

# **DSC –II offered by Department of Zoology**

## **Name of the course: DSC-II Zoology II (Non Chordate II and Genetics)**

**[4hrs/week= 15\*4 Th=60Th And 4 hrs/week= 15 weeks\* 4 pract = 60 P]**

**[Credits 4 T+2 P = 6]**

### **B.SC. Semester II**

#### **Paper II: Non Chordates-II and Genetics**

##### **Course Description**

This course is designed in such a way that the students will gain insights of Non-chordates animals from Arthropoda to Hemichordata. Students will also learn about different types of parasites and vectors. The students will also gain insights on Genetics and its applications.

##### **Course Objectives**

To learn the basics about Nonchordates animals and Genetics

##### **Course Learning Outcomes**

After successful completion of the course, the student is expected to

- CO1: Students will be able to understand and have basic knowledge of Animal Kingdom, Animal Diversity, and its Classification with from Arthropoda to Hemichordata.
- CO2: The student should gain insights of the concept of parasitology and knowledge of vectors.
- CO3: Students will be able to understand the concept of Genetics with respect to Mendelian and Non mendelian genetics
- CO4: Students will gain the basic knowledge of Population genetics and Hardy Weinberg Law.
- CO5: Students will also get insights on genetic disorders
- CO6: Student passing out in semester II will acquire the knowledge of Non-chordates from Arthropoda to Hemichordata as well as Genetics

## **UNIT - I**

- 1.1 Arthropoda :- General characters and external features of Cockroach.
- 1.2 Mollusca :- General characters and external features of Pila.
- 1.3 Pearl formation in mollusc.
- 1.4 Larval forms :- Nauplius, Zoa, Megalopa, Glochidium, Veliger

## **UNIT-II**

- 2.1 Echinodermata :- General characters, Echinoderm Larvae
- 2.2 *Asterias* :- External features, Water vascular system and locomotion
- 2.3 Hemichordata :- General features and phylogeny
- 2.4 *Balanoglossus* :- External features.

## **UNIT III**

- 3.1 Parasitism - Concept, Parasite Protozoa – Entamoeba, Leshmania
- 3.2 Parasitic Helminthes Adaptation
- 3.3 Taenia life cycle, Ascaris life cycle
- 3.4 Vector- Biological & Mechanical, Insect vector, Housefly

## **UNIT IV**

- 4.1 Mendelian Principles: Mendel and his experiments with pea plant. Law of segregation: Monohybrid cross, back cross and test cross. Dominance and Recessive, Law of Independent Assortment: Dihybridcross in Pea plant and Drosophila.
- 4.2 Exceptions to Mendelian Inheritance: Epistasis, Incomplete dominance, Co-dominance, Multiple alleles.
- 4.3 Cytoplasmic inheritance- Kappa particles in Paramecium, CO<sub>2</sub> sensitivity in Drosophila, Extra nuclear inheritance: (mitochondria).
- 4.4 Mutation, Types of mutations: spontaneous, induced, somatic, gametic, forward, reverse. Types of point mutation - deletion, insertion, substitution, transversion, transition. Mutagenic agents : UV radiation and ionising radiation, Base analogs, alkylating and intercalating agents.

## **UNIT V**

- 5.1 Sex linked inheritance in human: Colour – blindness, Haemophilia, Hypertrichosis
- 5.2 Types of sex determination: -XX-XY, ZZ-ZW, XX-XO and Parthenogenesis, Hypodiploidy, Gynandromorphism
- 5.3 Human karyotype: Classification of chromosomes based on position of centromere. Types of banding, and karyotype technique applications
- 5.4 Genetic disorders, Structural & numerical alterations of chromosomes (chromosomal aneuploidy - Down, Patau, Edward, Turner and Klinefelter syndromes).

## UNIT VI

- 6.1 Basic Concepts in population genetics: Mendelian population, gene pool, gene / allele, Frequency
- 6.2 Hardy Weinberg law and its equilibrium
- 6.3 Genetic counseling
- 6.4 Genetic Diagnostics & breeding technology.

### Practicals based on Non-chordates-II and GeneticsPart A: Nonchordates-II

#### I. Study of museum specimens (Classification of animal suptoorders)

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|--------------------|--|
| I. Arthropoda      | :- <i>Peripatus, Daphnia, Limulus, Scolopendra, Moth</i> |
| II. Mollusca       | :- <i>Chiton, Pila, Mytilus, Octopus</i>                 |
| III. Echinodermata | :- <i>Asterias, Holothuria, Echinus</i>                  |
| IV. Hemichordata   | :- <i>Balanoglossus</i>                                  |

II. Study of Permanent Slides Nauplius, Zoea of Arthropoda, Glochidium larva of Mollusca, T.S. of arm of starfish, Bipinnaria larva, T.S. *Balanoglossus* through proboscis

III. Anatomical observation/Demonstration & Detail explanation Digestive and reproductive system of Cockroach through ICT tools / Models / Charts / Photography

#### Part B: Genetics

- I. Study of Monohybrid and Dihybrid ratio
- II. Study of Normal Human Karyotype ( Normal male and female)
- III. Study of characters and Karyotypes of Syndrome like Down, Klinefelter & Turner
- IV. Field survey of Genetic traits in Human being and Submission of Diary
- V. *Drosophila* culture: Media preparation and handling of flies
- VI. Study of *Drosophila* life cycle and its external morphology.
- VII. Study of *Drosophila* mutants.

## **Reference Books Nonchordates-II**

1. Barnes –Invertebrate Zoology (Halt-Saunders international) Philadelphia, USA
2. Barradaile L.A. & Potts F.A. – The Invertebrate
3. Nigam –Biology of Nonchordates
4. Kotpal, Agrawal&Khetrapal –Modern Text Book of Zoology - Invertebrates, Rastogi Publication, Meerut
5. Puranik P.G. & Thakur R.S. –Invertebrate Zoology
6. Majupuria T.C. –Invertebrate Zoology
7. Dhami & Dhami –Invertebrate Zoology
8. Parker & Hashwell -Textbook of Zoology Vol. I (Invertebrates) A.Z.T.B.S. Publishers & Distributors, New Delhi
9. Dr. S.S. Lal - Practical Zoology Invertebrates 9th edition, Rastogi Publication Meerut
10. EJW Barrington– Invertebrate Structure and Function ELBS III Edition
11. R.L. Kotpal –Phylum Protozoa to Echinodermata (series), Rastogi and Publication, Meerut

## **Genetics**

1. Joshi - Genetics & Genetic Engineering
2. Joshi - Genetic Engineering & its applications
3. Gardener - Genetics
4. Winchester - Genetics
5. Gupta - Genetics
6. Sinnot Dunn, Dobzansy - Principles of Genetics
7. Ahluwalia - Genetics
8. Sarin – Genetics
9. Singleton - Elementary Genetics
10. Owen & Edger General Genetics
11. Alenberg - Genetics
12. Pai - Foundation of Genetics
13. Strickberger - Genetics
14. Veerbala Rastogi - T. B. of Genetics
15. Benjamin Lewis - Gene VI Oxford press
16. Benjamin Lewis - Gene VIII Oxford press
17. Pawar C. B. - Genetics Vol. I and II Himalaya publication