Experiment on Growth rate of Microorganisms
- 7 Experiment on MPN test
- 8 Experiment on Confirmation test of Coliform organisms
- 9 Demonstration of Viruses and microorganisms using Electron microscope
- 10 Exercise on Monod's kinetics
11. Exercise on Microbial metabolisms

Reference Books:

1. Microbiology: by Plezlar, Chan, Krieg - McGraw Hill
2. Environmental Microbiology by E. Gaudy and Gaudy – McGraw Hill