XL- K	Microbiology

Section 1: Historical Perspective

Discovery of microbial world; Landmark discoveries relevant to the field of microbiology; Controversy over spontaneous generation; Role of microorganisms in transformation of organic matter and in the causation of diseases.

Section 2: Methods in Microbiology

Pure culture techniques; Theory and practice of sterilization; Principles of microbial nutrition; Enrichment culture techniques for isolation of microorganisms; Light-, phase contrast- and electron-microscopy.

Section 3: Microbial Taxonomy and Diversity

Bacteria, Archea and their broad classification; Eukaryotic microbes: Yeasts, molds and protozoa; Viruses and their classification; Molecular approaches to microbial taxonomy.

Section 4: Prokaryotic and Eukaryotic Cells: Structure and Function

Prokaryotic Cells: cell walls, cell membranes, mechanisms of solute transport across membranes, Flagella and Pili, Capsules, Cell inclusions like endospores and gas vesicles; Eukaryotic cell organelles: Endoplasmic reticulum, Golgi apparatus, mitochondria and chloroplasts.

Section 5: Microbial Growth

Definition of growth; Growth curve; Mathematical expression of exponential growth phase; Measurement of growth and growth yields; Synchronous growth; Continuous culture; Effect of environmental factors on growth.

Section 6: Control of Micro-organisms

Effect of physical and chemical agents; Evaluation of effectiveness of antimicrobial agents.

Section 7: Microbial Metabolism

Energetics: redox reactions and electron carriers; An overview of metabolism; Glycolysis; Pentose-phosphate pathway; Entner-Doudoroff pathway; Glyoxalate pathway; The citric acid cycle; Fermentation; Aerobic and anaerobic respiration; Chemolithotrophy; Photosynthesis; Calvin cycle; Biosynthetic pathway for fatty acids synthesis; Common regulatory mechanisms in synthesis of amino acids; Regulation of major metabolic pathways.

Section 8: Microbial Diseases and Host Pathogen Interaction

Normal microbiota; Classification of infectious diseases; Reservoirs of infection; Nosocomial infection; Emerging infectious diseases; Mechanism of microbial pathogenicity; Nonspecific defense of host; Antigens and antibodies; Humoral and cell mediated immunity; Vaccines; Immune deficiency; Human diseases caused by viruses, bacteria, and pathogenic fungi.

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Section 8: Chemotherapy/Antibiotics

General characteristics of antimicrobial drugs; Antibiotics: Classification, mode of action and resistance; Antifungal and antiviral drugs.

Section 9: Microbial Genetics

Types of mutation; UV and chemical mutagens; Selection of mutants; Ames test for mutagenesis; Bacterial genetic system: transformation, conjugation, transduction, recombination, plasmids, transposons; DNA repair; Regulation of gene expression: repression and induction; Operon model; Bacterial genome with special reference to *E.coli;* Phage λ and its life cycle; RNA phages; RNA viruses; Retroviruses; Basic concept of microbial genomics.

Section 10: Microbial Ecology

Microbial interactions; Carbon, sulphur and nitrogen cycles; Soil microorganisms associated with vascular plants.

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