

**DEPARTMENT OF ZOOLOGY**  
**COURSE OUTCOME & PROGRAM OUTCOMES**

**B.Sc. First Year: Theory Paper 1: Animal Diversity (Non-Chordata)**

**Theory Paper 1: Course Outcomes (COs)**

- CO1 Describe the salient features and outline classification (up to Classes) of various Lower Non-chordate Phyla  
CO2 Describe Protozoa with particular reference to locomotion, nutrition.  
CO3 Describe Porifera with reference to classification and canal system  
CO4 Describe Coelenterata with reference to classification, polymorphism, including brief account of Corals and Coral reefs.  
CO5 Describe general characters of Aschelminthes  
CO6 Describe parasitic adaptations in Helminths.  
CO7 Describe Annelida with reference to general features, larval form/s, and metamerism.  
CO8 Describe Arthropoda with reference to general features.  
CO9 Describe Mollusca with reference to features and torsion.  
CO10 Describe Echinodermata with reference to general features, water vascular system.

**Time Allotted**

- i. Theory period of duration of 45 minutes for 6 days a week, i.e. a total of 4 and ½ hours per week.

**Theory Paper 1: Program Outcomes (POs)**

- PO1 A basic understanding of *Paramecium* with particular reference to locomotion, nutrition  
PO2 A basic understanding of canal system in sponges  
PO3 A basic understanding of Polymorphism in Coelenterata, of corals and coral reefs  
PO4 A basic understanding of characters and Life History of Helminthes and parasitic adaptations  
PO5 A basic understanding of salient features and outline classification of various Higher Non-chordate Phyla  
PO6 A basic understanding of Annelida characters up to classes  
PO7 A basic understanding of metamerism in Annelida (its origin and significance); of trochophore larva and its significance.  
PO8 A basic understanding Arthropods general characters and zoological importance of peripatus and limulus.  
PO9 A brief account of torsion in Gastropoda.


**Theory Paper 1: Programme Specific Outcomes (PSOs)**

- PSO1 A basic understanding of *Paramecium* with particular reference to locomotion, nutrition,  
PSO2 A basic understanding of Canal system, and affinities of Porifera.  
PSO3 A basic understanding of Polymorphism in Coelenterata, of corals and coral reefs  
PSO4 A basic understanding of morphology, life cycle, *Fasciola*, *Ascaris*,  
PSO5 A basic understanding of parasitic adaptations in Helminths  
PSO6 A basic understanding of salient features and outline classification of various Higher Non-chordate Phyla  
PSO7 A basic understanding of metamerism in Annelida (its origin and significance); of trochophore larva and its significance.  
PSO8 A basic understanding External features of *Peripatus*- Its distribution and Zoological importance.  
PSO9 A brief account of torsion in Gastropoda.


**B.Sc. First Year: Theory Paper 2: Cell Biology and Genetics**

**Theory Paper 2: Course Outcomes (COs)**

- CO1 Introduction to cell biology and cell theory  
CO2 Give comparative knowledge of prokaryotic and eukaryotic cells  
CO3 Elementary knowledge of the structure & functions of plasma membrane;  
CO4 Introduction to the organelles constituting endomembrane system (Endoplasmic reticulum, Golgi complex, Lysosome & Peroxisome).  
CO5 Elementary knowledge of the structure & functions Nucleus & nucleolus; Ribosome; Mitochondria.  
CO6 Elementary knowledge of the structure & functions of cytoskeleton.  
CO7 Elementary knowledge of Cell Division-Mitosis & Meiosis.

