

# BACHELOR OF SCIENCE

## 2<sup>nd</sup> SEMESTER

### DISCIPLINE SPECIFIC COURSE - 1 (CORE-1)

#### 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.

#### PRACTICAL (2 CREDITS)

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.*