VI SEMESTER B.SC ZOOLOGY
PAPER VII – DEVELOPMENTAL BIOLOGY AND ORGANIC EVOLUTION

40hours

UNIT I — 13 hrs
DEVELOPMENTAL BIOLOGY

1.1 **Introduction:** Definition and scope, Historical review – Preformation theory, Epigenetic theory, Baer's Law and Biogenetic law. — 01 hr

1.2 **Types of eggs:** Based on amount of yolk and distribution of yolk with examples. Mosaic and regulative eggs, Cleidoic egg (e.g., Hen's egg) and its significance. — 02 hrs

1.3 **Reproductive cycles:** Oestrous and Menstrual cycles and their regulation — 02 hrs

1.4 **Patterns of development:** Oviparity, ovoviviparity and viviparity with examples. — 01 hr

1.5 **Fertilization:** — 03 hrs

- **a.** Definition, Types, Mechanism of fertilization and significance.
- **b.** Polyspermy: pathological and physiological polyspermy with examples.
- **c.** Mechanism to block polyspermy in monospermic forms (fast block and slow block).

1.6 **Cleavage**: — 02 hrs

- **a.** Definition, planes of cleavage – meridional, vertical, equatorial and latitudinal.
- **b.** Patterns of cleavage – radial, biradial, spiral and bilateral cleavage with examples.
- **c.** Influence of yolk in cleavage.

1.7 **Blastulation**: Comparative account with reference to Amphioxus, Frog and Chick. — 02 hrs

UNIT II — 15hrs

2.1 **Fate maps and cell lineage**: — 02 hrs

- **a.** Presumptive organ forming areas and fate maps in Frog and Chick.
- **b.** Cell lineage in Nereis.

2.2 Gastrulation in Amphioxus, Frog and Chick. — 03 hrs

2.3 Frog: Neurulation, post-neurular development and metamorphosis. — 02 hrs

2.4 **Role of organizers in development**: Transplantation experiments of Spemann and Mangold, Chemistry of Organiser. — 02 hrs

2.5 Foetal membranes in Chick - formation, structure and function. — 01 hr

2.6 **Placenta**: Types - Yolk sac and Chorio-allantoic placenta; Deciduate and non-deciduate placenta; morphological and histological placental types with suitable examples — 02 hrs

2.7 **Parthenogenesis**: — 02 hr

- **a.** Definition.
- **b.** Natural parthenogenesis (arhenotoky and thelytoky)
- **c.** Artificial parthenogenesis
- **d.** Significance of parthenogenesis.

2.8 **Regeneration**:

- **a.** Definition and types – morphollaxis and epimorphosis with examples. — 01 hr
- **b.** Regeneration in Planarians (Polarity, dominance of head, Axial gradient theory of Child).

UNIT III — 12 hrs

EVOLUTIONARY BIOLOGY

3.1 **Neo-Darwinism**: Concept of gene pool and gene frequency, Hardy- Weinberg law – Definition and significance. 01 hr

3.2 **Role of Evolutionary forces in speciation**: 04 hrs

a. Sexual reproduction
b. Mutation
c. Genetic drift
d. Natural Selection- Introduction, Stabilizing selection, Directional selection and Disruptive selection.
e. Isolation and Isolating mechanisms –
    i. Geographical isolation.
    ii. Reproductive isolation:
    - Prezygotic/Premating isolation – Ecological, Seasonal, Ethological, Mechanical, Physiological and Gametic mortality.
    - Post zygotic/Postmating isolation – Cytological, Zygotic mortality, Hybrid inviability, Hybrid sterility.
f. Speciation: Introduction; Phyletic, Allopatric and Sympatric speciation.

3.3 **Evidences of Organic Evolution**: 05 hrs

a. Paleontological evidences: Fossils
    i. Fossil formation and types (Petrification, preservation, impressions, moulds and casts).
    ii. Dating of fossils–Lead method, Carbon method, Potassium–Argon method, Fission Track method.
b. Morphology and Comparative anatomy: Homologous structures (Fore limb of vertebrates, mouth parts of insects), analogous structures (cephalopod eye and vertebrate eye, wing of insect and bird), atavism and adaptive radiations.
c. Embryological evidences.

3.4 **Human evolution**: Salient features of important fossil stages of man: Ramapithecus, Australopithecus, Homo erectus, Rhodesian man, Neanderthal man and Cromagnon man 02 hrs

References:

1. Introduction to Embryology by Balinsky B.L.(1970)
2. Development by Beril N J and Karpotata(1978)
3. Developmental biology by Gilbert(2016)
4. Embryology by Gilbert and Raunio(1997)
5. Embryology by Barath
6. Chick Embryology by Patten(1971)

VI SEMESTER B.Sc., ZOOLOGY PRACTICAL
PAPER – VII - DEVELOPMENTAL BIOLOGY AND ORGANIC EVOLUTION

15 Units

I. Developmental Biology: 09 units

1. Early development of Frog: Cleavage, Blastula, Gastrula and Neurula.
2. Late development of Frog: Metamorphosis (Tadpole to young Frog)
3. Development of Chick: 18 hrs, 24 hrs, 36 hrs, 48 hrs and 72 hrs incubation stages
4. Mammals: T.S. of uterus and fallopian tube
5. Placenta: Morphological and histological types.

II. Organic evolution: 06 units

1. Study of Homologous organs:
   a. Fore limb bones of terrestrial Vertebrates (Frog, Lizard, Bird, Rat or Rabbit or Human).
   b. Mouth parts of Cockroach, House fly, Butterfly and Mosquito.
2. Study of Analogous organs:
   a. Cephalopod Eye and Vertebrate eye.
   b. Wing of Insect and Bird
3. Study of Vestigial organs: Appendix, Coccyx and Molar tooth.
4. Study of Connecting links: Peripatus and Tornaria larva.

SCHEME OF PRACTICAL EXAMINATION
VI SEMESTER B.Sc. ZOOLOGY
DEVELOPMENTAL BIOLOGY AND ORGANIC EVOLUTION: PRACTICAL - VII

Duration: 3 hrs. **Max.Marks:35**

1	**Developmental Biology:** Identify and comment on A, B, C and D with neat labelled diagrams. (Any one larval stage of Frog to be compulsorily included in the question)	16 marks (4x4)
2	**Organic Evolution:** Identify and comment on the evolutionary trends of E and F with neat labelled diagrams. (Note: From 1 and 2)	06 marks (3x2)
3	**Organic Evolution:** Identify and comment on 'G'. (Note: Any one from 3 and 4)	03 marks
4	**Viva voce:** Based on the questions of the practical examination (Minimum of 3 to 4 questions)	05 marks
5	**Class Records**	05 marks
	Total	**35 mark**