

Department of Zoology

Life & Diversity From Protozoa to Helminthes (paper code - 1.1)

B.Sc 1st Year (Sem. 1st)

Unit-I

Phylum- Protozoa

- i) General characters and classification up to order level
- ii) Biodiversity and economic importance
- iii) Type study of *Plasmodium*;
- iv) Parasitic protozoans: Life history, mode of infection and pathogenicity of *Entamoeba*, *Trypanosoma*, *Leishmania* and *Giardia*.

Unit-II

Phylum- Porifera:

- i) General characters and classification up to order level
- ii) Biodiversity and economic importance
- iii) Type study - *Sycon*.
- iv) Canal system in sponges
- v) Spicules in sponges

Unit-III

Phylum - Coelentrata:

- i) General characters and classification up to order level
- ii) Biodiversity, economic importance
- iii) Type Study - *Obelia*
- iv) Corals and coral reefs
- v) Polymorphism in Siphonophores

Unit-IV

Phylum - Helminths:

- i) General characters and classification up to order level
- ii) Biodiversity, economic importance
- iii) Type study - *Fasciola hepatica*
- iv) Helminths parasites: Brief account of life history, mode of infection and pathogenesis of *Schistosoma*, *Ancylostoma*, *Trichinella*, *Wuchereria* and *Oxyuris*.



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Bahal - 127 028 (Distt. Bhiwani) Haryana

Department of Zoology

Cell Biology (paper code - 1.2)

B.Sc 1st Year (Sem. 1st)

Unit-I

1. Ultrastructure of different cell organelles of animal cell.
2. Plasma Membrane: Fluid mosaic model, various modes of transport across the membrane, mechanism of active and passive transport, endocytosis and exocytosis.
3. Endoplasmic reticulum (ER): types, role of ER in protein synthesis and transportation in animal cell.
4. Goigi complex: Structure, Associated enzymes and role of golgi-complex in animal cell.

Unit-II

- 1 Ribosomes: Types, biogenesis and role in protein synthesis.
- 2 Lysosomes: Structure, enzyme and their role; polymorphism
- 3 Mitochondria: Mitochondrial DNA; as semiautonomous body, biogenesis, mitochondrial enzymes (only names), role of mitochondria.
- 4 Cytoskeleton: Microtubules, microfilaments, centriole and basal body.
- 5 Cilia and Flagella

Unit-III

1. Ultrastructure and functions of Nucleus: Nuclear membrane, nuclear lamina, nucleolus, fine structure of chromosomes, nucleosome concept and role of histones,
2. Euchromatin and heterochromatin, lampbrush chromosomes and polytene chromosomes.

Unit-IV

1. Mitosis and Meiosis (Cell reproduction)
2. Brief account of causes of cancer.
3. An elementary idea of cellular basis of Immunity.



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Bahal - 127 028 (Distt. Bhiwani) Haryana

Department of Zoology

Life & Diversity Of Annelida to Hemichordata (paper code - 2.1)

B.Sc 1st Year (Sem. 2nd)

Unit-I

Phylum - Annelida:

- i) General characters and classification up to order level
- ii) Biodiversity and economic importance of Annelida
- iii) Type study - *Pheretima* (Earthworm)
- iv) Metamerism in Annelida
- v) Trochophore larva: Affinities, evolutionary significance

Unit-II

Phylum - Arthropoda:

- i) General characters and classification up to order level
- ii) Biodiversity and economic importance of insects
- iii) Type study – *Periplaneta*

Unit-III

Phylum - Mollusca:

- i) General characters and classification up to order level
- ii) Biodiversity and economic importance
- iii) Type study - *Pila*
- iv) Torsion and detorsion in gastropoda
- v) Respiration and foot

Unit-IV

Phylum - Echinodermata:

- i) General characters and classification up to order level
- ii) Biodiversity and economic importance
- iii) Type Study - *Asteries* (Sea Star)
- iv) Echinoderm larvae
- v) Aristotle's Lantern

Phylum – Hemichordata: Type study: *Balanoglossus*



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Department of Zoology

Genetics (paper code - 2.2)

B.Sc 1st Year (Sem. 2nd)

Unit-I

1. Elements of Heredity and variations.
2. The varieties of gene interactions
3. Linkage and recombination: Coupling and repulsion hypothesis, crossing-over and chiasma formation; gene mapping.