  
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- CO8 Basic features of Cell cycle;  
 CO9 Elementary idea of cell transformation and cancer  
 CO10 Elementary knowledge of Mendel's law, Exceptions to Mendel's law.  
 CO11 Elementary knowledge of Incomplete dominance and Co-dominance, Multiple alleles, Lethal alleles, Epistasis, Sex-linked inheritance;  
 CO12 Elementary knowledge of Extra chromosomal inheritance  
 CO13 Elementary knowledge of Linkage & Crossing over.  
 CO14 Elementary knowledge of Sex determination  
 CO15 Elementary knowledge of Chromosome structure; Euchromatin; Heterochromatin, Histones, Polytene & lampbrush chromosomes.  
 CO16 Elementary knowledge of Eugenesis

### **Theory Paper 2: Program Outcomes (POs)**

- PO1 Outline study of the prokaryotic and eukaryotic cells, including ultrastructure of the eukaryotic cell  
 PO2 A basic understanding of ultrastructure, chemical composition, models, specialisations and functions of plasma membrane.  
 PO3 A basic understanding of structure and functions of mitochondria, ribosomes, Lysosomes, centrioles, Golgi Complex, Endoplasmic reticulum, Nucleus and nucleolus.  
 PO4 A basic understanding of Cell division, mitotic poisons and significance of mitosis, structure and functions of synaptonemal complex, significance of meiosis.  
 PO5 A basic understanding of cell transformation and cancer  
 PO6 A basic understanding of eukaryotic chromosomes, uninemic and multinemic concept of chromosome structure, and giant chromosomes


### **Theory Paper 2: Programme Specific Outcomes (PSOs)**

- PSO1 Outline study of the prokaryotic and eukaryotic cells, including ultrastructure of the eukaryotic cell  
 PSO12 A basic understanding of ultrastructure, chemical composition, models, specialisations and functions of plasma membrane.  
 PSO13 A basic understanding of structure and functions of mitochondria, ribosomes, Lysosomes, centrioles, Golgi Complex, Endoplasmic reticulum, Nucleus and nucleolus.  
 PSO4 A basic understanding of Cell division, mitotic poisons and significance of mitosis, structure and functions of synaptonemal complex, significance of meiosis.  
 PSO5 A basic understanding of cell transformation and cancer  
 PSO6 A basic understanding of eukaryotic chromosomes, uninemic and multinemic concept of chromosome structure, and giant chromosomes


### **B.Sc. First Year: Theory Paper 3: Taxonomy, Evolution and Computer**

#### **Theory Paper 3: Course Outcomes (COs)**

- CO6 Describe taxonomy and systematics, their relationship and significance  
 CO7 Describe species concept and back ground knowledge of taxonomic methodology  
 CO8 Give an account of concepts and evidences of evolution  
 CO9 Describe evolutionary theories  
 CO10 Describe evolution of man  
 CO11 Give an elementary knowledge of fossils  
 CO12 Describe geological time scale  
 CO13 Describe Mendelian inheritance/genetics  
 CO14 Describe Linkage  
 CO15 Describe Crossing over-mechanism and significance  
 CO16 Give an account of Determination of sex  
 CO17 Describe Sex linked inheritance  
 CO18 Describe Mutation

  
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### **Theory Paper 3: Program Outcomes (POs)**

- PO8 A basic understanding of taxonomy and systematics, their relationship and significance
- PO9 A basic understanding of Rules of nomenclature, components of classification and Linnean hierarchy
- PO10 A basic understanding of species concept-species as a category and kinds
- PO11 A basic understanding of taxonomic methodology
- PO12 A basic understanding of concepts and evidences of evolution
- PO13 A basic understanding of evolutionary theories, including evolution at molecular level
- PO14 A basic understanding of evolution of man
- PO15 A basic understanding of kinds of fossils, their formation and their significance
- PO16 Brief background knowledge of determining the age of fossils, and Geological time scale.

### **Theory Paper 3: Programme Specific Outcomes (PSOs)**

- PSO7 A basic understanding of taxonomy and systematics
- PSO8 A basic understanding of Rules of nomenclature
- PSO9 A basic understanding of species concept
- PSO10 A basic understanding of taxonomic methodology
- PSO11 A basic understanding of concepts and evidences of evolution
- PSO12 A basic understanding of evolutionary theories, including evolution at molecular level
- PSO13 A basic understanding of evolution of man
- PSO14 A basic understanding of kinds of fossils, their formation and their significance
- PSO15 Brief background knowledge of determining the age of fossils, and Geological time scale

