B. Tech Civil Engineering				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
CE322: Tunnel, Ports and Harbour Engineering	L	T	P	**NIL**
	3	1	0	

Course Objective: This course aims to develop a comprehensive understanding aspects of planning, design and construction of tunnels, harbours and docks.

S. No.	Course Outcomes (CO)
CO1	To expose students to equip them with knowledge of different methods and procedures of tunnelling.
CO2	To expose students to understand the elements of planning and design of a harbour.
CO3	To expose students to equip them with knowledge of the construction features of different types of docks.
CO4	To expose students to learn the concept of dredging and various navigational aids at the harbour.

S. No	Contents	Contact Hours
UNIT 1	Tunnelling: tunnel alignment and grade, size and shape of tunnel, methods of tunnelling in soft soil, compressed air and shield tunnelling, shafts in tunnels, safety measures, ventilation, lighting and drainage in tunnels.	10
UNIT 2	Introduction and planning of harbour: Harbour classification, characteristics of good harbour, and principles of harbour planning, site selection criteria and lay out of harbours. Breakwaters: function, types, general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories- function, types and suitability.	10
UNIT 3	Design and construction features, docks and locks; tidal basin, wet docks, design consideration, operation of lock gates and passage, repair docks, graving docks, floating docks, marine railway. Port amenities; ferry, transfer bridge, floating landing stages, transit sheds, ware houses, cold storage, aprons, cargo handling equipment, purpose and general description.	10
UNIT 4	Harbour navigational aids; channel and entrance demarcation, buoys, beacons, light house electronic communication device. Dredgers: types, suitability, disposal of dredged material.	10
	Total	**40**

REFERENCES

S. No	Name of Books/ Authors/ Publishers	Year of Publication/ Reprint
1.	Srinivasan R., "Harbour, Dock and Tunnel Engineering", Charotar Publishing House Anand, Gujarat	2016

2.	Bindra S.P., “A course in Docks and Harbour” Dhanpat Rai Publications, New Delhi	2010
3.	Saxena S.C., “Tunnel Engineering” Dhanpat Rai Publications, New Delhi	2010