Unit-II

1. Sex determination and its mechanism: male and female heterozygous systems, genetic balance system; role of Y -chromosome, male haploidy, cytoplasmic and environmental factors, role of hormones in sex determination.
2. Sex linked inheritance: Haemophilia and colour blindness in man, eye colour in *Drosophila*, Non-disjunction of sex-chromosome in *Drosophila*; Sex-linked and sex influenced inheritance.
3. Extra chromosomal and cytoplasmic inheritance:
 - i) Kappa particles in Paramecium.
 - ii) Shell coiling in snails.
 - iii) Milk factor in mice.

Unit-III

1. Multiple allelism: Eye colour in *Drosophila*; A, B, O blood group in man.
2. Human genetics: Human karyotype, Chromosomal abnormalities involving autosomes and sex chromosomes, monozygotic and dizygotic twins.
3. Inborn errors of metabolism (Alcaptonuria, Phenylketonuria, Albinism, sickle-cell anaemia).

Unit-IV

1. Nature and function of genetic material; Structure and type of nucleic acids; Protein synthesis. spontaneous and induced (chemical and radiations) mutations; gene mutations; chemical basis of mutations; transition, transversion, structural chromosomal aberrations (deletion, duplication, inversion and translocation); Numerical aberrations (autopolyploidy, euploidy and polyploidy in animals)
2. Applied genetics: Eugenics, eugenics and euphenics; genetic counseling, pre-natal diagnostics, DNA-finger printing, transgenic animals



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Department of Zoology

Life & Diversity Of Cordates - I (paper code - 3.1)

B.Sc 2nd Year (Sem. 3rd)

Unit-I

Chordates:

Principles of classification; Origin and Evolutionary tree; Role of amnion in evolution; Salient features of chordates; Functional morphology of the types with examples emphasizing their biodiversity, economic importance and conservation measures where required.

Unit-II

General characters and classification of phyla upto orders with examples emphasizing their biodiversity, economic importance and conservation measures where required.

Protochordates: Systematic position, distribution, ecology, morphology and affinities

Urochordata: *Herdmania* – type study

Cephalochordata; *Amphioxus* – type study

Unit-III

General characters and classification of phyla upto orders with examples emphasizing their biodiversity, economic importance and conservation measures where required.

Cyclostomes: Classification and ecological significance

Type study of *Petromyzon*.

Unit-IV

General characters and classification of all phyla upto orders with examples emphasizing their biodiversity, economic importance and conservation measures where required.

Pisces: Scales & Fins, Parental care in fishes, fish migration.

Types study of Labeo



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Department of Zoology

Mammalian Physiology - I (paper code - 3.2)

B.Sc 2nd Year (Sem. 3rd)

Unit-I

Introduction, Classification, Structure, function and general properties of carbohydrates and lipids.

Unit-II

Introduction, Classification, Structure, function and general properties of proteins; Nomenclature, Classification and mechanisms of enzyme action. Transport through biomembranes (Active and Passive), buffers

Unit-III

Nutrition: Nutritional components; Carbohydrates, fats, lipids, Vitamins and Minerals. Types of nutrition & feeding, Digestion of dietary constituents, viz. lipids, proteins, carbohydrates & nucleic acids; symbiotic digestion. Absorption of nutrients & assimilation; control of enzyme secretion.

Unit-IV

Muscles: Types of muscles, ultra-structure of skeletal muscle. Bio-chemical and physical events during muscle contraction; single muscle twitch, tetanus, muscle fatigue muscle, tone, oxygen debt., Cori's cycle, single unit smooth muscles, their physical and functional properties.

