

II Year B.Tech. Biotechnology I - Semester	L	T	P	To	C
	4	-	-	4	4

BT215 MICROBIOLOGY

Course Description & Objectives:

To familiarize the student to understand about classification, diversity and physiology of microorganisms. Also to acquaint about the methods of microbe cultivation and sterilization techniques as well as microbial diseases, host pathogen interactions and their control.

Course Outcomes:

1. Gives an insight on scope and historical developments in the field of microbiology
2. Acquaint the knowledge to identify and classify the newer microorganisms based on various characteristic features. This helps in designing a project for developing novel products from microorganisms.
3. Imparts knowledge on techniques used for identifying microorganisms.
4. Learn to cultivate the pure cultures by using specific media as well as enrichment.
5. Gain knowledge on how to control pathogenic microorganisms and maintain sterile conditions for doing experiments in biotechnology.

UNIT - I: Introduction to microbiology:

Discovery of microorganisms, Theory of spontaneous generation, Germ theory of diseases, Major contribution and events in the field of Microbiology. Scope and relevance of microbiology. Microscopic examination of microorganisms, Microscopy Types, Colony characteristics, Fixation, Principle dyes, Principles of different staining techniques: simple staining, differential staining, spore staining, flagellar staining, acid fast and capsular staining.

UNIT - II: Major groups of Microorganisms:

Microdiversity, Diversity classification of Woese et al. Three domains of life. Five - kingdom system of Whittaker. Classification systems - Phylogenetic, Phenetic, Genetic taxonomic ranks, Major characteristics used in Taxonomy, Molecular approaches to microbial taxonomy.

UNIT - III Nutrition, Cultivation and Growth kinetics:

Nutrition of microorganisms: Nutritional classes of microbes, Macro and micronutrients their sources and physiological functions of nutrients, growth factors and their functions in metabolism, aerobic and anaerobic metabolism.

Cultivation of microorganisms: Culture media-synthetic and complex media, solidifying agents, types of media -selective, differential and enrichment and enriched media, Pure culture methods - spread plate, pour plate and streak plate, special techniques for cultivation of anaerobes, growth of microorganisms, Growth curve, mathematics of growth, measurement of microbial growth (cell numbers, cell mass) and growth yields, Effect of environmental factors on growth, Continuous growth, chemostat, turbidostat, balanced and unbalanced growth.

UNIT - IV: Microbial Diseases and Host Pathogen Interaction:

Disease causing microorganisms, Classification of infectious diseases, Emerging infectious diseases, Molecular basis of pathogenicity and identification methods, Human diseases caused by viruses, bacteria and pathogenic fungi.

UNIT - V : Control of Microorganisms:

Control of microorganisms: Sterilization and disinfection-Physical (moist and dry heat, radiation and filtration). Chemical agents (disinfectants)- Characteristics & mode of action of antimicrobial agent. Classes of disinfectants - phenol and phenolics, alcohol, halogens (Cl, Chloramines, Br, I, tinctures of iodine, iodophores), Surfactants (soaps and detergents), Alkylating agents (formaldehyde, glutaraldehyde, 3-propiolactone and ethylene oxide), Heavy metals. (Hg, Silver and copper containing compounds). Evaluation of effectiveness of antimicrobial agents.

TEXT BOOKS:

1. Prescott LM, Harley JP, Klein DA, "Microbiology", 2ed., Mc Graw Hill, 2005.
2. Pelczar M.J. Chan ECS and Krieg NR. "Microbiology", 5ed.,Tata McGraw Hill, 2006.

REFERENCE BOOKS:

1. Prescott and Dunn, "General Microbiology", 1ed., Mc Graw Hill Publishers. 2004.
2. John. L. Ingraham, Catherine A lingraham, "Introduction to Microbiology a case History approach" 3rd ed., Thomson Publications, 2004

