UNIVERSITY DEPARTMENT OF ZOOLOGY

B.R.A.BIHAR UNIVERSITY, MUZAFFARPUR

M.Phil. Course work

Subject –Zoology

Course Structure

Paper-I

Unit- I-

[A]Research methodology

- Concept of research-basic and applied research
- Sampling methods.
- Research ethics.
- Preparation of research project.
- Funding agencies
- Reference collection, referring styles.
- Preparation of research diary ,
- Log book.

[B].Tools and Techniques-

- Microscopy –Compound, SEM, TEM
- Spectrophotometer, chromatography
- TLC gas,
- Colorimetery
- Electrophoresis (SDS-PAGE)

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- Tracer technique (autoradiography, chromogenic agents)
- Scintillations counter and G.Muller Counter.

[C].Histological, Haemological and Histochemical techniques---

- Histology-fixation &fixatives, stains, microtomy and slide preparation.
- Histochemistry qualitative test-
- Carbohydrate PAS reaction, detection of acid mucopolysaccharides by alcian blue method detection of glycogen by Best Carmine method.
- Protein –Millon reaction .Mercury bromophenol method, Ninhydrin Schiff's technique
- Lipids-Sudan Black Method, Wild red –o- method
- DNA --Feulgen reaction
- DNA&RNA—Methyl green pyronine method
- Qualitative detection of acid &alkaline phosphatises.

Unit III-

- Haematology
- RBC counting
- (ii)WBC-T.C. &D.C., Haemoglobin content
- PCV, ESR, Haemotocrit value, Na K, Ca, blood Urea, Uric acid.
- Quantitative detection of blood glucose, serum protein, cholesterol, triglycerides.
- Enzymes –Glutamate(S-G), SGPT, Acid phosphatase & alkaline phosphatase.

Unit –IV

- Computer Applications
- Data processing and computer application.
- Knowledge of computer hardware, software, CPU.
- Software application
- Search engines and applications of computer programming in biological researches
- PowerPoint presentation.

[B] Statistics

- SD &SE
- Test of significance (t-test, f-test &z-test)
- Chi-square test
- ANOVA (one way and two ways)
- Correlation coefficient & regression analysis

Paper—II

Unit- I –Molecular biology

- Blotting techniques (southern,nortern &western blots)
- PCR

- DNA & Protein sequencing
- Ageing
- Apoptosis,
- Cancer Biology.
- Concept of stem cell technology.

Unit II—Immunology

- Antigen
- Structure and function of various immunoglobulins
- Immune response
- MHC.

Unit –III –Environmental Toxicology /Pollution

- Various types of pollutants.
- Acute and chronic toxicity.
- Lethal – LC -50 & LD-50 determination .
- Regression and probability analysis.
- Sustainable development and environmental impact assessment.
- Biomagnifications
- Synergism
- Detoxification Mechanism

Unit IV –

- Population genetics and microbial genetics ,
- Applications of Hardy Weinberg law & its biological research.

Unit –V

- Recent trends in molecular biology
- Gene concept
- Gene expression and its regulation ,
- Plasmids and cloning
- Shuttle vector for DNA
- Genomic libraries
- Bacterial transformation –conjugation
- Transgenic animals

Paper- III

One paper should be selected by student

A. Fresh water Limnology and Biodiversity

B. Advances In Insect Biology and Pest Management.

C. Aquaculture

D. Advances in Nematolgy

Optional Paper –I: Fresh water Limnology and Biodiversity

UNIT-I

- Origin of lakes, Ponds and estuaries.
- Classification of lentic and lotic environments.

UNIT-II

- Physico-chemical Characters of pond, lakes and rivers
- Characteristics of estuarine environments.
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UNIT-III

- Productivity and energy flow in the freshwater environment.
- Cycling of nutrients in the freshwater environments.

UNIT-IV

- Pollution of the freshwater environment and its effect on organism.
- Water borne pathogens and diseases.

UNIT-V

- A general study of freshwater organisms {plankton nekton and benthos}
- Freshwater fisheries of India
- Major carps of India and recent trends in their culture practices.

