III Year-II Semester
(20CE6319) Coastal Structures

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	-	-	3

Pre- Requisites: Fundamentals of engineering mechanics and engineering hydrology

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

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.

Course Outcomes:

S.No	Course Outcomes	BTL
1	Understand Design Considerations for Coastal Engineering	L2
2	Derive Expressions for Linear Wave Function, Surface Profile, and Dispersion Relationship	L5
3	Understand the concept of Wave Mechanics including Celerity and Group Velocity	L2
4	Predict Deep water Waves, Draw beach profiles and Surf Zones	L5
5	Design Break Water to counteract and suppress wave intensities	L4

Correlation of Cos with POs & PSOs:

CO	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

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).