Subject Code : P8ZO10

CORE COURSE X - DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

Developmental Biology

Unit I

Gametogenesis – Sprematogenesis – Biochemistry of semen, Sperm physiology – Ooogenesis – Superovulation, ICSI, GIFT – Embryo cloning. Fertilization – *In Vitro* fertilization – vitellogenesis.

Morphogenetic gradients in egg-double gradient theory.
Embryonic fields and their properties

Differentiation: Concept and nature of differentiation-selective action of genes in differentiation in Drosophila development, recognition of gene to signal molecules – time factor in progressive differentiation.

Differentiation at tissue level : Lactate dehydrogenase and alkaline phosphatase. Chemical substances as means of controlling differentiation. Role of *Hox* genes and *Hoxa* genes.

Unit II

Embryonic induction-concepts-organizers-classical experiments on organizers-analysis of the nature of primary organizer-chemical nature of inducing substances – mechanism of induction-competence of organizer.

Influence of hormones on growth and metamorphosis of insects and amphibians.

Regenerative ability in various invertebrates and vertebrates-mechanism of regeneration in amphibians-blastema formation – Factors affecting regeneration.

Aging and alterations in development – Gene regulation of aging.

Immunology

Unit III

Scope of Immunology – recognition of self and non self – types of Immunity – innate and acquired, passive and active.

Primary and secondary lymphoid structures and organs – structure and functions of bone marrow, thymus, spleen, bursa of Fabricius, GALT, BALT and Lymph nodes.

Cells of immune system – origin and differentiation of T,B cells and macrophage, antigens – class determinants – reactive sites and receptor sites. Vaccines and toxoids – types of vaccines – vaccination schedule vaccination and serotherapy.

Unit IV

Antibody – immunoglobulin – primary structure – classes, functions, synthesis (cellular, subcellular and molecular). Monoclonal antibodies and their applications, Genetic mechanisms in generation of antibody diversity – Somatic mutation – class switching – allelic exclusion – regulation of antibody.

Complements – classical and alternatives pathways and immunological significance

Unit V

Major histocompatibility complex (HLA) and its products in man.

Diseases and immune response – viral – bacterial diseases – parasitic infections – tumour immunology.

Immune deficiency diseases – AIDS.

Autoimmune diseases – examples, concept and mechanisms.

Types of hypersensitivity.

Recommended Text Books for Reference:

Developmental Biology

BALINSKY, B.L., (1981) An Introduction to Embryology, V Ed., Saunders Co., Philadelphia.

BERRILL, N.J., (1986) Developmental Biology, Tata McGraw Hill, New Delhi

Immunology

Sells, S. (1987). Basic Immunology, Elsevier Science Publishing Co., New York.

TIZARD, I.R., (1995). Immunology – An Introduction, IV Ed., Saunders College Publications, Philadelphia.

Reference Books :

Developmental Biology

BERRILL, N.J., and KARP, G. (1976) Developmental Biology, McGraw Hill Inc. New York.

BROWDER, L.N. (1980) Developmental Biology, Saunders College, Philadelphia.

DEUCHAR, E.M., (1976) Cellular interaction in Animal Development, Chapman and Hall, London.

GILBERT, S.F. (1995) Developmental Biology, II Edn., Sinamer Associates Inc., Publishers, Saunderland, Massachusetts, USA.

SAUNDERS, A.W., (1982) Developmental Biology : Patterns / Principles / Problems. Macmillan Publishing Co., NewYork.

STEVAN, B. and OPPENHEIMER (1980) Introduction to Embryonic Development, Alley and Bern.

TIMIRAS, P.S. (1972) Developmental Physiology and Aging. The Macmillan Company, New York.

WILLER, B.H. and OPPENHEIMER, J.M., (1964) Fundamentals of Experimental Embryology, Prentice Hall.

Immunology

ABBAS A.K., LICHMAN A.K., JORDAN S. POBER J.S. (1997). Cellular and Molecular Immunology, Harcourt Brace and Co., Asia Pvt. Ltd., Singapore.
CHAMPION, M.D., and COOKE, A. (1987) Advanced Immunology, J.B. Lippincott Philadelphia.
CLARK, W.R. (1983). The Experimental Foundations of Modern Immunology, John Wiley & Sons, New York.
COLEMAN, LOMBARD and SICARD (1992). Fundamentals Immunology, W.M.C. Brown Publishers.
STITES D.P. and ABBA I.TERR A.I. (1991). Basic and Clinical Immunology, Prentice Hall International Inc.,
KUBY, J. (1994). Immunology. W.H.Freeman and Co., New York.
NANDHINI SHETTY (1996). Immunology : Introductory Text Book. New age International Pvt. Ltd. New Delhi
PAUL, W.E.M. (1989). Fundamentals Immunology, Raven Press, New York.
RAMAKRISHNAN, S and RAJI SWAMY (1995). Text Book of Clinical Biochemistry and Immunology, T.R. Publications, Madras.
ROITT, M.I. (1994). Essential Immunology, Blackwell Science Ltd., U.K.
ROITT, M.I., BROSTOFF & D.K.MALE (1996). Immunology, IV Edn., Mosby, London.
SRIVASTAVA, R., RAM, B.P. and TYLE, P. (1991). Molecular Mechanisms of Immune Regulation, VCH Publishers Inc., New York.