

**SYLLABUS**  
**COASTAL ENGINEERING**  
**(PG Degree Standard)**

**Subject Code:358**

**UNIT-I : COASTAL ENVIRONMENT**

Beaches - Coastal features - Types of beaches - Physico-Chemical Properties of Coastal Environment - Characteristics of Coastal Water bodies - Bays, Backwaters and Lagoons - Coastal Zonation - EEZ - Inshore and Offshore Areas - Mean Sea level - Basics of Tides and Waves - Coastal Morphology - Characteristic features of Continental Shelf - Structure and Nature of Indian Coastals with reference to Fisheries - Tamil Nadu Coastals with reference to Fisheries.

**UNIT-II : WAVES AND TIDES DYNAMICS**

Basics of waves - Classification - Wave Theory - Wave dynamics - Physical Characteristics of different types of waves - Wave period - Linear Wave Theory - Wave celerity - Velocities - Accelerations - Displacements - Wave dynamics in shallow and deep water conditions - Integral properties of waves - Energy flux, Mass flux and Momentum flux - Wave transformations - Wave breaking and its types - Surfing - Wave dynamics in relation to fishing and harbour activities - Nature of waves in Indian and Tamil Nadu Coastal areas-Tides - Types and their dynamics in coastals.

**UNIT-III : COASTAL PROCESSES**

Physico, Chemical and Biological processes in Coastal ecosystems - Salt Marshes, Mangroves, Corals and Sandy and Rocky Beaches - Sediments - Types and Characteristics - Nature of sediment movement and Transportation - Sea water circulations and Sediment dynamics - Beach nourishment through sedimentation - Sediment Budget and analysis - Total Sediment load transportation calculation - Cross Shore Transport - Long shore transport (littoral drift) - Impact of Sediment dynamics on Coastal eco-system with special reference to fisheries and aquaculture activities in coastal areas.

**UNIT-IV : COASTAL RESOURCES AND BIODIVERSITY**

Living and Non-living resources of coastal areas - Biotic and Abiotic factors affecting the resources of Coastal areas - Renewable and Non-renewable energy sources in Coastal zones - Exploration of Coastal resources - Minerals - Placer and Hydrocarbon deposits - Nodules - Mineral Nodule extraction from coastal waters - Salt production from coastal waters - Living marine resources - Groups of animals - Economical, Ecological and Commercial importance of living Marine organisms - Management of Ecosystems and Large Marine Ecosystems - Marine parks and Protected Areas for

conservation and management - Ecotourism - Biodiversity of different ecosystems - Mangroves, Corals, Sea grass beds - Coral reefs - Sustainable management of marine biodiversity - Community based coastal biodiversity management. Biodiversity of Indian coastal waters.

#### **UNIT-V : COASTAL STRUCTURES-PROTECTION AND ITS MAINTENANCE**

Coastal structures - Types - Purpose of construction/establishment - Piles - Moored structures - Navigational aids - Harbour structures - Protection embankments - Enclosures - Large and Small submerged structures - Floating breakwaters - Underwater cables and Associated structures - Rubble mound structures - Groynes - Breakwaters - Detached breakwaters - Port and harbour breakwaters - Sea walls - Sills - Designs and construction of Sea walls and breakwaters - Stability and Maintenance of breakwaters - Electrochemical process - Corrosion and its types - Chemistry of corrosion - Oxidation of metals - Corrosion prevention - Methods - Coatings - Metallic, Inorganic and Dynamic coatings.

#### **UNIT-VI : INTEGRATED COASTAL ZONE MANAGEMENT (ICZM)**

ICZM - Objectives - Basic Principles - ICZM framework - Zonation of coastal areas for better Management - Dynamics of coastal areas - Productivity of coastal zones - Threats and Challenges for coastal bodies and their resources - Institutions involved in ICZM - Tools and techniques in ICZM - Community participation in ICZM - Legal policies and frame works in ICZM - International and National bodies and frameworks - Integration among sectors, Zones, Governments and disciplines - Problems and Challenges monitoring and evaluation of effectiveness of integration. ICZM in Indian and Tamilnadu coasts - Status of implementation - Problems and challenges.

#### **UNIT-VII : APPLICATION OF GIS AND REMOTE SENSING IN COASTAL SURVEYING AND MANAGEMENT**

Coastal Survey - Large scale & Small scale surveying - Various instruments used in surveying - Hydrographic survey - Biological survey - GPS - Total stations used in surveying - Topographical surveying - Horizontal control methods - Vertical control methods - LIDAR surveying for digital elevation models - Acoustic Survey - Depth contour lines - Sound waves in water - Echosounder & SONAR - Principles & working - Hydrographical survey for fishing Harbour construction. Remote Sensing - Principles - OCEANSAT - Application of Remote sensing in coastal and ocean studies - SST - ISRO and coastal zone management - Digital image processing - Mapping of coastal ecosystem - Mangroves, corals, Seagrass etc., GIS - Principles - Methods and application in coastal management - GIS softwares - Application of GIS and Remote sensing in Indian coastal zone management.

**UNIT-VIII : FISHING HARBOUR CONTSTRUCTION**

Fishing Harbour & Fish landing centres - Types - Various components of fishing Harbour and landing centre - Land side and Water side facilities and structures of fishing Harbour - Types of Harbour - Small and medium fishing Harbour - Deep sea fishing Harbour - Hydrographic, acoustic and biological surveys to be conducted for site selection for Harbour construction - Tidal and Wave surveys - Environmental auditing for fishing Harbour - Dredging and breakwater construction - Layout and construction of Jetties, quays and slipways - Use of different construction materials for shore based and seaside structures - Fishing Harbour maintenance and waste disposal - Water treatment plant in fishing Harbour. Status of fishing Harbours in India.

**UNIT-IX : COSTAL AQUACULTURE ENGINEERING**

Costal Aqua Farming - Components - Water sources - Selection of site for coastal Aquaculture - Physical, Chemical, biological and meteorological parameters for site selection - Survey of site for coastal aquaculture - Water supply, tidal influence, ecological survey - Biological survey - Soil analysis and suitability studies for coastal aquaculture - Acid sulphate soil and its impact - Layout and design of aquafarm - Construction of dykes - Calculation related to dyke construction and earth excavation - Dyke maintenance and protection - Water transportation systems - Feeder & drainage canals - Channels - Water intake systems - Types of water transportation systems - Water control systems - Inlet & outlets - Types, construction and maintenance - Aquafarm machineries - Types - Selection of machineries - Pumps - Generators - Aerators, feeders - Types - Basic principles - Operation and maintenance. Status of coastal Aquaculture in India and Tamilnadu.

**UNIT-X : DISASTER MANAGEMENT IN COASTAL AREAS & COASTA EROSION**

Disasters - Cyclones - Tsunamies - Floods, Landslides, Earthquakes etc., - Hazard and risk identification and assessment - Vulnerability assessment - Preparedness to face disaster - Infrastructure and buildings. Cyclone shelters - Design and construction - Mitigation strategy planning - Engineering aspects of structures like seawalls - Preparedness for disasters in Coastal areas of India.

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