### **B.Sc. First Year: Practical's**

#### **Practicals: Course Outcomes (COs)**

##### **A. Non-Chordata**

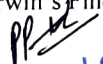
- CO1 Students will be able to Give a brief description Kingdom Protista: *Amoeba*, *paramecium*, *Euglena* and plasmodium.
- CO2 Students will be able to Describe of Phylum Porifera including T.S. and L.S. of Sycon.
- CO3 Students will be able to Describe of Phylum Platyhelminthes: Liver fluke, *Tenia solium*, and their life history stages.
- CO4 Students will be able to Describe of Phylum Nematelminthes: Male and Female *Ascaris*.
- CO5 Students will be able to Describe of Phylum Annelida: *Aphrodite*, *Nereis*, *Pheretima*, *Hirudinaria*.
- CO6 Students will be able to Describe of Phylum Arthropoda: *Plumonia*, *Cancer*, *Limulus*, *Palaemon*, *Julus*, *Apis*, *Periplatus*.
- CO7 Students will be able to Describe of Phylum Mollusca: *Chiton*, *Dentalium*, *Pila*, *Unio*, *Loligo*, *Sepia*, *Octopus*.
- CO8 Students will be able to Describe of Phylum Echinodermata: *Pentaceros*, *Ophiura*, *Echinus*, *Cucumaria* and *Antedon*.
- CO9 Animal Album needs to be made: with photographs, cutouts and writeup about collection.

##### **B. Cell Biology and Genetics**


- CO10 Students will be able to make Slide of tissues/Photographs of cell/tissues
- CO11 through Giant chromosomes preparation Students will be able to comprehend its Importance in cell biology
- CO12 Students will be able to understand the process of cell division by making slide of meiosis and mitosis using onion root-tip.
- CO13 Students will be able to comprehend the importance of mendelian inheritance using various example and hypothesis testing using chi-square test
- CO14 Study of human karyotype will make student to differentiate normal and abnormal chromosomes

##### **C. Evolution**

- CO 15 Study of fossil evidences from plaster cast models and pictures
- CO16 Study of homology and analogy from suitable specimens/ pictures and charts:
- CO17 Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors
- CO18 Darwin's Finches with diagrams/ cut outs of beaks of different species

  
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CO19 Visit to Museums, National parks and sanctuaries and submission of report. B.

#### **D. Biostatistics**

CO20 Practical application of statistics- Data presentation (Bar diagram, Histogram, Frequency distribution curve and scattered diagram).

CO21 Measures of central tendency (Calculation of Mean, Mode, and Median).

#### **E. Computer application**

CO22 Practical demonstration –preparation of Power Point presentation, Spread sheet, Chart and Design etc.

### **DEPARTMENT OF ZOOLOGY COURSE OUTCOME & PROGRAM OUTCOMES**

#### **B.Sc. Second Year: Theory Paper 1: Chordata**

##### **Theory Paper 1: Course Outcomes (COs)**


- CO1 Describe the salient features and Phylogeny of Protochordats.
- CO2 Describe body organization of Protochordats in reference to Balanoglossus, Herdmania & Amphioxus.
- CO3 Describe the salient features & classification of Agnatha Up to classes.
- CO4 Describe general characteristics of Lampreys and Hagfish and compare them.
- CO5 Give an account of class pisces .
- CO6 Describe scales and fins of fishes.
- CO7 Give an account of Hill stream adaptation in fishes.
- CO8 Describe general features and classification of class Amphibia up to orders.
- CO9 Give an account of parental care and neoteny in Amphibia.
- CO10 Describe general features and classification of class Reptiles up to orders.
- CO11 Give an account of Poisonous and non-poisonous snakes.
- CO12 Give an account of venom and antivenom and describe the biting mechanism in snakes.
- CO13 Describe general features and classification of class Aves up to orders.
- CO14 Give a description of feathers in Birds.
- CO15 Give an account of adaptations for aerial mode of life in Aves.
- CO16 Describe general features of Class Mammalia.
- CO17 Give an account of origin of mammals.
- CO18 Give an account of distribution and affinities of Prototheria, Metatheria and Eutheria.
- CO19 Describe aerial and aquatic adaptations in mammals.

