

**TELANGANA STATE PUBLIC SERVICE COMMISSION # HYDERABAD**

**SCHEME AND SYLLABUS FOR DEPARTMENTAL TEST**

**FISHERIES DEPARTMENT TEST - II**

**PAPER CODE NO.s.(015, 024, 056, 085) (WITHOUT BOOKS)**

<b>PAPER CODE No.</b>	<b>SUBJECT</b>	<b>MODE OF EXAM</b>	<b>DURATION</b>	<b>MAXIMUM MARKS</b>	<b>MARKS FOR PASSING</b>
<b>015</b>	PAPER-I: INLAND FISHERIES (WITHOUT BOOKS)	Objective	2 Hours	100	<b>40</b>
<b>024</b>	PAPER-II: AQUACULTURE AND AQUATIC ANIMAL HEALTH MANAGEMENT (WITHOUTBOOKS)	Objective	2 Hours	100	<b>40</b>
<b>056</b>	PAPER-III: FISH HARVEST AND POST HARVEST TECHNOLOGY (WITHOUT BOOKS)	Objective	2 Hours	100	<b>40</b>
<b>085</b>	PAPER-IV: FISHERIES MANAGEMENT AND ADMINISTRATION (WITHOUT BOOKS)	Objective	2 Hours	100	<b>40</b>

**SYLLABUS**

# As per G.O.Rt.No.90 AHDD & FISHERIES DEPT, Dated 06.06.2017

**FISHERIES DEPARTMENT TEST - II**

**PAPER CODE No. 015-PAPER-I: INLAND FISHERIES:**

**Introduction:** Inland Fisheries Resources of India and Telangana State. Salient Features of Fisheries Sector in India and Telangana State. Inland Fish Production Statistics in India and Telangana State based on Species, Water Body, Capture and Culture.

**Scope of Fisheries:** Scope of Fish and Prawn Farming in India and Telangana State Present Status and Problems in Fish and Prawn Farming.

**Inland Water Bodies:** Types -Ponds, Lakes, Tanks, Reservoirs, Bheels, Estuaries, Wetlands, Biosphere Reserves and Mangroves, Derelict Water Bodies, etc. Commonly available Fish (Native) in Inland Water Bodies. Types of Plankton, Aquatic Plants, Nekton and Benthos associated with Inland Water Bodies. Influence of Physical and Chemical conditions of the Environment on the Living Organisms in Inland waters.

**Cultivable Variety of Fish and Prawn:** Criteria for selection of Species for Culture in Rivers, Lakes and Reservoirs. Characteristics of Cultivable Freshwater Fishes: Indian Major Carps, Exotic Carps, Minor Carps, Murrels, Catfishes, Perches, Tilapia,

Pangassius, etc. Characteristics of Cultivable Freshwater Prawns: Scampi and Godavari River Prawn.

**Biology of Fish and Prawn:** External Morphology of Fish and Prawns. Taxonomy of commercially important Fish and Prawn. Anatomy of important cultivable species of Fish and Prawn with reference to Skeletal system, Digestive system, Respiratory system, Excretory system, Reproductive system, Circulatory system and Nervous system. Importance of Accessory Respiratory Organs in Fish. Food, Feeding Habits, Fecundity and Spawning of cultivable variety of Fish and Prawn. Age and Growth studies. Life Cycle of Fish and Prawn.

**Riverine Fisheries:** Ecology of Riverine Environment. Physico-Chemical and Hydrological features of Godavari River, Krishna River and their Tributaries located in the State of Telangana. Fauna and Flora associated with Godavari and Krishna Rivers, in relation to Fisheries.

**Riverine Fisheries Resources:** Status of Fisheries Resources in the Major Rivers of Telangana State. Direct and Indirect effects of Human intervention in Riverine Fish Production. Best Management Practices to improve Fish Production in the Riverine Systems. Construction of Dams across Rivers and their effect on Migratory Fish. Prospects of Natural Fish Seed collection in the Godavari and Krishna Riverine system.

**Fisheries of Lakes and Reservoirs:** Classification and Ecology of Lakes and Reservoirs. Present Production Levels in the Major Reservoirs of Telangana State. Best Management Practices to increase Fish Production Levels in Lakes and Reservoirs. Importance of Cage Culture system in the Reservoirs.

**Estuarine Fisheries:** Classification of Estuaries. Biota and Productivity of Godavari and Krishna Estuaries. Management problems in Estuarine Fisheries.

### **PAPER CODE No. 024 - PAPER-II: AQUACULTURE AND AQUATIC ANIMAL HEALTH MANAGEMENT:**

**Introduction:** History of Aquaculture. Scope and Importance of Aquaculture. Present status of Aquaculture in India and Telangana.