Optional paper –II

Advances in Insect Biology and Pest Management

UNIT-1: Biology:

- Overioles and testis follicles, their number in different Orders and basic Histomorphology
- Male and Female accessory glands, their secretion and modes of sperm transfer and reception {spermtophores and sperm thecae}
- Viviparity and viviparous Insects
- Factors regulating Parthogenesis
- Polymorphism with special reference to Homoptera: Isoptera and Hymenoptera

UNIT-II Ecology:

- Abiotic and biotic factors in Biology

- Abundance and distribution of insect with special reference to diapauses Interspecific and Interspecific interactions with special reference to insect migration and pest outbreak.
- Insect life table and its application methods of assessing insect pest /population-plant resistance

UNIT-III: Chemical control of insect pest:

- Classification of insecticides
- Modes of action of insecticides
- Mechanism of insecticide resistance
- Chitin inhibitors and their efficiency in pest management
- Recent trends in Pesticide application Technology.

UNIT-IV: Non- chemical control and insect pest:

- Dynamics of prey Predator interaction and host parasite/ parasitoid inter-actions
- Genetic and semi chemical bases of insect pest control
- Neurophormones juvenodids and ecdysoids in insects pest management.

UNIT-V: Integrated pest management {IPM}:

- Principles of IPM programme its objectives, strategy and tacties
- Ecological basis to pesticides application system analysis recent trend in IPM.

III OPTIONAL PAPER

PAPER-III:. Aquaculture

UNIT-I: Basics of aquaculture

- Introduction- Status of aquaculture in India –

- Role, constraint ,remedial measures and other related problems
- Importance of aquaculture-
- Fish product and by-product

UNIT-II :Capture fisheries

- Major inland capture fishery resources in India
- Lake and reservoir fisheries
- Nursery system in estuaries and Brackish Water and its fisheries in India Marine major and minor fishery resources in India and world
- Fin and shell fishes.

UNIT-III: Culture fisheries

- Monoculture- Polyculture
- Extensive, Intensive- Integrated fish farming -paddy cum fish culture - fish and prawn culture in freshwater ponds
- Fin fish and shell fish culture in brackish water ponds
- Ornamental fish culture.

UNIT-IV

- Live feed culture
- Taxonomy of live feeds
- General collecting methods- culture and nutritional value of Rotifer, Artemia Copepods and Daphnia.
- Molluscan culture and its status- culture of zooplanktons- seaweeds and their importance.

UNIT-V

- Recent techniques in aquaculture

- Cryopreservation techniques for live feeds
- Bio-enrichment technique
- Applied Genetics of cultivated fishes
- Regulation of vitellogenesis in shell and fin fishes.

IV. OPTIONAL PAPER.

I- Advances in Nematolgy

UNIT I

- History of Nematolgy in India and abroad-position of nematode in animal kingdom.
- Importance of nematodes to plants and animals

Unit II-

- Structure of nematode cuticles ,sense organs ,digestive ,reproductive and nervous system .
- General class of Secernentea, Tylenchoidae, Pratylenchidae Hoplolairnidae, Heteroderidae, and Tylenchoidea with examples .
- Classification of plant parasites nematodes based on feeding habits.

UNIT III

- General characters of class adenophora
- Nematodes of Human and Animal -Threadworm, Hookworms Lungworms, Gape worms Guinea worms, Eye worms, Wuchereria ,Heart worms Ascaris and Pinworms.
- Biology of Entomopathogenic nematodes.

UNIT IV

- Principle of nematode management- physical methods {soil solarization hot water treatment seed cleaning}
- Cultural methods {deep ploughing fallowing crop rotation}

- Biological control {antagonistic crops}
- Chemical control- soil fumigants and nematode management.

UNIT V

- Major nematode parasites and their symptom in rice {Aphelenchoidesbesseyi, Hirschmaniellaoryzae} wheat{Anguinwtritici, Heterodera avenae,} cotton {Rotylenchulusreniformis} tomato {Meloidogyne incognita and M. Javanica} potato{globoderarostochiensis, Globodera pallida} , banana { pratylenchus coffae, radopholussimilis} .
- Nematodes sample collection nematode extraction { Cobb's technique, centrifugal floatation, cyst extraction}.

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