#### **Time Allotted**


i. Theory period of duration of 45 minutes for 6 days a week, i.e. a total of 4 and ½ hours per week.

##### **Theory Paper 1: Program Outcomes (POs)**

- PO1 A basic understanding of salient features and Phylogeny of Protochordats.
- PO2 A basic understanding body organization of Protochordats in reference to Balanoglossus, Herdmania & Amphioxus.
- PO3 A basic understanding of salient features & classification of Agnatha Up to classes.
- PO4 A basic understanding of general characteristics of Lampreys and Hagfish and compare them.
- PO5 A basic understanding of class pisces .
- PO6 A basic understanding of scales and fins of fishes.
- PO7 A basic understanding of Hill stream adaptation in fishes.
- PO8 A basic understanding of characteristics and classification of class Amphibia up to orders.
- PO9 A basic understanding of parental care and neoteny in Amphibia.
- PO10 A basic understanding of general features and classification of class Reptiles up to orders.
- PO11 A basic understanding of Poisonous and non-poisonous snakes.
- PO12 A basic understanding of venom and antivenom and to understand the biting mechanism in snakes.
- PO13 A basic understanding of characteristics and classification of class Aves up to orders.
- PO14 A basic understanding of feathers in Birds.
- PO15 A basic understanding of adaptations for aerial mode of life in Aves.

  
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- PO16 A basic understanding of Class Mammalia.  
 PO17 A basic understanding of origin of mammals.  
 PO18 A basic understanding of distribution and affinities of Prototheria, Metatheria and Eutheria.  
 PO19 A basic understanding of aerial and aquatic adaptations in mammals.

### **Theory Paper 1: Programme Specific Outcomes (PSOs)**

- PSO1 A basic understanding of *Balanoglossus*, *Herdmania* and *Amphioxus*.  
 PSO2 A basic understanding of Lampreys and Hagfish.  
 PSO3 A basic understanding of Fishes, types of scales and fins in fishes.  
 PSO4 A basic understanding of hill stream adaptation in hill stream fishes.  
 PSO5 A basic understanding of Class Amphibia.  
 PSO6 A background knowledge of Parental care and Neoteny in Amphibia.  
 PSO7 A basic understanding of biting mechanism in snakes.  
 PSO8 A brief knowledge of venom and antivenom.  
 PSO9 A brief understanding of Aves and types of feathers in birds.  
 PSO10 A brief knowledge of adaptations in birds for aerial mode of life.  
 PSO11 Background knowledge of origin, distribution and affinities of mammals.  
 PSO12 A brief knowledge of aerial and aquatic adaptations in mammals.

### **B.Sc. Second Year: Theory Paper 2: Physiology and Biochemistry**

#### **Theory Paper 2: Course Outcomes (COs)**


- CO1 Give an account of digestive system.  
 CO2 Describe digestion and absorption of carbohydrates, Lipids and Proteins.  
 CO3 Describe physiology of respiration.  
 CO4 Give an account of blood components and blood coagulation.  
 CO5 Describe physiology of heart.  
 CO6 Describe structure and function of excretory system.  
 CO7 Describe nervous system.  
 CO8 Describe the process of initiation, conduction and transmission of nerve impulse.  
 CO9 Describe the structure and physiology of muscles.  
 CO10 Describe carbohydrate metabolism  
 CO11 Give an account of Lipids.  
 CO12 Describe Proteins.  
 CO13 Give an account of enzymes.

#### **Theory Paper 2: Program Outcomes (POs)**


- PO1 A basic understanding of the process of digestion and absorption.  
 PO2 A basic understanding of pulmonary ventilation, respiratory volumes and capacities.  
 PO3 A basic understanding of Transportation of oxygen and carbondioxide.  
 PO4 A basic knowledge of of mechanism of blood coagulation.  
 PO5 A basic understanding of Structure and function of heart.  
 PO6 A basic understanding of Physiology of urine formation.  
 PO7 A basic understanding of structure, types of neurons and function of neurons.  
 PO8 A basic understanding of synapse and nerve impulse transmission.  
 PO9 A basic understanding of structure and types of muscles.  
 PO10 A basic understanding of molecular and chemical basis of muscle contraction.  
 PO11 A basic understanding of carbohydrate, lipids and protein metabolism.  
 PO12 A basic understanding of types, properties and functions of enzymes.

