Tamil Nadu public Service Commission Syllabus Fisheries Science and Zoology (Degree Standard)

Code: 559

Unit I: Fish Biology, Resource Management and Regulations (20 Questions)

Systematics – Binomial nomenclature: classification of elasmobranchs, teleosts, crustaceans, and molluscs; external morphology – morphometric – meristic and anatomy of finfish and shellfish, DNA barcoding – Karyo taxonomy, Food and feeding habits – Gastro somatic index- length weight relationships – age and growth – reproductive strategies – breeding – maturation and spawning – Gonado – somatic index, fecundity and developmental biology of commercially important finfish and shellfishes – physiology – respiration, circulation, digestion, excretion, osmoregulation – reproductive physiology – endocrine glands and sex hormones. Fish genetics - Sex determination, hybridization, fish breeding techniques – Cryopreservation of gametes -Commercially important marine fishes, shellfishes, crustacean and seaweed resources of India and world, fish population dynamics – Vonbertalanfy's growth equations- growth and mortality parameters – Maximum Sustainable Yield –Maximum Economic Yield – CPUE-Yield per recruit- fish stock assessment Methods – Fish stock enhancement - growth - recruitment overfishing – Closed season – mesh size regulation – Turtle Excluder Device - Tamil Nadu Marine Fishing Regulation Act – Wildlife Protection Act – Coastal Aquaculture Authority Act.

Unit II: Aquaculture, Ornamental Fish Culture and Fish Diseases (30 Questions)

Site selection for fish culture – Chinese hatchery - cultivable fishes for freshwater- Pond chemistry – Dissolved Oxygen – Alkalinity, Hardness– Pond disinfection with lime -Soil and water quality management – Types of feed and formulation - integrated fish farming – sewage fed fish culture – cold water Fisheries - brackish water aquaculture - Shrimp culture – shrimp hatchery and nursery rearing- seed certification - culture techniques of bivalves, Mariculture- candidate species for Mariculture, Open water cages – Seaweed culture - Scampi culture -Ornamental fish culture – Live bearers - Egg layers- culture of Fish food organisms- Aquarium keeping – fish diseases -Bacterial, Fungal, viral and parasitic diseases - remedial measures - Recent Aquaculture techniques.

Unit III: Limnology, Aquatic Ecology and Biodiversity, Fishery Oceanography, Aquatic Pollution, Coastal Zone Management (20 Questions)

Physico – chemical characteristics of freshwater bodies; lentic and lotic systems, flora and fauna, classification of lakes based on origin, productivity & mixing of water; phytoplankton and zooplankton, nekton, benthos, Estimation of primary production; Components of aquatic ecosystems, food chain, energy flow, animal association; Ecological niches – lagoons, estuaries, mangroves, coral reefs, flood plains, wet lands- exotic species- endangered species, conservation of habitats Marine zones – physical properties of sea water –chemistry of sea water- waves, tides, currents, El -Nino, Ekmanspiral, upwelling; Aquatic pollution -BOD,COD, oxygen demanding waste, eutrophication-sewage pollution, red tide- oil pollution, pesticide pollution, thermal pollution, radioactive pollution- biological indicators of pollution; Application of GIS in aquatic resource identification- remote sensing for coastal management - CRZ - Environmental Impact Assessment.

Unit IV: Fisheries Economics, Statistics, Fisheries Marketing & Fisheries Extension (10 Questions)

Theories of demand and supply, market equilibrium, production function in capture and culture fisheries, Economics of fishing and fish farming, fish marketing; marketing channel, export and import policies; bar diagram, pie diagram, histogram, frequency polygon, primary and secondary data for statistical analysis, extension teaching methods and use of audiovisual aids in extension activities, individual group and mass contact methods.

Unit V: Fishing Craft and Gear Technology, Navigation and Seamanship, Refrigeration and Equipment Engineering (20 Questions)

Types of fishing gears & crafts – fishing gear materials and their properties– yarn numbering system –Fishing gear accessories, floats, sinkers, etc.-design and construction of gill nets longline, trawls and purse seine- Fish finding devices. Principles of hydrostatics, law of floatation – Archimedes principle – Simpson's rules Fishing craft materials – wood, steel, FRP- form coefficients, TPC– ship's stability– state of equilibrium- care and maintenance of vessels; types of propeller and rudder; Principles of navigation and seamanship – chart reading and fixing positions- chart symbols Compass, GPS–EPIRB- Rules of road related to fishing vessels – navigational lights-International code flags-life saving devices- buoyage system, storm signals, distress signals - Laws of thermodynamics-vapour compression refrigeration- vapour absorption refrigeration-Compressor, evaporator, condenser – Freezers – plate, blast, tunnel- refrigerated-coefficient of performance sea water systems; Types and functions – operation and maintenance of various processing equipments - types of diesel engines and their working principles –marine engines.