**Aquaculture Systems:** Traditional, Extensive, Semi-intensive and Intensive Methods of Fish Culture. Monoculture, Polyculture and Composite Fish culture systems. Culture of Fish in Ponds, Pens and Cages.

**Fish Farming:** Site Selection, Construction of Ponds, Nursery and Grow-out Pond Preparation, Fertilization, Stocking and Feeding schedules involved in the Farming of Indian Major Carps, Exotic Carps and Minor Carps, Magur, Singhi, Murrel, Tilapia, Pangasius, etc. Harvesting and Handling.

**Prawn Farming:** Culture of Giant Fresh Water Prawn (Scampi) – Mono and Poly Culture. Culture of conditioned Tiger Prawn and Vannamei in Inland Waters. Site selection, Construction of Ponds, Pond Preparation, Fertilization, Stocking, Feeding and Water Quality Management, Disease Prevention and Treatment. Harvesting and Handling.

**Integrated Farming Systems:** Concept and Scope for Integrated Aquaculture System in the Inland water Bodies. Integration of Fish Farming with Live Stock Animals, Agri and Horticultural Crops. Constraints in the Integrated Fish Farming System.

**Special Systems of Aquaculture:** i) Sewage Fed Fish Culture - Species suitable for Sewage Fed Fish Culture. Culture Practices, Treatment of Sewage Water used in Fish Culture. ii) Cage Culture - Species Selection, Construction of Cages, Culture Practice, Maintenance of Cages and Harvesting. iii) Fish Culture in Re-Circulatory Water Systems - Species suitable for Culture. Culture Practices. Mechanism of Water Recirculation. Water Quality and Health Management, Disease Prevention and Treatment, Harvesting and Handling.

**Ornamental Fisheries:** Status and Significance of Ornamental Fish Trade. Important species of Exotic and Indigenous Ornamental Fishes with their Taxonomic Position. Breeding and Rearing of Ornamental Fishes. Fabrication, Setting-up and Maintenance of Freshwater Aquarium. Importance of Accessories for Aquarium – Aquarium Plants, Lighting, Aeration, Filters and Decoratives. Feeding of Aquarium Fish –Live Fish Food Organisms and Artificial Feeds. Brood Stock Management. Common Diseases and their Control. Conditioning, Packing and Transportation of Aquarium Fish.

**Fish Breeding:** Natural Breeding – History, Current Status of Natural Seed Collection and Constraints. Selection of Riverine Spawn Collection sites, Methods of Spawn collection and Gears used. Breeding in Hatcheries - Criteria for Selection of Site for Hatchery and Nursery construction. Induced Breeding of Indian Major Carps, Exotic Carps, Murrels, Tilapia and Cat Fishes - Brood Stock Management, Spawning of Fish by Hypophysation technique using Pituitary Gland and by the use of Synthetic Compounds (Ovaprim and Ovatide). Incubation of Fertilized Eggs through Hapa system, Glass Jar Hatchery Technique and Chinese Hatchery Technique. Hatching Process, Larval Rearing Technology and Fish Seed Transportation.

**Prawn Breeding:** Breeding in Hatcheries - Criteria for Selection of Site for Hatchery and Nursery construction. Brood Stock Management of important cultivable Fresh Water Prawns - Scampi, Godavari River Prawn and Tiger Prawn. Culture of Live Fish Food Organisms, Algae, Spirulina, Diatoms, Rotifers and Artemia for Feeding the Juvenile Prawn. Induced maturation of Tiger Prawn through Eye Stock Ablation. Life Cycles of Scampi and Tiger Prawn. Treatment of Sea Water and Fresh Water used in the Fresh Water Hatchery. Better Management Practices (BMPs), Sanitary and Phytosanitary (SPS) measures and Bio-Security measures to be followed in the Prawn Hatchery.

**Soil and Water Quality Management:** Soil and Water Quality Monitoring – Collection and preparation of Soil and Water Samples for analyses of various Physio-Chemical characteristics. Soil and Water Quality Criteria/Requirements for Aquaculture, Soil and Water Quality Standards, Lime Requirement. Fertilizers and Manures - Different Types, Source, Rate and Frequency of Application, Bio-fertilizers. Measures to improve Quality of Water used in Fish Farms and Hatchery through Treatment, Filtration, Chlorination and Aeration. Measures to prevent Seepage of Pond Water through Pond Bottom soil. Measures to prevent Aquatic Weeds in Fish Ponds.

**Fish Nutrition and Feed Technology:** Nutritional Requirements of Cultivable Finfish and Shellfish. Feed Formulation and Feed Manufacturing. Forms of Feeds -Wet Feeds, Moist Feeds, Dry Feeds, Mashs, Floating and Sinking Pellet Feed. Feed Evaluation - Feed Conversion Ratio (FCR), Feed Efficiency Ratio (FER), Protein Efficiency Ratio (PER), Net Protein Utilization (NPN) and Biological Value (BV). Fish Feed Plant - Design, Equipments used and Maintenance.

