



ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

Reaccredited 'A+ +Grade by NAAC(CGPA:3.58/4.00)

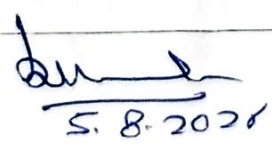
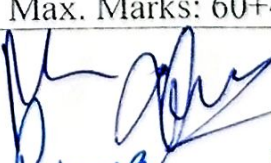
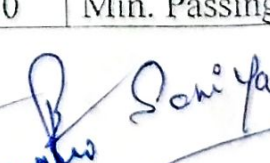
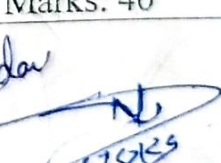
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DST-FIST Supported & STAR College Scheme by DBT

Theory Syllabus

Part A – Introduction

PROGRAMME: PG Diploma		Class: M.Sc.	2 Year/ 4 Semester	Session – 2026-27
Subject – Zoology				
1	Course Code	CC-41(Paper -1)		
2	Course Title	Entomology and Toxicology		
3	Course Type	Core course		
4	Pre – requisite (if any)	To study this course a student must have had one year PG diploma certificate or four year (Hon's/Hon's with research degree course.)		
5	Course Learning Outcomes (CLO)	- Understand and explain the diversity, classification, and ecological roles of insects, especially agriculturally and medically important species. - To know insect morphology, physiology, development, and behaviour in relation to their survival and pest potential. - Understand the principles and applications of Integrated Pest Management (IPM), biological control, and eco-friendly pest control strategies. - Understand Detoxification through Ancient Indian Techniques - Know toxicity data (such as LD₅₀, LC₅₀ values) and assess the risk and safety levels of different chemical agents on target and non-target organisms, Food toxicant and its control methods - careers in pest management, agricultural biotechnology, forensic entomology, environmental toxicology, and public health research.		
6	Credit Value	04		
7	Total Marks	Max. Marks: 60+40	Min. Passing Marks: 40	



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PartB-Content of the Course		
Total No. of Lectures-Tutorials-Practical (in hour per week):5 hour per week L-T-P		
Unit	Topics	No. of Lec
I	Insect Physiology and Morphology • Morphology: external features and their articulation • Integumentary system: Structure, function & formation, Growth, Moulting and Metamorphic development, hormonal influence, Sclerotization. • Endocrine system: Insect hormones with reference to metamorphosis & reproduction. Digestive & Excretory system: Alimentary tract, digestive and excretory physiology, Malpighian tubules, osmoregulation. • Circulatory system: Open circulatory system, hemolymph, hemocytes, Immunity and thermoregulation. Respiratory system: Tracheal system and physiology of gas exchange. • Reproductive system: Female & Male reproductive systems; Usual and unusual modes of reproduction. • Nervous system: Components of the nervous system, Sensing the environment - Sensory receptors, vision & acoustics.	18
II	• Classification of Class- insect upto order. a. Diagnostic features with examples of insect order Isoptera, Orthoptera, Hemiptera, Coleoptera, Hymenoptera, Odonata, Lepidoptera, Diptera. • Insect growth: Endocrine and hormonal regulation, molting, and metamorphosis. • Insect Vector and Pathogens: Important insect vectors and their characteristics; mouth parts and feeding processes of important insect vectors. Efficiency of transmission. • Transmission of plant viruses by psyllids, beetles and mites. Epidemiology and management of insect transmitted diseases through vector.	16
III	Toxicology of Insecticides • Introduction: Definition of pesticides, brief history, pesticides registration, pesticide industries and markets in world and India. • Toxicology of pesticides :LD50 and LC 50, Dose-response relationship; Carcinogenic, Mutagenic and Teratogenic effects, Method of testing chemicals on insect and evaluation of toxicity. • Group characteristics and function of pesticides:	

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	Organochlorines, Organophosphorus insecticides, Carbamates, Pyrethroids, other plant origin bio-insecticides, neonicotinoids and nitrogenous insecticides; fumigants; IGRs, attractants, repellents and anti-feedants. • Properties of few individual insecticides i.e. DDT, HCH (BHC), Lindane, Endosulfan, Parathion, Malathion, Carbaryl, Cypermethrin, etc. • Toxicological symptoms of Organochlorines, Organophosphorus, Carbamates, Pyrethroids, plant origin insecticides and other bioinsecticides.	
IV	Toxicants of public health • Detoxification (Shodhana) Techniques a) Plant-based detoxification of poisons in food or drugs b) Use of cow's urine, ghee, milk, and earth for toxin neutralization • Toxic chemicals and their effects: Heavy metals; Fertilizers, Radioactive substances, Automobile emissions, Food toxicants and their control methods. • Absorption of xenobiotics : Membrane barriers, binding of xenobiotics and storage depots, Excretion of xenobiotics • Occupational diseases: Pneumoconiosis (Silicosis, Anthracosis, Byssinosis, Bagassosis, Asbestosis, Farmers lung), Plumbism and Occupational dermatitis.	18
V	Natural Toxins and their health effects. • Microbial toxins: Anthrax, Botulism, Staphylococcal Enterotoxin, Mycotoxicosis, Mushrooms. • Venoms of invertebrates: Sponges, Coelenterates, Annelids, Arthropods, Molluscs and Echinoderms. • Venoms of Vertebrates: Fishes, Amphibians and Reptiles (lizards and snakes). • Poisonous plants: Castor (Ricinus communis), Rosary pea (Abrus precatorius), Hemlock (Conium maculatum), Water hemlock (Cicutavivrosa). Cyanogenic plants: Hydrangea (Hydrangea paniculata).	18

