## **COASTAL STRUCTURES**

# **Course Objectives**

The objectives of this course are:

- To learn about Design aspects, Long Period Waves, Tsunamis, Storm Surge, and Wind Set Up
- To know about Linear Wave Equation for Progressive and Standing Waves, Principle of Superposition
- To learn Wave Mechanics, Celerity, Wave Transformation
- To learn Wave Forecasting for Deep Water Waves
- To learn Wave forces on wall Breakwaters

## **Course Outcomes**

Upon the successful completion of this course, student can

- Understand Design Considerations for Coastal Engineering
- Derive Expressions for Linear Wave Function, Surface Profile, and Dispersion Relationship
- Understand the concept of Wave Mechanics including Celerity and Group Velocity
- Predict Deepwater Waves, Draw beach profiles and Surf Zones
- Design Break Water to counteract and suppress wave intensities

## **SYLLABUS**

#### UNIT – I

Introduction, General Design Considerations for Coastal Engineering. Long Period Waves: Tides, Seiches, Tsunamis, Storm Surge, and Wind Set Up.

#### UNIT - II

Solutions of Linear Wave Equation for Progressive and Standing Waves – Pressure Velocity Fields – Surface Profile and Dispersion Relationship – Principle of Super Position – Wave Energy, Energy Flux and Energy Principle – Group Velocity.

#### UNIT - III

Wave Mechanics. Celerity and Group Velocity. Wind Generated Waves. Wave Statistics. Wave Transformation: Shoaling, Refraction, Diffraction, and Reflection. Wave Breaking Criteria

## UNIT - IV

Wave Forecasting for Deepwater Waves. Beach Profiles and Surf Zone Wave Breaking. Sediment Transport. Impacts of Coastal Structures on Shoreline Changes. Seawalls, Breakwaters, Groins, Jetties, Wharves.

#### UNIT - V

Wave Forces on Walls. Design of Breakwaters: Rubble Mound-Type, Wall-Type, Structural Cross-Section. Wave Forces on Piles – Basic Assumptions – Values of the Inertia and Drag Coefficients and Their Dependence on the Wave Theory used.

# **Text Books**

- 1. Water Wave Mechanics for Engineers and Scientists by R.G.Dean and R.A.Darlymple, World Scientific Publishers.
- 2. Coastal Hydrodynamics by J.S.Mani. PHI Publishers 2nd Edition.

# **Reference Books**

- 1. Basic Coastal Engineering by R.M.Sorense, 3rd Edition, Springer.
- 2. Coastal Engineering Manual (CEM). US Army Coastal Engineering Research Center, 2002-2006. (Download from CECIL or USACE website).

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	3	1	1	1	2	2	3	1	1
CO2	3	3	2	3	2	3	3	1	1	1	1	3	3	2	2
CO3	3	3	2	3	3	2	3	1	3	3	2	3	3	2	2
CO4	3	3	3	3	3	3	3	1	3	3	3	2	3	3	1
CO5	3	3	3	3	3	3	3	2	2	3	3	2	3	3	3