

M.SC., SECOND SEMESTER

HARD CORE-3 ADVANCED CELL BIOLOGY

64hrs (4 credits)

- 1. Immunobiology:** (a) Historical account (b) General properties of immune responses – Innate immunity and its mechanisms – physical, physiological, chemical barriers and cellular and molecular basis of inflammation and its importance (c) adaptive immunity - active, passive and adoptive types, role of PAMPs, DAMPs, and TLRs (d) Humoral and cell mediated immunity (e) Cells of the immune system: Stem cells and Hematopoiesis. Structure, surface molecules and functions of (i) NK cells (ii) Dendritic cells (iii) Macrophages (iv) B Lymphocytes (v) T Lymphocytes - Th, CTLs and Tregs, $\gamma\delta$ T cells (f) Antigens (g) Immunoglobulins: Classes of immunoglobulins, structure of IgG, synthesis of immunoglobulins (h) Genetic basis of immunoglobulin diversity (i) MHC molecules: Types, structure, diversity and functions (j) Cytokines (k) Antigen recognition by cytosolic pathway, endocytic pathway and by cross presentation (l) Clonal selection and immunological memory (m) Immunological tolerance
22 Hrs
- 2. Clinical immunology:** (a) Vaccines – principles of vaccination, primary and secondary immune responses, Recombinant vaccines, DNA vaccines (b) Principles of monoclonal antibody production and its applications (c) Deficiencies in the immune system – congenital and acquired (AIDS) (d) Autoimmunity and autoimmune diseases (e) Hypersensitivity.
10 Hrs
- 3. Cell Cycle and its regulation:** (a) Phases of cell cycle (b) Biochemical studies with oocytes, eggs and early embryos (c) Molecular mechanisms regulating mitotic events (d) Regulation of cell cycle progression (e) Check points in cell cycle regulation (f) Cell cycle control in polyploid cells
08 Hrs
- 4. Cell signaling and Molecular basis of signal transduction** **03 Hrs**
- 5. Cellular aging and death:** (a) Causes of aging (b) Cellular changes due to aging (c) Theories of aging (d) Apoptosis (e) Longevity genes
05 Hrs
- 6. Biology of Cancer:** (a) Introduction (b) Non cancerous growth (c) Types (d) Tumor growth (e) Properties of benign and malignant cells (f) Transformation of cells in culture (g) Epidemiology (h) Carcinogens (i) DNA and RNA tumor viruses (j) Oncogenes and function of their products (k) Tumor suppressor genes and function of their gene products in development (l) Therapies of cancer (m) Multistep nature of cancer
16 Hrs