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Part B - Content of the Course

Total No. of Lectures – Tutorials – Practical (in hour per week):3 hour per week L-T-P

Unit	Topic	No of Lecture
1	• Morphology: Study of head and its sclerites of honeybee and cockroach. • Study of mouth parts of cockroach, housefly, honeybee, mosquito and butterfly. • Study of wings and their venation, Different types of antennae and legs of insects. • Study of stinging apparatus of honey bee. • Taxonomy: Identification of insects belonging to different groups up to orders and sub orders. • Study of various types of social insects and their nests. • Agricultural Entomology: Collection and identification of economically important insects and various stages of their life history. • Visits to agricultural fields and forests for on spot study of pests and damage caused by them.	20
2	• Identification of common vectors of plant pathogens- aphids, leafhoppers, whiteflies, thrips, beetles, nematodes; culturing and handling of vectors; demonstration of virus transmission through vectors- aphids, leafhoppers and whiteflies.	10
3	• Insecticide formulations and mixtures; quality control of pesticide formulations; laboratory and field evaluation of bioefficacy of insecticides; bioassay techniques; probit analysis. • Toxicological testing method, General tests, acute toxicity test, LC50 and LD50 test. • Visit to toxicology laboratories..	15

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4	• Histopathological/histochemical study of liver, kidney and brain after exposing suitable experimental organisms exposed to various toxicants. • Study of various natural toxins producing organisms (microbes, plants and animals) based on syllabus. Writing report on any one type of occupational hazardous event in the past.	15
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PROGRAMME: PG Diploma		Class:M.Sc.	2 Year/ 4 Semester	Session – 2026-27
Subject – Zoology				
1	Course Code	CC-42 (Paper -2)		
2	Course Title	Ichthyology and Limnology		
3	Course Type	Core course		
4	Pre – requisite (if any)	To study this course a student must have had one year PG diploma certificate or four year (Hon's/Hon's with research degree course.)		
5	Course Learning Outcomes (CLO)	- Understand and explain the taxonomic diversity, systematics, and evolutionary relationships among fishes. - To know about Ethno-Ichthyology and Folk Knowledge - Describe the anatomical and physiological adaptations of fishes to different aquatic habitats. - Analyze modern and indigenous fishery practices and their sustainability. - Understand and explain the structure, function, and dynamics of freshwater ecosystems (rivers, lakes, wetlands). - Identify and classify key freshwater flora and fauna, including plankton, benthos, nekton, and aquatic plants. - Analyze abiotic (e.g., pH, dissolved oxygen, temperature) and biotic (e.g., food webs, competition) components regulating freshwater environments. - Evaluate freshwater pollution sources, impacts (eutrophication, mitigation measures, bioaccumulation), and - Provides career opportunities in fisheries science, aquaculture, aquatic ecology, water quality management, and conservation of freshwater ecosystems.		
6	Credit Value	04		
7	Total Marks	Max. Marks: 60+40	Min. Passing Marks: 40	

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Part B - Content of the Course

Total No. of Lectures – Tutorials – Practical (in hour per week):3 hour per week L-T-P

Unit	Topic	No of Lacture
1	- Origin and evolution of fishes, classification of fishes as proposed by Berg. - Ethno-Ichthyology and Folk Knowledge: Knowledge of fish behaviour, migration, spawning, and lunar cycles in tribal and coastal societies - Fish integument, Types of scales and growth studies - Locomotion in fishes, Alimentary canal and digestion in fishes, Accessory respiratory organs, Air bladder, Weberian ossicles and their functions, Excretion and osmoregulation	15
2	- Nervous system and acoustic lateral line system, electric organs in fishes, Sound producing organ, Bioluminescence, Adaption in fish habitat, Migration in fishes, Sexual cycle and fecundity, Gono-somatic index - Induced breeding in fishes, Hypophysation and breeding in Major carps, Dry and wet bundh breeding in carps, - Fish reproduction and development, Fish diseases and their control	15
3	- Types of ponds, collection of fish seed, Management of hatcheries, nurseries, rearing pond and stocking ponds, aquatic weeds and their control, Methods of fish preservation, - Economic importance and Fish by-products, Transport of live fishes and fish seeds, Fish marketings, Fish co-operatives, Role of fisheries in rural development - Composite fish culture, Riverine fisheries, Sewage fisheries, Coastal fisheries, Paddy field fisheries, off shore and deep sea fisheries, Prawn culture, Pearl culture, Fisheries resources in M.P.	15

