

Unit 1: Status and Scope of Aquaculture

History and scope of aquaculture; Aquaculture practices in different parts of the world; Status of world aquaculture: production trend, consumption scenario and emerging trends, important cultivable species of finfish and shellfish, aquatic plants and their culture practices; Criteria for candidate species selection; Criteria for site selection for various culture practices; Aquaculture practices for freshwater fish (carps, catfishes, snake heads, feather backs, tilapia, murels, mahseer, trouts, etc.), freshwater prawn, brackishwater and marine shrimp and fish (seabass, milkfish, mullets, pearlspot, cobia, pompano, grouper, snappers, breams, perches), lobsters, freshwater and marine ornamental exotics.

Unit 2: Design, Construction and Operational Management of Aqua-Farms

Design and construction of aqua-farms: nutrient and soil quality, site selection; Pond preparations: Fertilization, micro-organisms and their role; Nursery and grow-out rearing: Pre-stocking, stocking and post stocking management in culture ponds, water supply and water circulation, soil and water quality management, feeding; Construction of pens and cages: Design and construction, fixed cages, floating cages, semi-submerged and submerged cages; Carrying capacity of aquafarms; Use of biofilters and aerators; Wastewater-fed aquaculture; Best Management Practices (BMP) in aquaculture; Environmental Impact Assessment (EIA), Responsible aquaculture; Sanitary and phytosanitary (SPS) agreement; IPR in aquaculture; Ecosystem approach to aquaculture; CRZ implications, CAA and its role; Ecolabeling; Organic certification.

Unit 3: Broodstock Management and Seed Production

Broodstock management and seed production technology: Natural seed resources and its management, collection techniques, holding, packaging and transportation; Reproductive physiology in fish and shellfish: Endocrine control of maturation, spermatogenesis, oogenesis, spawning and vitellogenesis; Assessment of gonadal maturation: evaluation of gamete quality; Improvement of seed quality through stock up-gradation, induced breeding, synthetic hormones and its analogues and their application; Incubation of eggs; cryopreservation of gametes; Hatchery seed production and management: Design and layout of hatcheries; Live feed culture: Microalgae, rotifers, artemia, copepods etc.; Seed production of carps, snakeheads, mahseer, trout, tilapia, pearlspot, ornamentals, cobia, grouper, pompano, tilapia, mullets, milkfish, snappers, breams, shrimps (*Penaeus monodon*, *P. indicus*, *P. semisulcatus*, *P. vannamei*), sand lobster, spiny lobster, mud crab (*Scylla serrata*) blue swimmer crab (*Portunus pelagicus*), giant freshwater prawn (*Macrobrachium rosenbergii*), mussel, edible oyster, pearl oyster.

Unit 4: Aquaculture Systems

Different systems of Aquaculture: Traditional, extensive, semi- intensive, intensive; Farming methods: Ponds, pens, cages, raceway, raft rope rack, monoculture, polyculture, composite culture; Culture based capture fisheries; Integrated multi-trophic Aquaculture (IMTA); Integrated fish farming; Organic aquaculture; Sewage fed aquaculture; Hi-tech aquaculture systems: Biofloc, aquaponics, RAS systems and flow through systems; Genetic improvement of aquaculture candidates through selective breeding/ hybridisation.