M.Sc., I- SEMESTER
Soft Core Paper-1
ADVANCED DEVELOPMENTAL BIOLOGY
(3 Hrs / Week x 16 = 48 Hrs)

I A) Introduction : Descriptive V/s. Experimental Embryology

B) Fertilization : a) An overview of structure and differentiation of egg and sperm
    b) General sequence and molecular events during fertilization

II. Early development - I :
    a) Nucleocytoplasmic interactions in early development : An overview of
       Nuclear transplantation experiments in Amphibians and mammals
    b) Creations of multicellularity : Cleavage-Regulatory mechanism
    c) Gastrulation : Morphogenetic movements and regulatory mechanisms in
       amphibian and mammalian embryo.

III. Early development - II:
    a) Morphogenetic determinants and their role in development : Yellow cytoplasm
       in Ascidians, Polar body in Mollusca, Pole plasm in Drosophila
    b) Laying down the embryonic body plan : Determination of embryonic axes
       in Drosophila – Anterior-posterior (maternal effect genes) & Dorsoventral;
       Amphibians (cell-cell interaction) & Mammals (Hox Genes)
    c) Cell lineage studies and cell death genes in Caenorhabditis elegans.

IV. Morphogenesis - I
    a) Early embryogenesis in Drosophila : Regional specification by. Segmentation genes :
       Gap genes,, Pair rule genes, Segment polarity genes, and Homeotic gens.
    b) Cellular differentiation and morphogenesis : i. Neuronal v/s epidermal fate

V. Morphogenesis-II
    a) Role of Cell Adhesion molecules in morphogenesis : Cadherins and Fibronectins
    b) Genetics of imaginal discs and transdetermination
    c) Limb development-an over view :
       i. Proximo-distal axis specification in developing limb.
       ii. Cell death and formation of digits.

VI. Post embryonic development
    a) Metamorphosis : Endocrine and molecular control of metamorphosis in
       insects and amphibians
    b) Types of growth
    c) Regeneration : Types, Blastema formation, Sources of cells for regeneration
    d) Abnormal development as seen in Teratogenesis.
1. Study of internal changes during early development of frog & chick (permanent slides) 2X4
2. Development of chick-Embryo mounting-permanent preparation 2X4
3. Study of early developmental stages of Drosophila (Live Observation of embryo) 2X4
4. Study of Imaginal discs – the precursors of adult structures in Drosophila 2X4
REFERENCES

1. Balinsky, B. I., 1984 An Introduction to embryology, W. B. Saunders company
2. George, M. Malacinski (ed) 1988, Developmental genetics of higher organisms, Macmillan Publishing Co.,