

Branch Name:	Civil Engineering
Program Code:	ET106
Course Name:	Dock, Harbour and Airport Engineering (Program Elective - III)
Course Code:	2ET1060705T
Pre-requisite Course:	Design and Construction and Maintenance of Dock Harbour and Airport Engineering

Course Objective:

1. To give knowledge of design and construction and maintenance of Dock Harbour and Airport Engineering.
2. To know the fundamentals of planning of various marine structures
3. To understand the fundamentals of planning of Airport structures.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	-	4	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
A.	DOCK HARBOUR ENGINEERING		
1	General Introduction & Policy History and development of water transportation at global and national levels, port development policies, classification of harbours including natural and artificial harbours, major ports in India and their administrative setup, along with an introduction to modern concepts such as green ports and smart port development.	3	3
2	Harbour Planning Components of harbour, characteristics of ships, requirements of a good harbour, principles of harbour planning, size and layout of harbours, site selection criteria, and surveys required for harbour planning including hydrographic and geotechnical investigations, along with integration of port planning with hinterland connectivity.	3	7
3	Natural Phenomena Study of wind, waves, tides, and currents including their generation and characteristics, effects of these phenomena on marine structures, sediment transport processes such as littoral drift, silting and erosion, and introduction to the impact of climate change on coastal infrastructure.	3	7
4	Marine Structures General design considerations of marine structures, functions and types of breakwaters and their design principles, wharves, quays, jetties, piers and related structures, mooring systems including dolphins and fenders, along with their suitability and functional design aspects.	6	14
5	Docks and Locks	3	7

	Types and functions of docks including wet docks and tidal basins, design considerations, operation of lock gates and passage systems, dry docks such as graving docks and floating docks, and an overview of port operations and cargo handling mechanisms.		
6	Port Amenities & Navigational Aids Facilities such as transit sheds, warehouses, cold storage, and cargo handling systems, ferry and transfer arrangements, floating landing stages, and navigational aids including buoys, beacons, lighthouses, and modern electronic communication systems for safe navigation.	3	7
7	Harbour Maintenance Coastal protection measures and their importance, dredging operations including purpose, methods, and types of dredgers, disposal of dredged materials, and introduction to sustainable maintenance practices in harbour engineering.	2	5
B.	AIRPORT ENGINEERING		
8	General Introduction to Airport History and development of air transport, classification of airports and aerodromes as per ICAO, characteristics of aircraft affecting design, airport authorities, and regulatory framework governing air transport systems.	2	5
9	Airport Planning Principles of airport planning including site selection based on ICAO and FAA recommendations, regional planning concepts, airport layout planning, estimation of future air traffic, zoning laws, environmental considerations, and requirements of an ideal airport.	5	10
10	Runway Design Factors affecting runway orientation using wind rose diagrams, runway length determination and corrections, runway configurations, geometric design elements, runway markings, and cross-sectional features.	4	10
11	Taxiway & Apron Design Design and layout of taxiways including geometric standards, exit taxiways, holding bays, turnaround facilities, planning of aprons including aircraft parking systems, and basic considerations for hangar and fuel storage areas.	3	10
12	Terminal Area Design Components of terminal area, functional requirements of terminal buildings, space and circulation planning, passenger flow management, and design of vehicular parking and access systems.	2	5
13	Grading & Drainage Importance of airport grading for operational safety, objectives of airport drainage, surface and subsurface drainage systems, and special considerations for effective drainage design in airfields.	2	5
14	Air Traffic Control & Visual Aids Objectives and functions of air traffic control systems, control networks, visual aids including markings and lighting, landing guidance systems, and introduction to instrument landing systems.	2	5

CO1 (L3 – Apply)

Apply principles of harbour planning and airport planning for selection, layout, and functional design of infrastructure systems.

CO2 (L4 – Analyze)

Analyze the impact of coastal phenomena (waves, tides, sediment transport) on the design and performance of marine structures.

CO3 (L3 – Apply)

Apply design concepts of runways, taxiways, and terminal areas considering operational and safety requirements.

CO4 (L4 – Analyze)

Analyze the functional requirements and operational systems of docks, ports, and airports including cargo handling and air traffic control.

CO5 (L5 – Evaluate)

Evaluate suitability of different marine structures, airport layouts, and maintenance techniques under varying environmental and operational conditions.

CO6 (L3 – Apply)

Apply sustainable and modern engineering practices in harbour and airport development including climate resilience and smart infrastructure concepts.

Reference Books:

1. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub.House, Anand
2. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros.,Roorkee
3. Airport Engineering, Charotar Publishing House Pvt. Ltd, Anand
4. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi
5. Airport Engineering, Charotar Publishing House Pvt. Ltd, Anand

List of Open-Source Software/learning website:

1. NPTEL (<https://nptel.ac.in/>)
 - o Courses on Docs Hrbour and Airport Enhineering

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Apply principles of harbour planning and airport planning for selection, layout, and functional design of infrastructure systems.	L-3
CLO2	Analyze the impact of coastal phenomena (waves, tides, sediment transport) on the design and performance of marine structures.	L-4
CLO3	Apply design concepts of runways, taxiways, and terminal areas considering operational and safety requirements	L-3
CLO4	Analyze the functional requirements and operational systems of docks, ports, and airports including cargo handling and air traffic control.	L-4
CLO5	Evaluate suitability of different marine structures, airport layouts, and maintenance techniques under varying environmental and operational conditions.	L-5

CLO6	Apply sustainable and modern engineering practices in harbour and airport development including climate resilience and smart infrastructure concepts.	L-3
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L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)					
Course Learning Outcomes	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6
CLO1	H	M	H		M	L	M					L	H	H		M	M	
CLO2	H	H	M	M	M	L	M					L	H	M	M	M	M	
CLO3	H	M	H		M	L	M					L	H	H		M	M	
CLO4	H	H	M	M	M	L	M					L	H	M	M	M	M	
CLO5	H	H	H	M	M	M	H	L			L	M	H	H	M	M	H	L
CLO6	H	M	H		M	M	H	M			L	M	H	H		M	H	L

H: High, M: Medium, L: Low