LSC 404 - MICROBIOLOGY

1. The microbial diversity, Theory of spontaneous generation, Experiments of Pasteur and Tyndall, Koch's Postulates, Isolation of bacteria, fungus, virus and mycoplasma from natural source, strategies -prevention and control of microbial diseases.

2. Changing concepts in microbiology taxonomy, genetics and evolution, Molecular taxonomy, Jackard's similarly coefficients, history and development of virology, cryptograms, and classification of viruses and viroids.

3. Role of microorganisms in human welfare, Biological concepts – Immunization, Pasteur experiment, Antibiosis, discovery of penicillin, Experiment with viruses, Vaccines, especially for smallpox and polio. Subunit vaccines, anti-idiotype and DNA vaccines

4. The Microbial cell, General organization of cell, Prokaryotes, Eukaryotes, and *Archaea*, Cell wall organization on Prokaryotes, Eukaryotes, and *Archaea*, Cell surface appendages, pilli, locomotion by flagella, Chemotactic movement, Peptidoglycan synthesis and inhibitors in different steps.

5. Microbial Genetics, Modes of genetic exchange in microbes, Transformation, Transduction, Conjugation, Evolutionary significance.

6. Microbial viruses: Diversity, classification, characteristics and applications of bacteriophages, and general account on algal, fungal and protozoan viruses.

7. Bacterial growth kinetics, Batch and continuous cultures, Nutritional classification of microorganisms, Nutritional uptake by microorganisms. Energy metabolism, Chemo autotrophs, Hydrogen bacteria, Phototrophic bacteria/Cyanobacteria.

8. Metabolic versatility of microbes, Anaerobic carbon metabolism: Anaerobic respiration, Sulphate respiration, Fermentation, diverse fermentation products, Putrefaction, Methane oxidizing and Methanogenic bacteria, Aerobic Carbon metabolism, TCA cycle alternative metabolic pathways.

9. Microbes in extreme environment: The basis of extremophiles and their applications, Life of a thermophile (*Thermus, Pyrococcus*).

10. Microbes in Agriculture: Symbiotic Nitrogen fixation, *Rhizobium, Cyanobacteria (Anabaena, Azolla, etc.), Mycorrihiza*, Biocontrol agent *Trichoderma.* Nitrogen metabolism; Nitrogen fixation, Assimilatory nitrate reduction, Ammonia assimilation and synthesis of amino acids, Regulation of 'nif'.

11. Clinical Microbiology: Survey of disease causing microbes, Mechanisms of pathogenesis, Antibiotics and their targets, Immune response elicited by microorganisms.

12. Industrial Microbiology: Major industrial products from microbes, Beverages, Antibiotics, Secondary metabolites, Recombinant products.

13. Environmental Microbiology: Nature of anthropogenic wastes, Municipal wastes and xenobiotics, Enrichment cultures, Xenobiotic degrading consortia, Bioremediation.

Suggested Readings

1. Basic Virology - by Edward K. Wanger, Martinez Hewiett, David Bloom and David Camerini, Blackwell Publishing.
2. Principles of Virology - by S J Flint, L W Enquest, R M Krug, V R Racanielo and A M Skalka. ASM Press, Washington DC.

3. Matthews' Plant Virology - by Roger Hull. 4th edition, Academic press.
4. Microbiology - by J.G. Cappuccino, N. Sherman, Pearson Education Publications.
5. Essential Microbiology - by Stuart Hogg, John Wiley and Sons Limited.
6. Microbiology: A Human Perspective - by E.W. Nester, D.G. Anderson, C.E. Roberts, N.N. Pearsall, M. T. Nester McGraw Hill Higher Education.
7. Manual of Environmental Microbiology - by C. J. Hurst, R.L. Crawford, G.R. Knudsen, M.J. McInerney, L.D. Stetzenbach, ASM Press.
8. Microbiology - by L.M. Prescott, J. P. Harley, D.A., Klein, McGraw Hill International Edition.
9. General Microbiology - by H.G. Schlegel, Cambridge University Press.