

**JYOTI NIVAS COLLEGE AUTONOMOUS  
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

**Programme: B.Sc.**

**Semester: VI**

**ZOOLOGY PAPER VIII  
DEVELOPMENTAL BIOLOGY AND ORGANIC EVOLUTION**

**Course Code: 18VIZO8**

**No. of Hours: 45**

**COURSE OBJECTIVES:**

- To have a strong foundation in the concepts of development and evolutionary mechanisms.
- To provide practical skills on the preparation of whole mounts of embryos and mouth parts of insects and identification of different fossils
- To do problems on gene and genotype frequency using Hardy-Weinberg law

**LEARNING OUTCOMES:**

- It enables the students to understand the different types of eggs, the early development and organogenesis of various animals including human reproduction.
- The students obtain the ability to critically evaluate the various theories of evolution and understand the role of population genetics and the consequences of selection, mutation, gene flow, genetic drift as important evolutionary forces

**PART. A - DEVELOPMENTAL BIOLOGY**

**UNIT I: FUNDAMENTALS OF EMBRYOLOGY 05 HRS**

1. Theories of Development- Epigenetic, Pre-formation and Von Baer's law 1 HR
2. Mosaic and regulative eggs. Determinate and Indeterminate development 1 HR
3. Cell lineage with reference to spiral cleavage in Nereis. 1 HR
4. Patterns of development – Oviparity, Ovoviviparity and viviparity with examples. 1 HR
5. Cleidoic egg and its evolutionary significance, Example: Hen's egg. 1 HR

**UNIT II: EMBRYOLOGY OF AMPHIOXUS, FROG AND CHICK 16 HRS**

1. Types of cleavage based on distribution and amount of yolk. 1 HR
2. Comparative account of Blastula in Amphioxus, Frog and Chick 3 HRS
3. Presumptive areas and fate maps of Frog and Chick. 2 HRS
4. Gastrulation in Amphioxus, Frog and Chick. 4 HRS
5. Organogenesis – Chordogenesis, Neurogenesis and Mesodermal differentiation in Frog. 3 HRS
6. Role of organizers in Development, Transplantation experiments of Spemann and Mangold, Chemistry of Organizers 2 HRS
7. Foetal membranes in Chick, their formation, structure and function. 1HR

**UNIT III: HUMAN EMBRYOLOGY 6 HRS**

1. Reproductive cycles – Estrous and Menstrual cycle and their regulation. 2 HRS
2. Placentation – Yolk sac, Allantoic placenta, Deciduate and indeciduate placenta 2 HRS
3. Morphological and histological types of placenta and gestation period with suitable examples 2 HRS

## **PART. B- ORGANIC EVOLUTION**

### **UNIT IV: THEORIES AND MECHANISMS OF ORGANIC EVOLUTION 5 HRS**

1. Lamarckism, Darwinism. Critical account of Darwinism. Neo-Darwinism **2HRS**
2. Population genetics and evolution: Hardy-Weinberg's law. **1 HR**
3. Role of isolation, mechanism and speciation **2 HRS**

### **UNIT V: EVIDENCES FOR EVOLUTION 08 HRS**

1. Anatomical, morphological, serological and embryological evidences **3 HRS**
2. Paleontological evidences: Fossils-Definition, their importance, formation, types of fossils. Dating of fossils: Uranium-lead method, Potassium-argon method and Radiocarbon method **3 HRS**
3. Geological time scale - Eras, periods, epochs with major fauna of each period **1 HR**
4. Continental drift theory **1 HR**

### **UNIT VI: EVOLUTION OF ELEPHANT AND MAN 05 HRS**

1. Evolution of Elephant **2 HRS**
2. Evolution of modern man: Ramapithecus, Australopithecus, Pithecanthropus, Neanderthal man, Cromagnon man **3 HRS**

## PRACTICAL VIII

### DEVELOPMENT BIOLOGY AND ORGANIC EVOLUTION

**DURATION: 3 HRS/UNIT**

**NO. OF UNITS: 15**

#### **Developmental Biology**

**6 UNITS**

- a) Types of eggs: Alecithal, Centrolecithal, Mesolecithal and Macrolecithal eggs
- b) Frog: Slides - Early and late Cleavage, Blastula, Gastrula and Neurula.
- c) Study of Larval stages
- d) Chick embryo: 18 hrs, 24 hrs, 36 hrs, 48 hrs and 72 hrs of development.
- e) Mammal: Sections of mammalian uterus and fallopian tube for Histological details

#### **Organic Evolution:**

**5 UNITS**

#### **Whole mount preparation:**

Mouth parts of insects- Cockroach and Mosquito

#### **Study of Homologous organs:**

- a) Fore limb of Frog and Bird
- b) Mouthparts of mosquito
- c) Study of serial homology: appendages of prawn

#### **STUDY OF ANALOGOUS ORGANS:**

**2 UNITS**

- a) Wing of bird and insect
- b) Study of Vestigial organs: Appendix, wisdom tooth

#### **Study of fossils:** Study of connecting link-Peripatus

**Study of population genetics:** Hardy-Weinberg's law on genes and genotype frequency in Mendelian population- Gene frequency problem

Practical tests/repetition

**2 UNITS**

**Note:** 13 Practical + 2 units for practical tests/repetition

#### **REFERENCES:**

#### **DEVELOPMENTAL BIOLOGY**

1. **BALINSKY B.I.** 1976. AN INTRODUCTION TO EMBRYOLOGY, W.B Saunders Company, London, 4th Ed.
2. **BRADLEY M. Pattern.** 1964. FOUNDATIONS OF EMBRYOLOGY, Mc Graw -Hill Publications, New York, 2<sup>nd</sup> Ed.
3. **INDERBIRSINGH.** 1996. HUMAN EMBRYOLOGY, Macmillan Publications, New Delhi, 6<sup>th</sup> Ed.
4. **SMITHWILLIAMS AND TREADGOLD.** 1988. BASIC HUMAN EMBRYOLOGY, ELBS Publications.
5. **VERMA P.S. AND AGARWAL V.K.** 2005. CHORDATE EMBRYOLOGY, S.Chand and Company, New Delhi.
6. **VIMALA C.M.** 2007. INTRODUCTORY ZOOLOGY VOL. VII, Interline Publishing, Bangalore

#### **EVOLUTION**

7. **COLBERT E.H.** *et al.* 2001.EVOLUTION OF THE VERTEBRATES, Wiley-Liss Inc., Canada, 5<sup>th</sup>Ed.
8. **DOBZHANSKY T.***et al.* 1977. EVOLUTION, W.H. Freeman and Co., San Fransisco.
9. **RICHARD SWANN LULL** .1984. ORGANIC EVOLUTION, Seema Publication .New Delhi. Revised Ed.
10. **SIMPSON G.G.** 1949.THE MEANING OF EVOLUTIION, Oxford and IBH Publishing Co., New Delhi.
11. **VIMALA C.M.** 2007. INTRODUCTORY ZOOLOGY VOL. VII, Interline Publishing, Bangalore.