

North Maharashtra University, Jalgaon
Pre Ph.D. Syllabus
Zoology course -II to be completed during Ph.D.

I. Entomology

1. Chemical, Biological and Environmental control of arthropod vectors.
2. Integrated Pest Management (IPM)
3. Biology and control of important insect pest of agricultural importance.
4. Insects of economic importance
5. Endocrine system in insects.

II. Parasitology

1. Important human and veterinary parasites viz. protozoans, helminthes and arthropods.
2. Mode of transmission of pathogens by vectors.
3. Life cycle and biology of
 - a) *Leishmania and Giardia intestinalis*
 - b) *Encylostoma deuodenale and Trichinella.*
 - c) *Sacculina and Musca domestica*
4. Molecular, cellular, biochemical and physiological basis of host-parasite interrelation.
5. Immune responses in parasitic diseases

III. Physiology

- 1) Thermoregulation, Digestion and Respiration.
- 2) Circulation, Excretion and Reproduction.
- 3) Nervous system- CNS, PNS, ANS and Sense organs.
- 4) Neuroendocrine system- Endocrine organs, classification of hormones and mechanism of hormone action.
- 5) Stress and adaptations.
- 6) Homeostasis

IV. Toxicology

- 1) Toxicology of pollutants-
 - a) Introduction, definition and scope.
 - b) Basic tests for air, water and soil pollutants.
- 2) Toxicants and toxicity-
 - a) Definition and types
 - b) Factors influencing toxicity- P^H, temperature, reproductive status, age and physiological state.
 - c) Dose, LD 50, LC50, types of effects and response
- 3) Toxicants of public health and hazards- Pesticides, heavy metals, fertilizers, food additives and radioactive substances.
- 4) Genotoxicology

V. Animal behaviour

- 1) Feeding learning, social and sexual behaviour.
- 2) Circadian rhythms, parental care and mimicry.
- 3) Migration of insects, fishes and birds.
- 4) Methods in field biology – methods in study of behaviour, habit characterization, ground and remote sensing methods

VI. Evolution

- 1) Principles and methods of taxonomy, levels of structural organization
- 2) Concept and theories of evolution
- 3) Organic evolution
- 4) Origin of life and origin of species

VII. Cellular and molecular biology

- 1) Cell cycle
- 2) Stem cells and regenerative medicine
- 3) Gene and gene action
- 4) DNA damage and repair.

VIII. Developmental biology

- 1) Cell differentiation and differential gene activity
- 2) Totipotency
- 3) Organizers- Concepts and induction process.
- 4) Biomarkers of cancer detection

IX. Fishery science

- 1) Fresh water fishes in India, river system, reservoir, pond, tank fisheries, captive, cultural fisheries and cold water fisheries.
- 2) Nutritional importance, preservation and economic importance of fish.
- 3) Marine fisheries of India- Pelagic, demersal, fishery resources, their exploitation, production, utilization and demand.
- 4) Importance of fish biotechnology

X. Advances and tools in Biology

- 1) Electrophoresis and chromatographic techniques for characterization of biomolecules DNA, RNA, Protein and Enzymes.
- 2) DNA Microarray, DNA sequencing and Molecular phylogeny
- 3) Methods of gene transfer
- 4) GISH (Genomic In Situ Hybridization) and FISH (Fluorescence In Situ Hybridization).
- 5) Flow cytometry

XII Recent tools in biology

- 1) Polymerase Chain Reaction (PCR), ELISA, Northern, Western, Southern Blot techniques.
- 2) DNA barcoding and systemic classification
- 3) RFLP, RIA, RAPD and AFLP

- 4) Immunofluorescence

XIII Computational methods

- 1) Proteomics and genomic analysis, nucleic acid and protein sequencing databases
- 2) Data mining for sequence analysis
- 3) Web based tools for sequence search.

XIV Environmental Science

- 1) Biodiversity- Types and conservation strategies.
- 2) Ecosystem and types.
- 3) Biotic, abiotic factors and their interrelation.
- 4) Ecological succession and types.
- 5) Natural resources, types and their conservation.
- 6) Wild life management and conservation acts.
- 7) Global warming
- 8) Bioremediation
- 9) Biosensor
- 10) Bioresources

XV Immunobiotechnology

- 1) T cells, B cells, Antigen and antibody structure
- 2) Humoral and cell mediated immune responses, Complements and Cytokines
- 3) Activation of T cell and B cell, MHC I and II , APCs
- 4) Measurement of antigen and antibody reaction

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1. MCQS-
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Pranav Kumar & Satyendra Singh (Edition-2010)
 2. CSIR- JRF Life Sciences Fundamentals & Practice

Part-I & II

Pranav Kumar & Usha Mina

3. CSIR – UGC – NET/SLET

Life Sciences (Paper- I & II) Pritam Singh – Brights Publications

4. Modern UGC NET

Life Sciences – Anmol Publications, New Delhi, 2004

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