

**MARINE BIOLOGY**  
**(PG DEGREE STANDARD)**

**SUBJECT CODE: 294**

**UNIT – I: TAXONOMY AND BIOLOGY OF MARINE ORGANISMS**

Classification of marine fin and shell fishes - Important fishes of the world – Their identification; sea turtle and mammals – Classification and diagnostic characters. Food and feeding; age and growth and reproductive biology; fish eggs and larvae and developmental biology. Functional morphology of digestive, respiratory, circulatory, excretory and reproductive systems in fin and shellfish. Principles of immunology and Endocrine system.

**UNIT – II: MARINE CAPTURE FISHERY AND STOCK ASSESSMENT**

Classification, definitions of fishery zones and fishery resources – Neritic, benthic, demersal, pelagic & deep sea systems; world and Indian fishery resources; potential marine fishery resources of Indian EEZ. Population dynamics; mortality – Natality - theory of fishing - Catch Per Unit Effort (CPUE) - Maximum Sustainable Yield (MSY) - Maximum Economic Yield (MEY) - Fishery Maximum Economic Yield (FMEY) – Overfishing.

**UNIT – III: METEOROLOGY AND GEOGRAPHY**

Structure of atmosphere; weather and climate – Definition and concepts, characteristics and laws of black body radiation; solar radiations, its characteristics; vertical and horizontal heat balances; air temperature – Horizontal distribution; explanation of DALR, SALR and isotherms; general circulation – Monsoon characteristics, water in atmosphere, condensation; clouds and its classification; weather systems – FAO classification of fishery zones of world oceans.

**UNIT – IV: OCEANOGRAPHY (PHYSICAL, CHEMICAL AND BIOLOGICAL)**

Major divisions of marine environment; Physical properties of seawater -Thermal properties of seawater; concepts of sonar, channel and shadow zone; heat budget; T-S diagram; properties of Waves: types of waves and properties of ocean waves; Tides: Origin of the tides; Wind and Ocean circulation – Types of currents.

Chemical properties of seawater: Concept of chlorinity and salinity of seawater; gases, organic and particulate matter. Origin, distribution of nutrients cycle and their significance. Upwelling; manganese nodules. Primary and Secondary productivity of the coastal environment; Phytoplankton and Zooplankton: Classification, distribution, their role in coastal ecosystems and adaptations. Primary production and factors affecting primary production. Seaweed, seagrass, mangrove and coral ecosystems; Fouling and boring organisms.

#### **UNIT – V: MARINE POLLUTION AND COASTAL ZONE MANAGEMENT**

Types of pollution – Organic (domestic, municipal and industrial), heavy metals, radioactive, pesticide, oil and thermal; Treatment methods (primary, secondary and tertiary); Pollution indicators; role of pollution control board and prevention of pollution. Goals and purposes of coastal zone management; methods of coastal zone management and policies involved; Coastal Regulation Zone Act, Integrated Coastal Zone Management; International treaties and conventions.

#### **UNIT – VI: CULTURE OF COMMERCIALY IMPORTANT MARINE FISH AND SHELL FISHES**

Present status of aquaculture in the world, in general and India, in particular; important cultivable species of fin and shell fishes; criteria for species selection; site selection for culture systems; components of aquaculture farms – Water intake and filtration systems; preparation of ponds – Water culture – Water quality parameters – Stocking – Feeding - Aquaculture systems – Land-based and open sea farming. Artificial feed formulation. Pond management; disease management; harvest and post-harvest technology. Marine Ornamental fishes – Setting up of aquarium - maintenance – Export potential and marketing.

#### **UNIT – VII: HATCHERY SEED PRODUCTION TECHNOLOGY**

Hatchery seed production of commercially important fin and shell fishes; collection and transport of seeds from natural environment; criteria for site selection and construction of hatcheries – Different components of hatcheries; operation and management; induced breeding and broodstock maintenance; cryopreservation; larval rearing and culture of live feed – Chlorella, nanoflagellates, Artemia, Rotifers and Daphnia; nursery rearing.

## **UNIT – VIII: NAVIGATION AND SEAMANSHIP**

Coastal navigation, distance and direction in navigation – Rules of the roads for fishing vessels; Navigational types and importance – Magnetic compass, Gyro compass, Sextant, bearing instruments; chart abbreviations and symbols; types of charts and chart reading; sounding instruments – Echo sounder; lead lines; electronic navigation and communication; radio-transmitters and receivers, VHF, SONAR, block diagram, Radio telephones, RADAR and GPS; bad weather conditions and warning signals.

## **UNIT – IX: DISASTER MANAGEMENT**

Global warming – Types of natural and man-made hazards in fisheries and aquaculture – Cyclones, floods, droughts, tsunami, El-Nino, algal blooms, avalanches, pollution destructions; Introduction of alien / invasive species; epidemics, land slides and laws of biodiversity; management strategies – Pre-disaster, during disaster and post-disaster – Prevention, preparedness and mitigation; post-disaster – Different ways of detecting and predicting of disasters, methods for assessment of initial and long-term damages, reconstruction and rehabilitation; prevalent national and global management practices in disaster management; agencies involved in monitoring and early warning – District, state, national and global level; uses of communication channels and media, disaster case studies.

## **UNIT – X: REMOTE SENSING, MARKETING AND CO-OPERATION**

Remote sensing satellites – Application of INCOIS data in capture fisheries; introduction of marketing – Market structure and functions – Fish markets – Demand and supply of fish – Price fixation in marine fish markets, hygienic handling of fishes, cold chain marketing – Resources, availability for marketing; principles and objectives of cooperation; cooperative movement in India, problem of fisheries cooperative management in relation to resources, production and marketing; role of fishermen cooperative societies in the upliftment of marine fishers.