

MB2PG05- GENERAL MICROBIOLOGY

Number of Hours / Week: 4

Credits: 4

UNIT I

The historical foundations and development of microbiology. An overview of microbial world. Microbial diversity - Prokaryotic and eukaryotic microbial diversity .The bacteria and the archaea. Principles of bacterial taxonomy Molecular methods in taxonomy. Intraspecies classification of bacteria.

UNIT II

Morphology and structure of bacteria. Surface structures and inclusions of bacteria. Viruses-unique properties, morphology and structure. Virion, Viroids and Prions. Viral replication. Viral diversity–bacterial, plant and animal viruses. Fungi –properties and classification. Identification of bacteria. Staining reactions. Cultural, physiological and biochemical properties. Molecular methods for identification.

UNIT III

Factors influencing microbial growth. Environmental and nutritional factors. Nutritional types of bacteria. Autotrophs and Chemolithotrophs, Physiological groups of chemolithotrophs, Microbial locomotion – flagellar motility, gliding motility and amoeboid motion. Chemotaxis, Phototaxis and other taxes. Cultivation of bacteria- culture media and methods. Measurement of bacterial growth. Bacterial growth curve. Binary fission, Growth cycle, Microbial growth at different temperature, pH and oxygen level. Continuous cultures. Maintenance and transport of cultures.

UNIT IV

Sterilization – Principles and methods, physical and chemical methods. Disinfectants – modes of action. Testing of disinfectants. Antibiotics – mechanism of action. Drug resistance in bacteria. Antibiotic sensitivity tests.

UNIT V

Genetic materials in bacteria. Bacterial chromosome. Extrachromosomal genetic elements. Plasmid- copy number and incompatibility, Replication of plasmid. Episomes. Transposable element-IS element and transposon, Integrons and Antibiotic resistance cassettes, Multiple antibiotic resistant bacteria, Mu-virus.. Mutation, Site Directed Mutagenesis, DNA repair, Mutant selection. Mechanism of gene transfer – transformation, transduction and conjugation. Recombination- types, mechanism and enzyme involved. Gene mapping. Bacteriophage genetics-Plaques formation & phage mutants, genetic recombination in lytic cycle. Genetic system in Yeast & Neurospora.

References

1. Russell AD, Hugo WB, & Ayliffe GAJ (1999) *Principles and practice of disinfection, preservation, and sterilisation* (Blackwell Science, Oxford) 3rd ed
2. Bryan LE (1984) *Antimicrobial Drug Resistance* (Academic Press, Orlando)
3. Topley WWC, Wilson GS, Parker T, & Collier LH (1990) *Topley and Wilson's Principles of Bacteriology, Virology and Immunology* .Edward Arnold, London. 8th ed.
4. Davis BD (1990) *Microbiology* (Lippincott, Philadelphia) 4th ed
5. Zinsser H & Joklik WK (1992) *Zinsser Microbiology* (Appleton & Lange, Norwalk, CT) 20th Ed
6. Gerhardt P (1994) *Methods for General and Molecular Bacteriology*. American Society for Microbiology, Washington, D.C.
7. Pelczar MJ, Chan ECS, & Krieg NR (1993) *Microbiology : concepts and applications* .McGraw-Hill.5th ed.
8. Prescott LM, Harley JP, & Klein DA (2005) *Microbiology* (McGraw-Hill, Boston ; London) 6th ed.