**Fish Diseases:** Basics of Fin Fish and Shellfish Health Management – Relationship between Host, Pathogen and Environment. Impact of Environmental Stress Fish and

Shell Fish, Parasitic and Mycotic diseases - General characteristics, Epizootiology, Diagnosis, Life cycle, Prevention and Treatment. Infectious Bacterial and Viral diseases - General characteristics, Epizootiology, Diagnosis, Prevention and Treatment. Noninfectious Diseases - Nutritional diseases. Water, Soil, Environmental Parameters and their effects on Fish Health. Diseases in Hatcheries and Grow out systems. Disease Control and Management - Environment Management, Chemotherapeutic Agents, Host Management and Probiotics. Detection of Aqua Food Pathogens using Conventional and Molecular (Polymerase Chain Reaction-PCR) methods. Best Management Practices (BMP) in Aquaculture.

**PAPER CODE No. 056-PAPER-III: FISH HARVEST AND POST HARVEST TECHNOLOGY:**

**Fish Harvest Technology:** History and Development of Fishing Gear and Craft. Factors that determine the Selection of Fishing Gear and Craft. Gears and Crafts used in relation to Fish and Fishing Area.

**Fishing Crafts:** Classification of Fishing Crafts based on the Fabrication, Dimension, Nature of Fishing, Depth of Operation. Crafts used for Inland waters. Materials used for Fabrication of Fishing Boats. Different Types of Crafts – Catamaran, Dugout Canoe, Coracle, Masula Boat, Wooden Nava, Theppas, etc. Basic concepts involved in the Construction of Wooden Boat, Steel Boat, Fibre Glass Boat, Aluminium and Ferro Cement Boats. Maintenance and Preservation of Fishing Boats.

**Fishing Gears:** Classification of Fishing Gears based on the method of Operation. Gears commonly used in Inland Waters. Selection of Netting Material for various Types of Fishing Gear. Net Webbing – Type of Meshes, Shaping of Webbing. General Principles and Fabrication Methods of various Fishing Gears used in Inland Water Bodies. Accessories for Fishing Gear – Hooks, Floats, Sinkers. Maintenance and Storage of Fishing Gears.

**Fishing Operation:** Operation of various Traditional Gears for Catching Fish in Inland Water Bodies –Hand Line, Pole and Line, Reel and Line, Trap Nets, Seines, Set Nets, Cast Net, Pots, Stake Nets, Bag Nets, Barriers, Gill Nets, Long Lines and Drag Nets.

**Principles of Fish Processing:** Aims of Fish Processing, Composition and Structure of Fish Muscle, Handling of Harvested Fresh Fish and Prawn, Mechanism of Fish Spoilage. Unit Processes involved in the Processing of Fish – dressing, gutting, scaling, filleting, sorting, grading, candling, depuration, peeling, battering, breading, etc.

**Fish Preservation Methods:** Principle involved in the Preservation of Fish and Prawn by Drying, Salting, Smoking, Marination, Fermentation, Irradiation, Chilling, Freezing, Freeze Drying, Irradiation and Canning Technology. High Temperature Short Time (HTST) Processing. Advantages and Disadvantages of different methods of Fish Preservation. Additives used in Aquatic Food Products during Processing and Preservation of Fish. Transportation of Fish and Fishery Products. Principles of Cold Chain concept.

**Value Added Fish Products:** Importance of Value Addition to Fish and Fish products. Preparation of Minced Meat (Surimi) based Products – Fish Sausages, Imitation products and Kamaboko. Preparation of Ready to Eat Fish Products such as Fish Cake, Fish Balls, Fish Cutlet, Fish Fingers, Fish Nuggets, Fish Wafers, Fish Pickles, Fish Chutney Powder, Fish Papads, Fish Sauce, Fish Protein Concentrate (FPC), Partially Hydrolyzed and Deodorized (PHD) Fish Meat and PHD Fish Flour.

**Fish By-Products:** Importance of Fish By-product Preparation. Principle involved in the Preparation of Fish Meal, Fish Body Oil, Fish Liver Oil, Fish Silage, Chitin and Chitosan, Sea Cucumber, Pearl Essence, Fish Glue, Fish Gelatin, Fish Collagen, Fish Leather, Icing Glass and Shark Fin Rays.

**Packaging Technology:** Objectives of Packaging Fish and Fishery Products. Functions of Packaging Materials, Packaging Material used for Storage of Fresh Fish and Processed Fishery Products. Principle involved in Active Packaging, Vacuum Packaging, Modified Atmosphere Packaging (MAP) and Controlled Atmosphere Packaging (CAP).

