

**FISHERIES SYLLABUS FOR CONDUCTING WRITTEN EXAMINATION FOR DIRECT
RECRUITMENT OF TEACHING POSTS IN THE CADRE OF ASSISTANT PROFESSORS AT
UASM**

Aquaculture systems: Extensive, semi-intensive and intensive culture of fish and prawn. Partitioned aquaculture systems: raceways, tanks, flow-through systems, polyculture, and composite fish culture. Cages and enclosure. Peri-urban aquaculture systems: aquaponics, RAS, bio-floc technology and land based aquaculture systems.

Integrated fish farming: Global status, integration with agricultural (paddy), horticultural crops (vegetable and fruits) and livestock (cattle, poultry, ducks, pigs and other terrestrial animals). Effective recycling of wastes, nutrient budgeting in different integrated farming systems. Production levels and economics.

Seed quality: Hatchery protocols, water quality management, larval rearing, estimations, trouble shooting in hatcheries, record keeping, packing and transport of seed, anaesthetics in fish seed transport. Quarantine and Hatchery protocols and biosecurity principles; sanitary and phytosanitary (SPS) measures; Better Management Practices (BMPs); packaging and transport of seed. SPF brood stock development. Economics of seed production of different species

Different culture systems: Cages, pens and enclosures in open waters, Seed stocking, quality and quantity, Cages for sea, estuaries, reservoirs, lakes and canals, Pen culture, Selection of site for sea farming, Different designs of open sea farming structures-construction of cages-bioengineering problems and solutions, Species selection for open water aquaculture, Rearing of fingerlings, advanced fingerlings and table size fish in open water bodies.

Soil and water quality monitoring: Soil and water quality standards; Equipment used for soil and water quality estimations, automated systems for monitoring, Quality checks and management, aeration system for water quality management

Biodiversity: Definition and concept; Categories of biodiversity - Species diversity, Genetic Diversity; Habitat Diversity; Ecosystem services and Economic appraisal of biodiversity

Aquatic biodiversity: Threats-Over exploitation, habitat reclamation, pollution, habitation, planning and management, tools for conservation, participatory approach -Impact of climate change on the ecosystem biodiversity, health and productivity.

Fish diversity: Fresh water fish diversity- Marine fish diversity-Quantification and importance of biological diversity- abundance- distribution.

Plankton diversity and productivity: Definition, Classifications and functions in aquatic ecosystem; Primary and secondary production - Production - Biomass (P/ B ratio), factors affecting production.

Ecology of phytoplankton: Freshwater and marine, Spatial and temporal variations, succession; Contribution of nanoplankton to primary production; Algal blooms and algal toxins; Nutrient manipulation for algal growth and control; Biological control of algal blooms; Mass culture of phytoplankton as a live-feed; Role of microalgae in carbon sequestration.

Biodiversity Conservation - Global diversity patterns and loss of biodiversity; Conservation measures; Biodiversity hotspots, Biosphere reserves; National parks, sanctuaries; Marine protected areas; Convention on Biological Diversity; IUCN; CITES; Ramsar Convention; Man and Biosphere Programme; Indian legislations to biodiversity conservation, Ecological Sensitive Areas (ESAs), Establishment of National marine parks, in situ and ex situ conservation. Wildlife protection act, Biodiversity Act, International treaties and conventions (CITES, CMS, RAMSAR Convention).

Climate change threats to fisheries resource: Temperature, Freshwater precipitation and sea level rise- Climate-induced degradation and loss of critical fish habitats. –Resilience - Tolerance limit-Temperature, pH and Salinity- Global warming and ocean acidification on fish early life stages.

Riverine fisheries resources in India: Present trend of dwindling fisheries resources, Direct and Indirect effects of human intervention in rivers, habitat modification and improvement (rehabilitation of channels and flood plains), Protection and restoration of fish movements (different types of fish passes and enhancement of fish migration), Management and repair of riverine vegetation, Stock enhancement strategies like introduction of new species, Pre- and post-stocking management, Potential risk of stocking.

Types of inland aquatic resources: Concept of watershed; Lacustrine, Riverine, Wetlands, Floodplains, Swamps and Ponds, Habitat characteristics, Flora and Fauna, Economic importance; Relationship between productivity (primary and secondary) and fish yield.

Wetlands: Trophic classifications, Functions, Degradation of wetlands (causes consequences; Constructed wetlands; Restoration, Conservation and management of wetlands, Ecological services and livelihood from wetland.

Sediment properties: Weathering of rocks; Soil formation, Soil profile, Mineral weathering; transformation, weathering products, Structure of oxide and silicate minerals, Sources of charge, adsorption on to clay minerals of major cations and anions, Double layer, Ion exchange - concept and source of cation exchange capacity (CEC), Sediment texture.