#### **Theory Paper 2: Programme Specific Outcomes (PSOs)**

- PSO1 A basic understanding of Intracellular and extracellular digestion.  
 PSO2 A basic understanding of the process of digestion and absorption.

  
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- PSO2 A basic knowledge of pulmonary ventilation, respiratory volumes and capacities.  
 PSO3 A basic knowledge of Transportation of oxygen and carbondioxide.  
 PSO4 A basic knowledge of of mechanism of blood coagulation.  
 PSO5 A basic understanding of Structure of heart and origin and conduction of nerve impulse.  
 PSO6 A basic understanding of structure and physiology of nephron.  
 PSO10 A basic understanding of physiology of muscle contraction.  
 PSO7 A brief idea of tetanus and fatigue.  
 PSO11 A basic understanding of Glycolysis, Kerb's cycle, Gluconeogenesis, Glycogenesis and Glycogenolysis.  
 PSO12. A basic understanding of transamination and deamination.  
 PSO13 A brief Knowledge of enzymes and their mechanism of action.

**B.Sc. Second Year: Theory Paper 3: Molecular Biology, Biotechnology and Microbiology**

**Theory Paper 3: Course Outcomes (COs)**


- CO1 Describe structure of DNA.  
 CO2 Describe DNA double helix model of Watson and Crick.  
 CO3 Give an account of enzymes involved in prokaryotic and eukaryotic DNA replication.  
 CO4 Describe Causes and types of DNA damage and mechanism of DNA repair.  
 CO5 Describe Structure and types of RNA.  
 CO6 Give an elementary knowledge of transcription in prokaryotes.  
 CO7 Give a background knowledge of biotechnology and its scope.  
 CO8 Describe recombinant DNA technology .  
 CO9 Describe DNA fingerprinting.  
 CO10 Describe PCR and its significance.  
 CO11 Give an account of innovations of biotechnology in different areas.  
 CO12 Give an account of Cynobacteria, fungi, yeast and viruses.  
 CO13 Give a detail account of Bacteria.

**Theory Paper 3: Program Outcomes (POs)**


- PO1 A basic understanding of DNA, nucleoside, nucleotide and polynucleotide chain.  
 PO 2 A basic understanding of DNA as genetic material, its packaging and types of DNA.  
 PO3 A basic understanding of DNA damage and mechanism of DNA repair.  
 PO 4 A basic understanding of Clover leaf model of tRNA.  
 PO 5 A basic understanding of transcription mechanism in prokaryotes.  
 PO 6 A basic understanding of processing of pre-mRNA  
 PO 7 A brief background knowledge of biotechnology.  
 PO 8 A basic understanding of recombinant technology and DNA fingerprinting.  
 PO 9 A basic understanding of PCR and its significance.  
 PO 10 A brief knowledge of biotechnological innovations.  
 PO 11 A basic understanding of Cynobacteria, fungi, yeast and viruses.  
 PO 12 A basic understanding of structure, classification, nutrition and reproduction in Bacteria.

**Theory Paper 3: Programme Specific Outcomes (PSOs)**

- PSO6 A basic understanding of DNA, nucleoside, nucleotide and polynucleotide chain.  
 PSO 7 A basic understanding of DNA as genetic material, its packaging and types of DNA.  
 PSO 8 A basic understanding of DNA damage and mechanism of DNA repair.  
 PSO 9 A basic understanding of Clover leaf model of tRNA.  
 PSO 10 A basic understanding of transcription mechanism in prokaryotes.  
 PSO 12 A basic understanding of processing of pre-mRNA  
 PSO 13 A brief background knowledge of biotechnology.  
 PSO 14 A basic understanding of recombinant technology and DNA fingerprinting.  
 PSO 15 A basic understanding of PCR and its significance.  
 PSO 16 A brief knowledge of biotechnological innovations.  
 PSO 17 A basic understanding of Cynobacteria, fungi, yeast and viruses.  
 PSO 18 A basic understanding of structure, classification, nutrition and reproduction in Bacteria.

