

BACHELOR OF SCIENCE

2nd SEMESTER

DISCIPLINE SPECIFIC COURSE - 2 (CORE-2)

BT220C: BIO-TECHNOLOGY: CELL BIOLOGY, MICROBIOLOGY AND IMMUNOLOGY

CREDITS: THEORY – 4, PRACTICAL– 2 (4+2)

THEORY (4 CREDITS: 60 HOURS)

MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objective: This course is aimed to introduce students about the creation of life through cellular processes.

Unit – 1 (15 Hours)

Structure and organization of prokaryotic and eukaryotic cells; Structure and function of plasma membrane with special reference to membrane transport; Structure and function of cell organelles - Endoplasmic Reticulum, Golgi Apparatus, Mitochondria, plastids, Ribosomes, Lysosomes and Nucleus; Organization of genomic DNA in prokaryotes and eukaryotes

Unit – 2 (15 Hours)

Introduction to microbiology – definition, basic features of prokaryotic and eukaryotic members of microbial world, brief history (spontaneous generation, fermentation, germ theory of disease, Koch's postulates); Bacteria: classification based on Gram staining; Structure and function of bacterial cell wall, flagella and cytoplasmic inclusions; Special features of Archaeobacteria; Gene transfer in bacteria - transformation, conjugation and transduction (generalized, specialized); Viruses: general structure and basis of viral classification.

Unit - 3 (15 Hours)

Principles of microbial nutrition; Principle and procedure of sterilization (moist heat, filtration and chemical treatment); Commonly used techniques of culturing microorganisms; Microbial growth - growth kinetics, growth curve & its phases, synchronous batch and continuous culture, measurement of microbial growth, factors affecting microbial growth.

Unit – 4 (15 Hours)

Brief history of immunology; Basic concept of innate & adaptive immunity, cell & humoral immunity; Hematopoiesis; Cells of the immune system (B lymphocyte, T lymphocyte, NK cell, APCs, Granulocytes); Organs of the immune system – Primary (Bone marrow, Thymus),

Secondary (Lymph node, Spleen, MALT); Nature and properties of antigens / immunogens;
Structure, types and functions of antibodies.

PRACTICALS (2 CREDITS: 60 HOURS) MAXIMUM MARKS: 30, MINIMUM MARKS: 12

1. Identification of prokaryotic and eukaryotic cell.
2. Preparation and sterilization of culture media for bacterial cultivation.
3. Gram staining
4. Culture Techniques: Streaking, Spreading etc.
5. Total and differential Leukocyte count.
6. Total RBC count.
7. Blood grouping

BOOKS RECOMMENDED

1. *Molecular Biology of the Cell*: Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J. D. - Garland Publishing Inc. New York.
2. *Cell and Molecular Biology - Concepts and Experiments*: Karp, G. - John Wiley Inc. New York.
3. *General Microbiology*: Stanier, R. Y., Ingraham, J. L., Wheelis, M. L. and Painter, P. R. – Macmillan Press Ltd., UK.
4. *Microbiology*: Prescott, L. M., Harley, J. P. and Klein, D. A. – McGraw-Hill.
5. *Microbiology*: Pelczar, M. J., Chan, E. C. S. and Krieg, N. R. – McGraw-Hill.
6. *Kuby Immunology*: Goldsby, R. A., Kindt, T. J., Osborne, B. A. and Kuby, J. - W.H. Freeman and Company, New York.
7. *The Immune System*: Parham, P. - Garland Publishers.

Expected Learning Outcomes:

1. Understanding of basic differences between eukaryotic and prokaryotic cell system, structure-function relationships of different cell organelles.
2. Detailed understanding of bacteria/viruses and gene transfer methods in bacteria.
3. Description of different types of blood cells and organs involved in primary and secondary immune response.
4. Practical know-how of different techniques/methods used in microbiology and immunology.