SYLLABUS FOR THE POST OF LECTURER (10+2) ZOOLOGY

I. ANIMAL DIVERSITY

a) Basic concepts:

1. Levels of structural organizations: unicellular, colonial, & multicellular forms
2. Levels of organization of tissues, organs, & systems
3. Symmetry and tissue layers
4. Coelom and its types
5. Reproduction and development
6. Outline classification of animal kingdom and their evolutionary relationships

b) Non-chordates:

1. General characters and classification of non-chordates up to class level
2. Protozoa: locomotion and nutrition
3. Porifera: canal system and skeletal elements
4. Coelenterates: polymorphism and coral reefs & their formation
5. Platyhelminthes and nemathelminthes: parasitism and parasitic adaptations. Pathogenicity and life cycle of *Taenia*, *Schistosoma*, *Ascaris* and *Ancylostoma*
6. Annelida: coelom formation and filter feeding in polychaetes
7. Arthropoda: mouth parts and metamorphosis in insects
8. Mollusca: modification of foot and torsion & detorsion in gastropods
9. Echinodermata: water vascular system & larval forms

c) Chordates:

1. Origin of chordates. General characters & classification of chordates up to order level
2. Hemichordates: phylogeny and affinities. Retrogressive metamorphosis
3. Pisces: skeleton, respiration and osmoregulation in fishes
4. Amphibians: origin and evolution; paedogenesis and neoteny
5. Reptiles: snakes, lizards, turtles & tortoises, crocodiles & alligators
6. Aves: feathers, beaks and claws. Flight adaptations
7. Mammals: hair structure, dentition and adaptive radiations

II. ANIMAL PHYSIOLOGY

a) Nutrition:

1. Animal food, composition, feeding types, intra-cellular & extra-cellular digestion
2. Digestive enzymes and their functions; GIT Hormones
3. Absorption and assimilation

b) Respiration:

1. Comparative physiology of respiration
2. Respiratory mechanism- Pulmonary ventilation and gaseous exchange
3. Respiratory volumes and capacities in Humans
4. Regulation of respiration and respiratory disorders in humans

c) Excretion:

1. Detailed structure of human kidney
2. Physiology of excretion: nephron structure & urine formation; electrolyte balance
3. Artificial kidney
4. Excretory disorders in humans

d) Circulation:

1. Vertebrate heart: its structure & working
2. Cardiac activity: cardiac cycle, cardiac output, heartbeat, heart rate and ECG
3. Blood: Composition, volume, functions, ABO blood groups and Rh factor

4. Blood coagulation

e) Control and coordination:

1. Nervous system: CNS and PNS; structure of neuron; physiology of nerve impulse
2. Sense organs: physiology of vision and hearing
3. Endocrine glands structure & functions; hormones- nature & mechanism of action
4. Hormonal disorders in humans

III. CELL AND MOLECULAR BIOLOGY

a) Structure and functions of cell:

1. Plasma membrane: chemical composition, structure and functions
2. Nucleus: morphological organization and nucleolus
3. Structure and functions of cell organelles
4. Cell division and cell cycle; control and regulation of cell cycle

b) Structure and organization of chromatin:

1. Biochemical composition, structure and types of chromosomes
2. Specialized chromosomes: lampbrush and polytene, extra-chromosomal genome
3. Structural and numerical changes in chromosomes
4. Biology of cells; effect of radiation on cancer cells and carcinogens

c) Biomolecules of life

1. Carbohydrates: structure, types & functions
2. Lipids: structure, types & functions
3. Proteins: basic structure and functions
4. Nucleic acids: composition, types & functions

d) Molecular biology

1. Replication in prokaryotes and eukaryotes
2. DNA damage & repair
3. Transcription & its regulation in prokaryotes and eukaryotes
4. Translation and post-translational modifications in eukaryotes

IV. GENETICS

1. Mendelian principles
2. Concept of gene, multiple alleles, complementary & supplementary genes
3. Extension of Mendelian principles: co-dominance, incomplete dominance
4. Linkage and crossing over, sex limited and sex influenced characters
5. Sex determination: history and chromosomal theory
6. Human genetics: pedigree analysis, single gene disorders and their inheritance (Colour blindness, Haemophilia, Sickle cell anemia, Cystic fibrosis)
7. Chromosomal aberration's: deletion, duplication, inversion & translocation
8. Autosomal abnormalities: Down's syndrome, Patau syndrome, & Edwards syndrome
9. Sex anomalies: Turner's syndrome, Fragile X syndrome and Klinefelter's syndrome