  
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## **B.Sc. Second Year: Practical's**

### **Practicals: Course Outcomes (COs)**

#### **C. Chordata**

CO1 Students will be able to Give a brief description Protochordats: *Balanoglossus*, *herdmania*, *Amphioxus*.

CO2 Students will be able to identify and describe class Pisces *Sphyrna*, *Pristis*, *Torpedo*, *Labeo*, *Exocoetus*, *Anguilla*, *Tor putitora*, Hill stream fishes Amphibia: *Ichthyophis/Ureotyphlus*, *Salamandra*, *Bufo*, *Hyla*, Axolotal larva Reptilia: *Chelone*, *Hemidactylus*, *Chamaeleon*, *Draco*, *Vipera*, *Naja*, *Crocodylus*, *Gavialis* Key for Identification of poisonous and non-poisonous snakes Aves: Study of six common birds from different orders Mammalia: *Sorex*, *Bat*, *Funambulus*, *Loris*.

CO3 Students will be able to identify poisonous and non-poisonous snakes.

CO3 Students will be able to Describe different common birds from different orders.

#### **D. Physiology and Biochemistry**

CO10 Students will be able to make Slide of haemin crystal from human blood.

CO11 Students will be able to estimate the haemoglobin percentage in human blood.

CO12 Students will be able to identify the presence of carbohydrate, protein and lipid in any solution .

CO13 Students will be able to determine the blood group.

CO14 Students will able to identify and differentiate different histological slides.

#### **C. Molecular Biology & Biotechnology**

CO 15 Study of Watson and Crick Model of DNA.

CO16 Study of Clover leaf structure of tRNA.

CO17 Study of gel electrophoresis and plasmids.

#### **D. Microbiology**

CO22 study of Media preparation and sterilization.

CO16 Study of homology and analogy from suitable specimens/ pictures and charts:

CO17 Phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors

CO18 Darwin's Finches with diagrams/ cut outs of beaks of different species

CO19 Visit to Museums, National parks and sanctuaries and submission of report. B.

#### **D. Conservation Biology**

CO20 Practical application of statistics- Data presentation (Bar diagram, Histogram, Frequency distribution curve and scattered diagram),

CO21 Measures of central tendency (Calculation of Mean, Mode, and Median).

#### **E. Developmental Biology**


CO22 Practical demonstration –preparation of Power Point presentation, Spread sheet, Chart and Design etc.

#### **F. Toxicology**


### **DEPARTMENT OF ZOOLOGY COURSE OUTCOME & PROGRAM OUTCOMES**

### **B.Sc. Third Year: Theory Paper 1: Endocrinology and Applied Zoology Theory Paper 1: Course Outcomes (COs)**

PO1. To understand the Basic idea of endocrine, paracrine & autocrine secretion.

  
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- PO2. To understand the Mechanism of action of hormones. Structure and function of Pituitary, Thyroid, Adrenal, Pancreas, Testes and ovary. Hormonal control of menstrual cycle
- PO3. To understand the Structure and function of Pituitary, Thyroid, Adrenal, Pancreas, Testes and ovary. Hormonal control of menstrual cycle.
- PO4. To understand the Sericulture: Types of silk worms (Mulberry & Nonmulberry), Rearing of Mulberry Silkworm
- PO5. To describe the Lac culture: cultivation practices of host plants, extraction and uses of lac
- PO6. To describe the Medicinal Pests: Identification, Characteristics of Mosquitoes, Housefly, Bedbug, Sand Medicinal Pests fly, Human lice, Tse Tse fly, Rat flea
- PO7. To describe the Aquaculture (Fish Culture): Monoculture and composite culture.
- PO8. To describe the Hatchery management – development of fish hatcheries, types of hatcheries, production of spawn, fry and fingerlings,
- PO9. To describe the techniques of Pond management and fertilization - pre and post stocking management( Indian major carps).

