GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3170623
Semester – VII
Subject Name: Port and Harbor Engineering

Type of course:

Prerequisite: Nil

Rationale:
Safe, timely and economic transportation of passengers and goods is necessary for social and economical development of any region or nation. Roads and railways are important for the surface transport, whereas for the large quantity of cargo movement over the long distances at the national, international and intercontinental levels; waterway transportation is the most economical mode. Planning of new port requires proper knowledge of location, natural phenomena, environmental impacts, hinterland products, connectivity, forecast of passenger and cargo demand, infrastructure and management aspects. Planning, design, construction and maintenance of seaport components like harbor, docks, breakwaters, wharf, quay, jetty, transit sheds, warehouses, loading and un-loading devices, dredging, other navigation aids are essential for the civil engineering. Therefore, this subject is aimed to provide the clear understanding of the Port and Harbor components.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	1	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	**Introduction to Water Transportation:** History, Scope, Merits, Developments of Water Transportation in India, Inland waterways, River, Canal, Inland water transportation, Harbor, Port, Dock, Development of Ports & Harbors, classification, Harbor site selection, Harbor dimensioning.	5
2	**Port Planning:** Characteristics of good seaport and principles of seaport planning, size of seaport, site selection criteria and layout of seaport, Dry ports, Bulk cargo, Transshipment ports, Port of call, Surveys to be carried out for seaport planning, regional and intercontinental transportation development, forecasting cargo & passenger demand, regional connectivity, cargo handling capacity of port.	6
3	**Natural Phenomena:** Wind, Tides, Water waves, Wind rose and wave rose diagrams, wave diffraction, breaking, reflection, Littoral drift, sediment transport, Effects on Harbor and structure design.	6
4	**Harbor Infrastructures:**	9

	Ship characteristics. Design of Harbor entrance, channel, turning basin, IS provisions, Breakwaters - function, types, general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories, IS provisions. Repair facilities, wet docks, lift docks, dry docks, gates for graving docks, floating docks, slipways, locks and gates.	
5	**Port Amenities & Operations:** Ferry, Transfer bridges, floating landing stages, transit sheds, warehouses, cold storage, aprons, cargo handling equipment, purpose and general description: stack area, single point mooring, IS provisions	6
6	**Navigational Aids:** Channel and entrance demarcation, buoys, beacons, light house electronic communication devices.	4
7	**Seaport Maintenance**: Costal protection-purpose and devices, sea wall protection-sea wall revetment, bulkhead. Dredging, dredgers-types and suitability, usage of dredged materials.	5
8	**Impact analysis**: Economic evaluation of port project, Environmental impacts of port activities.	4
	Total	45

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	**15**	**20**	**20**	**15**	**15**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub.House, Anand
2. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, DhanpatRai& Sons, NewDelhi
3. IS Codes: 4651 (Part I to V), 7314, 9527 (Part I, III, IV, VI), 10020 (Part IV).
4. Alonzo Def. Quinn, Design and Construction of Ports and Marine Structure, McGraw - Hill Book Company, New York

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Course Outcomes: After studying this subject, students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	understand important planning concepts of harbor and ports	30%
CO-2	know important functional components of harbor and ports	30%
CO-3	understand important design concepts of harbor and ports components	40%

Assignments based on:

1. Forecasting of Cargo, Passengers for the Seaport
2. Windrose diagram and wave rose diagram
2. Lay out planning of Seaport
3. Components design of Seaport Infrastructure using IS codes
4. Dredging computation for the seaport area
5. Economic evaluation of the Port
6. Environmental impact analysis of the Port area

Major Equipment: Nil

List of Open Source Software/learning website: www.nptel.iitm.ac.in/courses/