Unit VI: Fish in Nutrition, Fish Processing Technology and Packaging Technology (25 Questions)

Nutritional value of fish- protein, non -protein, nitrogen, lipid, minerals, micro and macro element, trace elements, other functional biomolecules in fishes. Freshness of fish and rigor mortis – mechanisms of fish spoilage – fish drying methods – principles of salting and salt curing methods – smoking of fishes. Canning materials – canning media – methods of canning – quality of canned fishery products. Spoilage of canned foods, types, causes and preventive measures-packaging materials for canned foods. Fish preservation by chilling and icing – preparation of ice-chemicals used in freezing – types of freezing changes during frozen storage– method of thawing. Microbiological and biochemical changes in freezing – packaging and transport of frozen fishery products – freeze drying - Packaging materials and their properties-packaging for retail sale and storage- retort pouch packing, vacuum packaging, active packaging, MAP. Fishery by products – Fish meal- fish oil- shrimp waste- chitin –chitosan-fish protein concentrate- fish hydrolysate- fish silage – fish maws, fish glue- gelatin-isinglass-utilization of seaweeds –agar agar – algin – carrageenan.

Unit VII: Microbiology of Fish and Fishery Products, Quality Assurance of Fish and Fishery Products (15 Questions)

Source and types of microorganisms in fish and fishery products-Indicators of microbiological quality of fish and fishery products-nutritive values of processed seafood. Quality dimensions of sea food-assessment of quality changes in fresh and iced fish and during processing- application of HACCP concept in quality assurance- Role of EIA and MPEDA in fish and fishery products-Certification system for fish and fishery products –sea food safety – authenticity – traceability.

Unit VIII: Invertebrates and Chordates (25 Questions)

Invertebrates: General Organization and Classification upto Classes. Organization of Coelom – Acoelomates, Pseudocoelomates and Coelomates. Economic importance of Protozoans. Canal System in Sponges. Metagenesis and Polymorphism in Coelenterates. Helminthes in relation to man. Metamerism in Annelids. Larval forms and Parasitism in Crustaceans. Chordates: General Organization and Classification upto Classes. Ascidian – Retrogressive Metamorphosis, Neoteny and Affinities. Fishes – Locomotion, Migration, Respiration and Parental Care. Amphibia – Respiration and Parental Care. Reptiles – Identification of Poisonous and Non-poisonous Snakes. Birds – Flight Adaptations and Mechanism of Flight – Flightless Birds. Mammals – Dentition – Prototheria, Metatheria, Eutheria and their Phylogenetic relationships.

Unit IX: Cell & Molecular Biology, Biochemistry, Physiology, Biophysics, Genetics and Evolution (20 Questions)

Cell and Molecular Biology: Structure and Function of Cellular Organelles – Cell Division and Cell Cycle – Structure & Functions of Genetic Materials – Lac Operon Concept. Biochemistry: Structure and Functions of Biomolecules. Hormones – Classification, Biosynthesis and Function. Physiology: Digestion, Circulation, Respiration, Nerve Impulse and Conduction, Excretion, and Reproduction in Mammals. Biophysics: Centrifugation, Colorimetric Techniques, Electrophoresis, PCR, RFLP, RAPD and DNA fingerprinting. Genetics: Mendelian Principles – Mutation – Chromosomal Aberration: Structural and Numerical. Evolution: Origin of Life and Theories of Evolution.

Unit X: Biostatistics, Immune System, Developmental Biology and Ecology (15 Questions) – Biostatistics: Mean, Median, Mode and Standard Deviation. Basics of Bioinformatic Tools – DNA and Protein Sequence Analysis. Immune System: Types and Functions – Vaccination. Developmental Biology: Gametogenesis, Fertilization, Cleavage, Gastrulation and Organogenesis. Ecology: Ecosystem – Structure and Function – Ecological Succession – Population Ecology – Biodiversity and its Conservation.

Dated: 17.04.2025