

CORE COURSE I – MICROBIOLOGY

Unit I

Discovery of Microbes – contribution of various scientists and Development of Microbiology in twentieth century, Classification and characteristic features of Micro organisms(eubacteria, archae, fungi, algae, protozoa and viruses) – Concept of taxa, species, strain, nomenclature and Bergey's manual, Classification of bacteria based on morphology (shape and flagella), staining reaction, nutrition and extreme environment). Bacterial taxonomy – New approach. Importance and Scope of Microbial technology.

Unit II

Bacterial respiration – aerobic and anaerobic, bacterial photosynthesis and reproduction – asexual and sexual, genetics. Bacterial growth and nutritional requirements, Growth curve, measurement of growth, types of media and preparation of ordinary and special media – methods of preservation and storage of microbes. Culture of viruses. Current methods of microbial identification

Unit III

Antimicrobial agents – Physical and chemical, Antibiotics (each with one example) affecting cell membrane, nucleic acid synthesis, protein synthesis and metabolism, Mode of action – Kinds of side effects – Antifungal and antiviral drugs, Mechanisms of drug resistance, Bioactive natural products (anti-bacterial, anti-fungal, anti-viral) from macroalgae, marine bacteria, dinoflagellates etc.

Unit IV

Biofertilizers – Mechanism of nitrogen fixation and its uses. Bioinsecticides Mycoinsecticides – advantages and mode of action – Bacillus thuringiensis, Baculo viruses, NPV- Biodegradation of xenobiotics, Bio leaching –principle and method – advantages and chemical reaction, Biodegradation, Bioremediation, Biosurfactants, Bioventing, Biospraying, Phytoremediation, Microbes in petroleum extraction. Applying of microbial biotechnology in sewage and waste and water treatment.

Unit V

Microbial fermentation- Bread, Beer, Wine, Cheese, Vinegar, fermented vegetables, SCP, Alcohol, Acetic acid, fermented Milk and other products – Spoilage microbes and means of controlling the (Physical and Chemical means).

Production of useful products – Antibiotics, Amino acids, vitamins, solvents, vaccines, enzymes, extremozymes from extremophiles – its biotechnological application, Bioenergy, biopolymer and bioplastics production.

Text Book:

1. Glazer and Nikaido, (2007), Microbial Biotechnology, II edition, Cambridge University Press

Reference Books:

1. Alexander M. (1977) Introduction to Soil Microbiology, John Wiley & Sons, New York
2. Ronald M. Atlas, Richard Bartha R., (2004), Microbial Ecology – Fundamentals and applications, Pearson education Limited
3. Pelzer M.J. Jr., Chan. E.C.S. and Kreig N.R. (1993), Microbiology, McGraw Hill Inc. New York
4. Salle A.J. (1999), Fundamental Principles of Bacteriology, fifth edition Tata McGraw – Hill Publishing Company Limited, New York.
5. Adams, Martin, R. Moss., Maurice O. (2004) Food Microbiology, Third edition, Royal Society of Chemistry, Cambridge
6. Frazier WC. And Wean hoff DC., (1998), Food Microbiology, Tata McGraw Hill Publishing Company Limited, New Delhi
7. Baily, J.E..and Ollis, D.F. (1986), Biochemical Engineering Fundamentals, Mc Graw Hill, New York
8. Balasubramanian, D. and Bryce, C.F.A. Jeyaraman, K. Dharmalingam K. Green (2004) Concepts in Biotechnology, COSTED-IBN, University Press, Hyderabad
9. Flickinger M.C. & Drew S.W. (1999) Encyclopedia of Bioprocess Technology – Fermentation Biocatalysis and Bioseperation, (Volumes I – V), John Wiley and Sons , Inc., New York
10. Stanbury P.F. & Whitaker. A. and S.J. Hall (2003), Principles of Fermentation Technology, Butterworth – Heineman, New Delhi
11. Jacquelyn G. Black, (2008), Microbiology Principles & Explorations, Seventh Edition
12. Brenner, D.J. Kreig, N.R. Staley, J.T., (eds.) (2005), Bergey's manual of systematic bacteriology, Vol.II edition, New York, Springer
13. P.S. Bisen, (1994) Frontiers in Microbial Technology, CBS Publishers, Delhi
14. Gerard. J. Tortora, Berdell R. Funke, Christian L. Case, (2006), Microbiology: An introduction, ninth edition, Benjamin Cummings Publications