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SYLLABUS OF ENTRANCE TEST
FOR ADMISSION TO M.SC. ZOOLOGY (SESSION 2023-24)

ANIMAL DIVERSITY OF NON-CHORDATES

1. 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*.
2. 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
3. Phylum – Coelenterata:
 - i) General characters and classification up to order level
 - ii) Biodiversity and economic importance
 - iii) Type Study -*Obelia*
 - iv) Corals and coral reefs
 - v) Polymorphism in Siphonophores
4. Phylum – Helminthes:
 - i) General characters and classification up to order level
 - ii) Biodiversity and economic importance
 - iii) Type study – *Fasciola hepatica*
 - iv) Helminthes parasites: Brief account of life history, mode of infection and pathogenicity of *Schistosoma*, *Ancylostoma*, *Trichinella*, *Wuchereria* and *Oxyuris*.
5. Phylum – Annelida:
 - i) General characters and classification up to order level
 - ii) Biodiversity and economic importance of Annelida
 - iii) Type study – *Pheretima* (Earthworm)
6. Metamerism in Annelida
 - i) Trochophore larva
7. Phylum – Arthropoda:
 - i) General characters and classification up to order level
 - ii) Biodiversity and economic importance of insects
 - iii) Type study – *Grasshopper*
 - v) Metamorphosis and mouthparts of insects
8. 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

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- v) Respiration and foot
9. Phylum – Echinodermata:
 - i) General characters and classification up to order level
 - ii) Biodiversity and economic importance
 - iii) Type study – *Asterias* (Sea Star)
 - iv) Echinoderm larvae
 - V) Aristotle's Lantern
10. Phylum Hemichordata: General Characters; Type Study of *Balanoglossus*

ANIMAL DIVERSITY OF CHORDATES

1. Chordates: Salient features of chordates; Principles of classification; Origin and Evolutionary tree.
2. Protochordates: Systematic position, distribution, ecology, morphology and affinities of protochordates
3. Urochordata: *Herdmania* – type Study
4. Cephalochordata: *Amphioxus* – type study
5. Agnatha: Classification upto orders, Cyclostomata: General characters and classification upto order level. Affinities and ecological significance, Petromyzon: Structural & functional morphology
6. Pisces: General characters and classification up to orders with examples emphasizing their biodiversity, Scales & Fins, Parental care in fishes, fish migration, Type study of *Labeo*
7. Amphibia: General Characters and Classification upto orders; Origin, Evolutionary tree. Type study of frog (*Rana tigrina*), Parental Care and Neoteny and metamorphosis in Amphibia
8. Reptilia: General Characters and Classification upto orders, Type study of Lizard (*Hemidactylus*): Structural & Functional morphology, Origin, Evolutionary tree. Extinct reptiles; Poisonous and non-poisonous snakes; Poison apparatus and biting mechanism in snakes.
9. Aves: General Characters and Classifications upto orders. Type study of Pigeon (*Columba livia*); Structural & Functional morphology, Aerial adaptation, Principles of aerodynamics in Bird flight, migration in birds.
10. Mammals: General Characters and classification up to orders; type study of Rat; Adaptive radiations of mammals, dentition, Affinities of Prototheria, Metatheria & Eutheria

ANIMAL BIOCHEMISTRY AND PHYSIOLOGY

1. Introduction, Classification, Structure, function and general properties of proteins, carbohydrates and lipids.
2. Nomenclature, Classification and mechanisms of enzyme action; Energy Kinetics of enzymes, factors affecting enzyme activity, inhibition of enzymes
3. Transport through biomembranes (Active and Passive), osmotic pressure, hydrogen ion concentration and buffers

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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, lactose intolerance, Physico-chemical mechanism of Absorption of nutrients & assimilation; control of secretion of digestive juices.

Muscles: Types of muscles, ultra-structure of skeletal muscle, neuromuscular junction. 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

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.

Respiration: Exchange of respiratory gases, transport of gases, lung air volumes, oxygen dissociation curve of haemoglobin, Bohr's effect, Hamburger's phenomenon (Chloride shift), control / regulation of respiration (peripheral reflexes, chemical control and Higher centres), Myoglobin.

Excretion: Patterns of excretory products viz. Amonotelic, ureotelic uricotelic, ornithine cycle (Kreb's - Henseleit cycle) for urea formation in liver; Urine formation, composition of Urine, counter-current mechanism of urine formation, osmoregulation, micturition.

10. Neural Integration: Nature, origin and propagation of nerve impulse alongwith medullated & non-medullated nerve fiber, conduction of nerve impulse across synapse, synaptic delay and synaptic fatigue, Neurotransmitter.