Sample collection techniques: Determination of physicochemical parameters of sediment – pH, electrical conductivity, redox potential, soil texture, bulk density, particle density, porosity, total and organic carbon, total and available nitrogen, phosphorus, potassium and micronutrients; C: N: P ratio, CEC

Qualitative and quantitative analytical techniques including Gravimetric and volumetric analyses used in environmental science, Sampling techniques and procedures, Factors affecting the choice of analytical techniques, Interferences and their minimization, Laboratory safety measures

Climate change, Its impacts, Aquatic ecosystem, Capture and culture fisheries, Carbon footprint in fisheries and aquaculture, Weather and climate, Greenhouse effect, Radioactive balance, Climatic migration, Impact on women; Carbon Sequestration and trading, Projected trends of climate change and disasters.

Aquatic pollution: Sources, types and impacts, Pollution problems of groundwater resources (arsenic, fluoride, nitrate, pesticides), Sources of contamination and management issues.

Toxicity: Factors influencing toxicity, Environmental, genetic and nutritional, Ecological effects of toxicants, Genotoxicity, Neurotoxicity, Toxicology of emerging contaminants, New generation pesticides and antibiotics, Antibiotic resistance, Bioaccumulation, Bioconcentration and Biomagnification, Systemic effects of toxic metals, Pesticides and Herbicides; Effect of select toxicants on aquatic life and detoxification mechanisms, Interrelationship of xenobiotics with other environmental variables, biofilter organisms.

Mangrove ecosystem: Species diversity, distribution and importance; other intertidal systems - Seagrass, Sandy beach, Lagoon and estuary

Basic ecological concepts: Habitat ecology, systems ecology, Synecology, Autecology; Characteristic features of different biomes; Concept of community, Continuum, Community attributes, Community development, Ecological succession, Changes in ecosystem production, Concept of climax. Ecological issues, Impacts of environment changes, Threats to biodiversity, Habitat destruction; Depletion of fisheries resources.

Oceanographic factors in fisheries: Effects of physio-chemical and biological oceanographic factors on adaptation, Behaviour, Abundance and distribution of aquatic organisms; Primary and secondary productivity in ocean, Productivity changes in the ocean.

Ecological restoration; Ecological processes and structures, Regional and Historical contexts, and sustainable culture practices; Ecosystem integrity; Community ecological principles; Disturbance, Succession, Fragmentation; Ecosystem function and Services.

Coastal Zone Management: Integrated Coastal Zone Management (ICZM) - its benefits, Principles, Goals and objectives, scope, zonation

Distribution and classification: Microbial community in freshwater; Estuarine and marine environment (types and abundance); Factors affecting microbial growth and abundance; Extremophiles and their significance.

Principles and applications of bioprocesses: Bioremediation, Biofertilization, Biofilms, Biofloc, Probiotics, Bio-leaching, Bio-corrosion, Bio-fouling; Microorganisms as Bioindicators and Biosensors.

Genetic Selection and Breeding: Scope, Application, Role of genetics in fish selection and breeding National and International scenario of selective breeding programmes in aquaculture.

Economic traits in cultured species-Performance- Growth, Disease resistance, productive and reproductive traits, Recapture frequency, Behavior, Quality traits and their inheritance, Recording economic traits, Study of growth curves and their components, Influence of non-genetic factors on economic traits

Nutritional requirements of finfish and shell fish: Nutritional requirements of larvae, growout and broodstock of commercially important finfish and shellfish. Methods of studying nutritional requirements; Qualitative and quantitative methods; Nutrients deficiency symptoms.

Nutrient dynamics: Influence of nutrient cycles on food web/chain. Influence of detrital food web on nutrient distribution, Nutrient loading through feed and fertilizer.

Productivity and fish production: Optimization of natural productivity for increasing fish production, Different food chains in aquatic ecosystem, Feeding behavior and feeding niche, Effect of environmental parameters on appetite of fish

Therapeutics in aquaculture: Common therapeutants used in aquaculture; their mode of action, Dose and dosage, Methods of application; Phytotherapy, Phagetherapy, Nanoparticle-based drugs, Antimicrobial peptides,

Introduction to fish disease diagnosis: Introduction to disease diagnosis; different roles and levels of diagnosis in aquaculture; The evolution of diagnostic techniques in aquaculture; A brief introduction to diagnostic features of important diseases of finfish and shellfish.

Production economics: Basic theory of the firm, Concepts, Production functions, Isoquants derivations and applications, optimization behaviour, Alternative models, Short run and long run cost functions; Total price effect, Substitution effect, Output effect and Profit maximization effect

decomposition analysis, Analytical approaches, joint products, Concepts and constrained optimization.