Bones: Structure and types, classification, bone growth and resorption, effect of ageing on skeletal system and bone disorders.



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Department of Zoology

Life & Diversity Of Cordates - II (paper code - 4.1)

B.Sc 2nd Year (Sem. 4th)

Unit-I

Amphibia: Origin, Evolutionary tree. Type study of frog (*Rana tigrina*), Parental Care in Amphibia

Unit-II

Reptilia: Type study of Lizard (*Hemidactylus*), Origin, Evolutionary tree. Extinct reptiles; Poisonous and non-poisonous snakes; Poison apparatus in snakes.

Unit-III

Aves: Type study of Pigeon (*Columba livia*); Flight adaptation, Principles of aerodynamics in Bird flight, migration in birds.

Unit-IV

Mammals: Classification, type study of Rat; Adaptive radiations of mammals and dentition.

Note: Type study includes detailed study of various systems of the animal.



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Department of Zoology

Mammalian Physiology - II (paper code - 4.2)

B.Sc 2nd Year (Sem. 4th)

Unit-I

Circulation: Origin, conduction and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac output, fluid pressure and flow pressure in closed and open circulatory system; Composition and functions of blood & lymph; Mechanism of coagulation of blood, coagulation factors; anticoagulants, haemopoiesis

Unit-II

Respiration: Exchange of respiratory gases, transport of gases, lung air volumes, oxygen dissociation curve of hemoglobin, Bohr's effect, Haburger's phenomenon (Chloride shift), control / regulation of respiration.

Excretion: Patterns of excretory products viz. Amonotelic, ureotelic uricotelic, ornithine cycle (Kreb's– Henseleit cycle) for urea formation in liver.

Unit-III

Excretion: Urine formation, counter-current mechanism of urine concentration, osmoregulation, micturition.

Neural Integration: Nature, origin and propagation of nerve impulse along with medullated & non-medullated nerve fibre, conduction of nerve impulse across synapse.

Unit-IV

Chemical integration of Endocrinology: Structure and mechanism of hormone action; physiology of hypothalamus, pituitary, thyroid, parathyroid, adrenal, pancreas and gonads.

Reproduction: Spermatogenesis, Capacitation of spermatozoa, ovulation, formation of corpus luteum, oestrous-anoestrous cycle, Menstrual cycle in human; fertilization, implantation and gestation.



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Department of Zoology

Fish & Fisheries (paper code - 5.1)

B.Sc 3rd Year (Sem. 5th)

Unit-I

Introduction to world fisheries: Production, utilization and demand.

Fresh Water fishes of India: River system, reservoir, pond, tank fisheries; captive and culture fisheries, cold water fisheries.

Unit-II

Fishing crafts and gears.

Fin fishes, Crustaceans, Molluscs and their culture.

Unit-III

Seed production: Natural seed resources – its assessment, collection, Hatchery production.

Nutrition: Sources of food (Natural, Artificial) and feed composition (Calorie and Chemical ingredients).

Unit-IV

Field Culture: Ponds-running water, recycled water, cage, culture; poly culture.

Culture technology: Biotechnology, gene manipulation and cryopreservation of gametes.



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Department of Zoology

Ecology & Evolution (paper code - 5.2)

B.Sc 3rd Year (Sem. 5th)

Unit-I

Basic concepts of ecology: Definition, significance. Concepts of habitat and ecological niche.

Factors affecting environment: Abiotic factors (light-intensity, quality and duration), temperature, humidity, topography; edaphic factors; biotic factors.

Unit-II

Ecosystem: Concept, components, properties and functions; Ecological energetics and energy flow-food chain, food web, trophic structure; ecological pyramids concept of productivity.

Biogeochemical cycles: Concept, reservoir pool, gaseous cycles and sedimentary cycles.