11. Chemical integration of Endocrinology: Structure, chemical nature and mechanism of peptide and steroid hormone action; physiology of hypothalamus, pituitary, thyroid, parathyroid, adrenal, pancreas and gonads, Hormonal disorders.

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

CELL BIOLOGY & GENETICS

1. Ultrastructure of different cell organelles of animal cell., Plasma Membrane: Fluid mosaic model, various modes of transport across the membrane, mechanism of active and passive transport, endocytosis and exocytosis, Endoplasmic reticulum (ER): types, role of ER in protein synthesis and transportation in animal cell, Golgi complex: Structure, associated enzymes and role of golgi-complex in animal cell., Ribosomes: Types, biogenesis and role in protein synthesis., Lysosomes: Structure, enzymes and their role; polymorphism,
2. Mitochondria: Mitochondrial DNA as semiautonomous body, biogenesis, mitochondrial enzymes (only names), role of mitochondria., Cytoskeleton: Microtubules, microfilaments, centriole and basal body., Cilia and Flagella,

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3. Ultrastructure and functions of Nucleus: Nuclear membrane, nuclear lamina, nucleolus, fine structure of chromosomes, nucleosome concept and role of histones, euchromatin and heterochromatin, lampbrush chromosomes and polytene chromosomes.
4. Mitosis and Meiosis (Cell reproduction), Brief account of causes of cancer., An elementary idea of cellular basis of Immunity., Elements of Heredity and variations., The varieties of gene interactions, Linkage and recombination: Coupling and repulsion hypothesis, crossing-over and chiasma formation; gene mapping.,
5. 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, Barr body and Lyon's Hypothesis., 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, Extra chromosomal and cytoplasmic inheritance, Multiple allelism: Eye colour in *Drosophila*; A, B, O blood group in man.,
6. Human genetics: Human karyotype, Chromosomal abnormalities involving autosomes and sex chromosomes, monozygotic and dizygotic twins., Inborn errors of metabolism (Alkaptonuria, Phenylketonuria, Albinism, sickle-cell anemia)., Nature and function of genetic material:
7. Structure and type of nucleic acids; Replication and Protein synthesis., Eugenics, euthenics and euphenics; 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),
8. Applied genetics: genetic counseling, pre-natal diagnosis, DNA-finger printing, transgenic animals.

ECOLOGY, EVOLUTION, DEVELOPMENTAL BIOLOGY & APPLIED ZOOLOGY

1. Basic concepts of ecology: Definition, significance. Concepts of habitat and ecological Niche., Factors affecting environment: Abiotic factors (light-intensity, quality and duration), temperature, humidity, wind, Rainfall, topography; edaphic factors; Biotic factors., Introduction to major ecosystems of the world.
2. Ecosystem: Concept, components, properties and functions; Ecological energetics and energy flow-food chain, food web, trophic structure; ecological pyramids, concept of productivity.
3. Biogeochemical cycles: Concept, reservoir pool, gaseous cycles and sedimentary cycles.
4. Population: Growth and regulation., Concept of biodiversity and conservation of natural resources., Migration in fishes and birds., Parental care in animals.
5. Population interactions: Competition, predation, parasitism, commensalism, amensalism and mutualism.
6. Environmental Pollution: Air, water, soil and management strategies.
7. Origin of life., Concept and evidences of organic evolution., Theories of organic evolution., Concept of micro, macro-and mega-evolution., Concept of species, Phylogeny of horse., Evolution of man.
8. Historical perspectives, aims and scope of developmental biology, Generalized structure of mammalian ovum & sperm, spermatogenesis and Oogenesis, fertilization,

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parthenogenesis, different types of eggs and patterns of cleavage, Process of blastulation and fate-map construction in frog and chick., Gastrulation in frog and chick upto the formation of three germinal layers., extraembryonic membranes and types of placenta., Elementary knowledge of primary organizers., Elementary knowledge of extra embryonic membranes., Concepts of competence, determination and differentiation, Concept of regeneration.

9. 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, Fishing crafts and gears, Fin fishes, Crustaceans, Molluscs and their culture,
Seed production: Natural seed resources – its assessment, collection, Hatchery production, Nutrition: Sources of food (Natural, Artificial) and feed composition (Calorie and Chemical ingredients),
Field Culture: Culture, Culture in Pond-running waters; recycled water culture, cage culture; poly culture.,
Culture technology: Induced breeding in fishes, techniques and hormones; Fish Biotechnology (Transgenesis and Cryopreservation of gametes).
10. 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, Integrated pest management, Important bird and rodent pests of agriculture & their management.

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