V. ANIMAL BEHAVIOUR

a) Biological rhythms:

1. Circadian and circannual rhythms
2. Migration (fishes and birds), orientation and navigation

b) Learning and memory:

1. Habituation
2. Classical conditioning
3. Instrumental conditioning

4. Imprinting

c) Behaviour

1. Social behaviour: aggression and its types; group & kin selection
2. Innate behaviour: definition and examples
3. Parental behaviour, reproductive behaviour/ sexual selection
4. Ecological aspects of behaviour: homing, territoriality, dispersal

VI. SYSTEMATICS AND EVOLUTION

1. Taxonomic collections, characters and methods of identification
2. Theories of biological classification
3. Species concept and hierarchical taxa
4. Biological nomenclature
5. Speciation: allopatric, parapatric and sympatric
6. Theories of evolution: Lamarckism, Darwinism, Mutation theory, Neo-Darwinism
7. Evidences of biological evolution
8. Interspecific categories, variations and their importance
9. Hardy-Weinberg's Principle: factors affecting it
10. Human Evolution

VII. ECOLOGY

1. Concept of ecosystem: components and types
2. Biogeochemical cycles: carbon, nitrogen and phosphorous
3. Primary and secondary productivity
4. Energy flow in different ecosystems, food chain, food web and trophic levels
5. Environmental pollutions: air, water, noise & land
6. Attributes of population: natality, mortality, life-tables & survivorship curves
7. Population growth: exponential and logistic growth patterns; growth models
8. Life history strategies: r and k selection, clutch size and sex-ratio
9. Community characteristics: dominance, diversity, species richness & abundance
10. Ecological niche: concept, types and examples

VIII. WILDLIFE BIOLOGY, CONSERVATION AND MANAGEMENT

1. Ecological zones of India/ distribution of wildlife in India
2. Wildlife of Jammu and Kashmir: Status/detailed account
3. Methods/techniques of studying wildlife
4. Measures for wildlife protection, conservation and management
5. Sanctuaries, national parks, biosphere reserves and their characteristic wildlife
6. Categories of threatened species
7. Wildlife Protection Act (1972): its brief structure and recent amendments
8. Wildlife conventions and organizations: RAMSAR, CITES, IUCN, WWF

IX. REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

1. Male and female reproductive organs of humans
2. Gametogenesis: spermatogenesis and oogenesis
3. Vitellogenesis
4. Reproductive cycle: estrous and menstrual cycle
5. Mechanism of fertilization
6. Cleavage: types and patterns
7. Gastrulation: embryological significance of three germ layers; fate maps
8. Development and organogenesis of chick (heart, brain, spinal cord and eye)

9. Extra-embryonic membranes
10. Placenta: structure, types and functions

X. IMMUNOLOGY

1. Historical background & scope of immunology
2. Cells, tissues and organs of the immune system
3. Innate immunity and acquired immunity
4. Vaccines and their types
5. Complement system: components & pathways of its activation
6. Immune deficiencies: primary & secondary
7. Tumor immunology and tumor immunotherapy
8. Hypersensitivity reactions: types and mechanism
9. Autoimmune diseases
10. Transplantation immunology: types of grafts; mechanism of homograft rejection

XI. APPLIED ZOOLOGY

a) Applied entomology

1. Insects as food & medicine
2. Insects as biological control agents
3. Role of beneficial insects in agriculture

b) Animal breeding and animal products

1. Inbreeding and outbreeding; modern methods of breeding for sheep and cattle
2. Classification, action and uses of animal poisons
3. Vermiculture and vermicompost

c) Aquaculture and culture techniques

1. Aquaculture: status and prospects; induced breeding
2. Trout and carp culture; composite fish culture; integrated fish farming
3. Prawn culture & pearl culture techniques

d) Animal biotechnology

1. Concept and scope of biotechnology; gene manipulation
2. Genetically modified organisms: production of cloned and transgenic animals
3. Recombinant DNA technology and its applications for production of biomolecules