### **B.Sc. Third Year:**

#### **Theory Paper 2 : Ecology, Conservation Biology and Animal Behaviour**

#### **Theory Paper 2: Course Outcomes (COs)**


- PO1. To describe the concept of Ecology: Definition, scope and importance, Introduction to laws of Limiting factors: Liebig's law of the minimum, Shelford's law of tolerance. Factor interaction
- PO2. To describe the Biogeochemical cycles: Concept and types of biogeochemical cycle (Water, Carbon, Nitrogen and Phosphorus cycle
- PO3. To describe the Ecosystem concept: Component & types (Grassland, Forest, Pond, River); Abiotic, biotic & edaphic factors and their interdependence, Energy flow in ecosystem. Primary and secondary productivity. Food chains, food web and ecological pyramids
- PO4. To describe the Conservation Biology: Definition & scope. Concept of biodiversity; Biodiversity as a resource; Biodiversity loss and its Causes. Conservation & Management of Biodiversity.
- PO5. To describe the Concept of Protected Areas: *Ex-situ* & *In-situ* Conservation. Biodiversity hot spots. India's wildlife: Habitats & Distribution; Protected areas: National Parks & Sanctuaries.
- PO6. To describe the The science of behaviour: History, scope and terminology.
- PO7. To describe the Biological rhythms. Biological Clock. Circadian rhythms and their synchronisation seasonal rhythms. Photoperiodism

### **B.Sc. Third Year:**


#### **Theory Paper 3: Developmental Biology and Toxicology**

#### **Theory Paper 3: Course Outcomes (COs)**

- PO1. To describe the Gametogenesis: Spermatogenesis in mammals, Morphology of mature mammalian spermatozoon: Oogenesis in mammals, Vitellogenesis in birds.
- PO2. To describe the Fertilization: external (amphibian), Internal (mammals), Block to polyspermy

  
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PO3. To describe the Early Development of Frog and Human: types of egg; patterns of cleavage; role of yolk during cleavage; Morphogenetic movements;

PO4. To describe the Development up to formation of gastrula. Neurulation in frog embryo, Extra embryonic membranes.

PO5. To describe the Implantation of embryo in human; Types of placenta on the basis of histology; Formation of human placenta and its functions.

PO6. To describe the Elementary concept of primary organizer; Induction. Differentiation and organogenesis of vertebrate eye.

PO7. To describe the Definition, history, scope of toxicology. Classification of toxic agents, natural toxins, food toxins, and chemical toxins Environmental toxicology of heavy metal (lead)

PO8. To describe the Air pollution-types of air pollutants, their effects and remedial measures.

PO9. To describe the Water pollution- types of water pollutants, their effects and remedial measures. General introduction to pesticides, herbicides, fungicides, and insecticides

### **Practicals: Course Outcomes (COs)**

PO1. To identify and describe the slides; pituitary, adrenal gland, thymus, testes, ovary

PO2. To describe the Models based on different aspects of ecology.

PO3. To describe the Population study of available terrestrial and aquatic animals

PO4. To describe and analyze the Physico-chemical study of soil and water (pH, DO, Free CO<sub>2</sub>, Turbidity etc)

PO5. To describe the ecosystem, its biotic components and food chains

PO6. To describe the Models Based on different aspects of animal behavior.

PO7. To describe the Birds Nest showing Nesting Behaviour

PO8. To describe the Experiments related to learning behavior/conditional learning.

PO9. To describe the Concept of biodiversity; Biodiversity as a resource; Biodiversity loss and its Causes.


PO10. To identify Biodiversity hot spots with the help of maps..


PO11. To identify and describe the Protected areas: National Parks & Sanctuaries with the help of maps.

PO12. To describe the developmental stages of frog- whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole-external and internal gill stages.

PO13. To identify and describe the different types of placentae- histological sections through permanent slides or photomicrographs.

PO14. To describe the concept of Toxicology.

  
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