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 8

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 : 8

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: 8

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 *Drosophil*a – 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 8

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 specification in *Drosophila.* ii. Vulval induction in Caenorhabditis elegans.

V. Morphogenesis-II 8

a) Role of Cell Adhesion molecules in morphongenesis : 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 8

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.

Advanced Developmental Biology – Practicals

8X4=32 Hrs

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.,
3. Gilbert, S.F., 1997. Developmental Biology, 5th Edn, Sinauer, Associates, Massachusettes.
4. Tamarin, R., 1991, Principles of Genetics, 3rd edition.
5. Vasudeva Rao, 1994, Developmental Biology : A modern synthesis, Oxford & IBH, New Delhi.