**Quality Assurance of Aqua Foods:** Introduction, Principles of Hazard Analysis Critical Control Point (HACCP). Facilities required for Approval of Aqua Food Processing Plant. Physical, Chemical and Biological Hazards in Aqua Food Processing. Aqua Food Pathogens -*Escherichia coli*, *Vibrio cholera*, *V. parahaemolyticus*, *Salmonella spp.*, *Staphylococcus aureus*, *Shigella spp.*, *Listeria monocytogens* and *Clostridium botulinium*. Control of Pathogens in Fish and Fishery Products. Good Management Practices (GMP) in Aqua Food Processing. Machineries used in Aqua Food Processing Plant and Maintenance.

**Fishery Economics:** Introduction to Fisheries Economics, Importance of Economics in Fisheries Management, Economics of Fish Production Systems – Capture and Culture. Role of Fisheries in Economic Development, Importance of World Trade Organization (WTO), Fish Exports, Socio-economic conditions of Fishermen in the State of Telangana. Role of Fisherwomen in Marketing and Processing of Fish.

**Fish Marketing:** Introduction to Fish Marketing. Types of Fish Markets. Structure and Functions of Fish Market. Marketing Strategies - Fish and Fish Products Pricing, Promotion, Marketing Channels, Marketing Margins, Market Research, Market Development. Inland Fish Marketing in India and in the State of Telangana. Demand and Supply of Fish and Fishery Products, Export Marketing of Fish and Fishery Products. Cooperative Marketing and its Scope. Role of Cold Storages in Fish Marketing.

**PAPER CODE No. 085-PAPER-IV: FISHERIES MANAGEMENT AND ADMINISTRATION:**

**Concept of Management and Administration:** Functions of Management – Manpower Development, Different Categories of Manpower required for Fisheries Sector, Manpower Planning and Recruitment, Training of Manpower, Performance Appraisal, Communication Skills, Leadership, Motivation and Team Work.

**Entrepreneurship Development:** Importance of Entrepreneur Development, Types of Entrepreneurs, Qualities and Qualifications of Good Entrepreneur.

**Project Formulation, Monitoring and Implementation:** Project Identification, Project Design, Analysis of Expected Results, Project Implementation, Preparation of Project Report Case Study, Project Evaluation and Review Techniques (PERT).

**Fisheries Management and Conservation:** Conservation of Genetic Diversity – Intraspecific Variability, Inter-specific Genetic Variability. Conservation of Ecological Diversity – Diversity of Habitats.

**International Union for Conservation of Nature (IUCN) Red List Categories:** List of Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Conservation Dependent, Low Risk, Data Deficient and Not Evaluated Fish Species and Threatened Freshwater Fishes.

**Measures for Fish Conservation:** Conservation of Fishery Resource in Natural Ecosystem (In-Situ), Cryopreservation of Gametes and Gene Banking of desired Fish Species (Ex-situ). Fish Passes for Migratory Fishes, Aqua Parks and Sanctuaries, Mangrove Afforestation, Artificial Reefs.

**Fishing Regulations:** Mesh Size regulation, Gear Size regulation, Gear Materials regulation, Gear Accessories regulation, Craft Fabrication Material regulation, Closed Fishing Seasons, Catch Quota regulation, Fish Size regulation.

**Inland Fisheries Regulation and Development:** Regulations for Conservation and Management of Fishery Resources in Rivers, Lakes and Reservoirs – Indian Fisheries Act, Inland Fisheries Act, Fish Seed Act, Inland Fisheries Governance, Inland Property Regime, Leasing Policies for Water bodies in the State of Telangana. Different kinds of Inland Water Bodies and their Controlling systems. Functions and Powers of Gram Panchayat, Municipalities, Forest and Endowments on Inland water bodies.

**Fisheries Administration:** Organizational set up of Fisheries Administration at the Centre and State level responsible for Fisheries Development. Functions and Powers of Functionaries of Department of Fisheries, Fisheries Corporations and Fishermen Cooperatives. Central and State Level Fisheries Institutions (Teaching, Research and Extension). Role of Central and State Government in the Regulatory Activities of Aquaculture and Fisheries. Role of National Fisheries Development Board (NFDB), Marine Products Export Development Authority (MPEDA) and Coastal Aquaculture Authority (CAA) in the Development of Fisheries.

**Fisheries Co-operatives:** Structure, Functions and Status of Fisheries Cooperatives in India and the State of Telangana. Evaluation of the performance of Fisheries Cooperatives, Problems in Fisheries Co-operatives and Remedial Measures. Development of Fisheries Cooperative in Telangana - Managerial aspects of Cooperative Societies; Cooperative Marketing in Fisheries, State Fisheries Cooperative Federation and Self Help Groups in Fisheries.