LS 404A	**Microbiology**	**3 Credits**
Name of the Faculty: Prof. A.K. Johri*, Prof. A. S. Kharat, Prof. Kiran Babu Uppuluri		
S.No.	**Topic**	**Faculty Name/ Contact Hours**
1.	History of Microbiology: Theory of spontaneous generation, Experiments of Pasteur and Tyndall, Koch's Postulates, Isolation of bacteria from natural sample column, Microbial growth and control	ASK/4
2.	Role of bacteria in human welfare: Biological concepts – Immunization (Pasteur experiment Antibiosis), (penicillin story), Griffith's experiment Avery and McCarty's experiment, Experiment with viruses	ASK/4
3.	The Microbial cell: General organization of cell, Prokaryotes, Eukaryotes,and Archaea, Cell wall organization on Prokaryotes, Eukaryotes and Archaea, Cell surface appendages, locomotion by flagella, Chemotactic movement, and Peptidoglycan synthesis inhibitors in different steps.	ASK/4
4.	Changing concepts in microbiology; Taxonomy- earlier systems, molecular taxonomy, Jackard's similarity Coefficient.	ASK/3
5.	Growth and nutrition: Growth kinetics, Batch and continuous cultures, Nutritional classification of microorganisms, Nutritional uptake by microorganisms (C.N.P).	ASK/3
6.	Metabolic Pathways: Metabolic versatility of microbes, Anaerobic Carbon metabolism: Anaerobic respiration, Sulphate respiration, Reference to glycolysis, Fermentation diverse fermentation products, Putrefaction, Methane oxidizing and Methanogenic bacteria, Aerobic Carbon metabolism: TCA cycle alternative metabolic pathways.	KBU/2
7.	Nitrogen metabolism; Nitrogen Fixation, Assimilatory nitrate reduction, Ammonia assimilation and synthesis of amino acids, Regulation of *nif*.	KBU/2
8.	Energy Metabolism: Chemo autotrophs, Hydrogen bacteria, Phototrophic bacteria/Cyanobacteria	KBU/1
9.	Microbial Genetics: Modes of genetic exchange in microbes, Transformation, Transduction, Conjugation, Evolutionary Significance.	KBU/4
10.	Microbes and Agriculture: Symbiotic Nitrogen fixation: Rhizobium, Cyanobacteria (Anabaena, Azolla etc.), Mycorrihiza	AKJ/2
11.	Clinical Microbiology: Survey of disease-causing microbes, Mechanisms of Pathogenesis, Antibiotics, types, mechanism of action,and their targets, Immune response elicited by microorganisms. Microbiome and human health	AKJ/3
12.	Industrial Microbiology: Major industrial products (Vitamin B12 and Citric acid) from microbes, Beverages, Antibiotics, Secondary metabolites, Recombinant products. Microbes in Extreme Environment: The basis of extremophiles and their applications, Life of a thermophile (Thermus, Pyrococcus).	AKJ/5
13.	Environmental Microbiology: Nature of anthropogenic wastes, Municipal wastes and xenobiotics, Enrichment Cultures, Xenobiotic degrading consortia, Bioremediation.	AKJ/5

Suggested readings:

1. Microbiology, J.G. Cappuccino, N. Sherman, Pearson Education Publications
2. Essential Microbiology, Stuart Hogg, John Wiley and Sons Limited
3. Microbiology: A Human Perspective, E.W. Nester, D.G. Anderson, C.E. Roberts,
4. Culture of Animal Cells, a Manual of Basic Technique. R. I. Freshney, Wiley
5. Manual of Environmental Microbiology, C. J. Hurst, R.L. Crawford, G.R.Knudsen,M.J.McInerney, L.D. Stetzenbach, ASM Press USA.
6. Microbiology, L.M. Prescott, J. P. Harley, D.A., Klein
7. General Microbiology. H.G. Schlegel
8. General Microbiology, Fifth Edition, Roger Y. Stanier, John L Ingraham, Mark LWheelis,Rage R Painter
9. Microbiology, by M. J. Pelczar, Jr., E.C.S. Chan , Noel R. Kregi
10. Fundamental Principles of Bacteriology, A. J. Salle