

FISHERIES

PART - I

1. FISHERY BIOLOGY.
2. HYDROGRAPHY.
3. AQUACULTURE.

1. FISHERY BIOLOGY :

- * Commercially important freshwater fin and shell fishes of India. Food and feeding habits of commercially important fin and shell fishes. Age and growth reproductive biology, maturity stages, gonadosomatic index, spawning and fecundity of commercially important fresh water fishes. Eggs and larval stages of Indian Major Carps and exotic cultivable fish species.
- * Freshwater capture fishery. Natural fishery resources of North Eastern Region. Fisheries of major reservoirs/flood plain lakes/rivers. Fish population dynamics and fish stock assessment. Cold water fishery resources of India

2. HYDROGRAPHY :

- * Physical and chemical properties of soil. Soil reactions and P^{II} , soil fertility, fertilizers and their interaction with soil. Physical, chemical and biological properties of water in relation to fisheries.
- * Classification and dynamics of inland waters. Physical, chemical and biological properties of impounded water bodies. Water quality of fish ponds and their indices in relation to fishery components of aquatic ecosystems. Aquatic productivity, nutrient cycles, energy flow and food chain. Aquatic communities and biodiversities, conservation and management of endangered fish species. Aquatic pollution and its remedial measures. Micro and macro aquatic flora & fauna and its limnological significance. History of oceanography, coastal upwelling and sinking- important to fisheries catastrophic affects of El-Nino, water masses, tides & currents

3. AQUACULTURE :

- * History, growth and present status of aquaculture. Site selection, design and construction of freshwater aquafarm. Production and sustainability in aquaculture.
- * Different freshwater aquaculture systems. Pond productivity, carrying capacity and stocking density of fish ponds. Systems of aquafarming - extensive, semi-intensive and intensive. Non-conventional aquaculture, small-scale aquaculture, mono and poly culture of fish. Concepts of integrated and wastewater aquafarming. Ornamental fishes and aquarium management.
- * Fish pond fertilization and manuring preparation and management of nursery, rearing and grow out ponds. Importance of air breathing fish culture and practices. Freshwater shell fish farming. Coldwater fish culture. Mono and poly culture of brackish water fin and shell fishes. Sea weeds culture.
- * Fish feeds, Energy and nutritional requirements of fin and shell fishes. Balanced diets protein, amino acid, carbohydrates, lipids, vitamins, micro/macro nutrients essential in fish feeds. Supplementary feeding in fish culture systems. Techniques of feeding. Feed formulation, processing and storage. Micro particulate and microencapsulated diets.
- * Natural breeding and seed production of freshwater fin and shell fishes. Technology of fish seed production. Brood stock management. Technique of induced breeding and hypophysation technique. Pituitary gland and other synthetic compounds used to induce

fish spawning. Multiple carp spawning, cryopreservation of gametes. Breeding techniques of cultivable carps ornamental fish and air breathing fishes. Incubation devices of fish eggs, hatchery models, chinese technique of using spawning pool and incubation/hatching pools. Design, construction and operation of fish hatcheries. Concept of fishery biotechnology. Fish generics- sex reversal, inbreeding, hybridization, gynogenesis, androgenesis polyploidy and sexuality in fish. Transgenic fish. Biofertilizations, bioprocessing and biofiltration in aquaculture.

- * Fish diseases, its diagnosis and health management. Significance of fish diseases in relation to aquaculture practices. Parasitic, bacterial, fungal, viral and nutritional fish diseases. Environment in relation to fish diseases. Prophylaxis and treatment of fish diseases. Introduction to fish immunization and vaccine production.

FISHERIES

PART - II

1. FISHERY TECHNOLOGY.

2. FISHERY MANAGEMENT.

3. FISHERY EXTENSION EDUCATION.

1. FISHERY TECHNOLOGY:

* Freezing technology , types of freezers; changes of fish after death, spoilage of fish, spoilage and pathogenic micro organisms. Sanitation in processing plants. Freezing of fish-fundamental aspects , physico - chemical changes during freezing. Thawing , methods of thawing. Chilling , methods of chilling, drip , protective treatments. Packaging of frozen foods.

* Fishing crafts and their types. Terminology of fishing crafts . Maintenance of fishing of fishing crafts. Fishing gears and their classifications. Fishing gear materials. Modern commercial fishing methods - trawling , purseining, gill netting, long lining, automated tuna long line and squid jigging methods. Electro fishins methods. Fishing gear accessories and deck equipments. Acoustic instruments - principle of working and application of eco sounder , sonar, net sonde. Preservation of fishing gear.

* Fish processing technology. Traditional fish preservation techniques - sun drying , curing , smoking , salting , fermentation, etc. Fish product preparation. Fish sauce preparation. Quality standard of different cured fish products. Principle and methods of preparation of various fish paste products. Fish food packaging - objectives and requirements.

Fish by products and their uses , caned fish . Spoilage of canned and other packed fish products . Diversified fishery products. .

* Bio chemistry of fish proteins - structure of fish muscle and muscle proteins , fish lipids , rancidity , indices of rancidity.

* Microbial standard of fish , micro flora of fresh and processed fish products, beneficial and harmful micro organisms , quality control in fish processing , HACCT and identification of critical control point.

2. FISHERY ECONOMICS & MANAGEMENT:

Estimation of inland fish catch statistics. Economics of fish production system , capture and culture . Profit maximization. Problems in estimating costs and return in fishes. Fishery projects - preparation and implementation. fish marketing and present state fish marketing system in India . Export for fish and fishery products.

3. FISHERY EXTENTION EDUCATION :

History of fishery extention , concept , principles . Role of fishery extention in socio - economic development. Present status fishery extention . Extention methods . Participatory Rural Appraisal (P.R.A.) techniques. Organisational structure of fishery extention system, Farming System Research & Extention (F.S.R.E.) and technology transfer.