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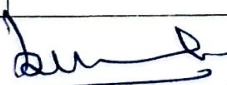
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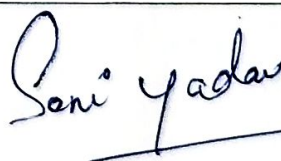
4	Limnology • Limnology Definition historical development and scope of Limnology. • Types of fresh water habitats and their ecosystem- a) Ponds, Streams and rivers. b) Lakes: Origin and classification. • Morphometry: Use of various morphometric parameters and Zonation. • Eutrophication causes, consequences and control mechanisms. • Productivity of water bodies: Concept of productivity, primary secondary and tertiary productivity. Factors affecting productivity.	20
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V	Physico-Chemical Characteristics • Light and Temperature- a) Light as an ecological parameter in freshwater. b) Temperature-Radiation, Stratification and Heat Budget. c) Dissolved Solids Carbonates, Bicarbonates, Phosphate and Nitrate. d) Physico-Chemical characteristics of fresh water with special reference to different parameters Turbidity, dissolved gasses (oxygen, Carbon dioxide, Hydrogen Sulphides) Seasonal changes in dissolved gasses, BOD, COD and pH • Study of Biota a) Phytoplankton, Zooplankton and their Inter-relationship. b) Aquatic insects, birds and their environmental significance. - Hydrobiological Insights in Ancient Texts: Observation of plankton blooms, fish kill, water colour in <i>Manasollasa</i>, <i>Varahamihira's Brihat Samhita</i>	25
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Practical Syllabus

PROGRAMME: PG Diploma		Class: M.Sc.	2 Year/ 4 Semester	Session – 2026-27
Subject – Zoology				
1	Course Code	PC-42 (Paper -2)		
2	Course Title	Ichthyology and Limnology		
3	Course Type	Core course		
4	Pre – requisite (if any)	To study this course a student must have had one year PG diploma certificate or four year (Hon's/Hon's with research degree course.)		
5	Course Learning Outcomes (CLO)	- Collect, preserve, and identify different types of parasites from various hosts using microscopic and staining techniques. - Prepare permanent and temporary mounts of parasitic organisms for morphological study. detailed - Collect and identify freshwater organisms such as phytoplankton, zooplankton, macro invertebrates, and aquatic plants. - Measure and analyze key physico-chemical parameters of freshwater (e.g., pH, temperature, dissolved oxygen, turbidity, conductivity). - Use field equipment such as plankton nets, Secchi disc, DO meters, and water sampling bottles proficiently. - Assess freshwater pollution levels through biological indicators and chemical analysis techniques (e.g., BOD, COD estimation)		
6	Credit Value	04		
7	Total Marks	Max. Marks: 60+40		Min. Passing Marks: 40

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Part B - Content of the Course

Total No. of Lectures – Tutorials – Practical (in hour per week): 5 hour per week L-T-P

Unit	Topic	No of Lectu
I	Morphology & Anatomy • Identification of external features of cartilaginous and bony fishes • Dissection to study digestive, reproductive, and nervous systems (preferably models or virtual tools) • Mounting of fish scales (cycloid, ctenoid, placoid, ganoid) • Observation of fin types and their modification • Study of accessory respiratory organs (e.g., <i>Clarias</i>, <i>Anabas</i>)	15
II	Fisheries and Aquaculture Techniques • Survey of a local fish market or fish farm • Identification of exotic vs. indigenous fish species • Study of fish preservation techniques (salting, drying, freezing) • Hatchery visit (if possible): learn induced breeding and larval rearing methods	10
III	• Introduction to limnological instruments (Secchi disk, water samplers, thermometers, etc.). • Light and Temperature Studies: Measurement of light penetration using a Secchi disk. • Chemical Characteristics of Freshwater: a) Dissolved solids: Total Dissolved Solids (TDS) measurement b) Carbonates & Bicarbonates: Alkalinity testing using titration methods c) Phosphate and Nitrate: Colorimetric analysis using spectrophotometer or test kits d) Turbidity: Using turbidity meter or visual methods • Dissolved Gases Analysis: a) Dissolved Oxygen (DO): Winkler's method b) Carbon dioxide (CO₂): Titration method c) Hydrogen Sulphide (H₂S): Lead acetate method d) Seasonal Variations: Comparative analysis using data from different seasons or archival data	20

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IV	• pH and Conductivity a) Measurement of pH using pH meter b) Conductivity as an indicator of ionic content • Biological Analysis (Biota Study) a) Collection and identification of phytoplankton and zooplankton using plankton net and Preparation of permanent slides b) Survey and identification of aquatic insects and birds. • Field visit to local pond/stream/lake for sample collection and basic observations • Water Quality Testing a) Biochemical Oxygen Demand (BOD): BOD test b) Chemical Oxygen Demand (COD): Dichromate reflux method	15
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