Population: Growth and regulation.

Unit-III

Origin of life.

1. Concept and evidences of organic evolution.
2. Theories of organic evolution.
3. Concept of microevolution and concept of species

Unit-IV

1. Concept of macro-and mega-evolution.
2. Phylogeny of horse.
3. Evolution of man.



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Department of Zoology

Entomology (paper code - 6.1)

B.Sc 3rd Year (Sem. 6th)

Unit-I

Study of important insect pests of crops and vegetables:

Sugarcane: (a) Sugarcane leaf-hopper (*Pyrilla perpusilla*) (b) Sugarcane Whitefly (*Aleurolobus barodensis*) (c) Sugarcane top borer (*Sciropophaga nivella*) (d) Sugarcane root borer (*Emmalocera depresella*) (e) Gurdaspur borer (*Bissetia steniellus*) With their systematic position, habits and nature of damage caused. Life cycle and control of *Pyrilla perpusilla* only.

Cotton:
(a) Pink bollworm (*Pestiphora gossypifolia*) (b) Red cotton bug (*Dysdercus Cingulatus*)
(c) Cotton grey weevil (*Mylocerus undecimpustulatus*) (d) Cotton Jassid (*Amrasca devastans*)
With their systematic position, habits and nature of damage caused. Life cycle and control of *Pectinophora gossypiella*.

Unit-II

3 Wheat:

Wheat stem borer (*Sesamia inferens*) with its systematics position, habits, nature of damage caused. Life cycle and control.

4 Paddy:

(a) Gundhi bug (*Leptocorisa acuta*) (b) Rice grasshopper (*Hieroglyphus banian*)
(c) Rice stem borer (*Scirpophaga incertullus*) (d) Rice Hispa (*Diceladispera armigera*)
With their systematic position, habits and nature of damage caused. Life cycle and control of *Loptocorisa acuta*.

Unit-III

Vegetables

(a) *Raphidopalpa faveicollis* – The Red pumpkin beetle. (b) *Dacus cucurbitas* – The pumpkin fruit fly.
(c) *Tetranychus tecarius* – The vegetable mite. (d) *Epilachna* – The Hadda beetle.
Their systematics position, habits and nature of damage caused. Life cycle and control of *Aulacophora faveicollis*.

Stored grains:

(a) Pulse beetle (*Callosobruchus maculatus*) (b) Rice weevil (*Sitophilus oryzae*)
(c) Wheat weevil (*Trogoderma granarium*) (d) Rust Red Flour beetles (*Tribolium castaneum*)
(e) Lesser grain borer (*Rhizopertha dominica*) (f) Grain & Flour moth (*Sitotroga cerealella*)
Their systematic position, habits and nature of damage caused. Life cycle and control of *Trogoderma granarium*.

Unit-IV

Insect control: Biological control, its history, requirement and precautions and feasibility of biological agents for control.

Chemical control: History, Categories of pesticides. Important pesticides from each category to pests against which they can be used. Insect repellants and attractants.

1. Integrated pest management.
2. Important bird and rodent pests of agriculture & their management.



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Developmental Biology (paper code - 6.2)

B.Sc 3rd Year (Sem. 6th)

Unit-I

1. Historical perspectives, aims and scope of developmental biology.
2. Generalized structure of mammalian ovum & sperm. Spermatogenesis and Oogenesis.

Unit-II

1. Fertilization, parthenogenesis, different types of eggs and patterns of cleavage in invertebrates and vertebrates.
2. Process of blastulation in invertebrates and vertebrates
3. Fate-map construction in frog and chick.

Unit-III

1. Gastrulation in invertebrates and vertebrates
2. Gastrulation & formation of three germinal layers in frog and chick.
3. Elementary knowledge of primary organizers.

Unit-IV

1. Extra embryonic membranes: structure & significance in birds and mammals.
2. Concepts of competence, determination and differentiation.
3. Concept of regeneration.



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