

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: CIVIL ENGINEERING
SUBJECT NAME: HARBOUR AND AIRPORT ENGINEERING
SUBJECT CODE: 2180602
B.E. 8th SEMESTER

Type of course: Departmental Elective III

Prerequisite: NIL

Rationale: Harbour and Airports are important infrastructure for economic growth of any country. It requires large scale planning, design and construction. It requires huge amount of investment. Precise engineering skill is required for the planning, design and construction and maintenance of Harbour and Airport engineering. The subject covers the fundamental knowledge of various important elements of Harbour and Airport Engineering. It includes the planning, design and construction techniques used in the Harbour and Airports.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		ESE (V)		PA (I)		
PA	ALA	ESE		OEP						
3	1	0	4	70	20	10	30	0	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
A	HARBOUR ENGINEERING		
1	General: History of water transportation at world level and at national level development and policy, classification of harbours, natural and artificial. Major ports in India, administrative set up.	1	3%
2	Harbour Planning: Harbour components, ship characteristics, characteristics of good harbour and principles of harbour planning, size of harbour, site selection criteria and layout of harbours. Surveys to be carried out for harbor planning.	3	7%
3	Natural Phenomena: Wind, waves, tides formation and currents phenomena, their generation characteristics and effects on marine structures, silting, erosion and littoral drift.	3	7%
4	Marine Structures: General design aspects, breakwaters - function, types general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories – function, types, suitability, design and construction features.	9	15%
5	Docks and Locks: Tidal basin, wet docks-purpose, design consideration, operation of lock gates and passage, repair docks - graving docks, floating docks.	3	7%

6	Port Amenities and Navigational Aids: Ferry, transfer bridges, floating landing stages, transit sheds, warehouses, cold storage, aprons, cargo handling equipments, purpose and general description, Channel and entrance demarcation, buoys, beacons, light house electronic communication devices.	3	7%
7	Harbour Maintenance: Costal protection-purpose and devices, dredging, purpose, methods, dredgers-types, suitability, disposal of dredged materials .mechanical and hydraulic dredgers.	2	5%
B	AIRPORT ENGINEERING		
1	General: History, development, policy of air transport, aircrafts, aerodromes, airtransport authorities, air transport activities, air crafts and its characteristics, airport classifications as per ICAO.	2	5%
2	Airport Planning : Regional planning-concepts and advantages, location and planning of airport as per ICAO and F.A.A.recommendations, airport Elements -airfield, terminal area, obstructions, approach zone,zoning laws, airport capacity, airport size and site selection, estimation of future air traffic, development of new airport, requirements of an ideal airport layout.	6	10%
3	Run Way Design: Wind rose and orientation of runway ,wind coverage and crosswind component, factors affecting runway length, basic runway length, and corrections to runway length, runway geometrics and runway patterns (configurations).Runway marking, threshold limits cross section of runway	5	10%
4	Taxiway Design: Controlling factors, taxiway geometric elements, layout, exit taxiway, location and geometrics, holding apron, turnaround facility. Aprons -locations, size, gate positions, aircraft parking configurations and parking systems ,hanger-site selection, planning and design considerations, Fuel storage area, blast pads . wind direction indicator	3	10%
5	Terminal Area Design: Terminal area elements and requirements, terminal building functions, space requirements, location planning concepts, vehicular parking area and Circulation network. passenger requirements at terminal building	4	5%
6	Grading and Drainage : Airport grading-importance - operations, airport drainage aims,functions, special characteristics, basic requirements, surface and subsurface drainage systems.	2	5%
7	Air Traffic Control and Visual Aids: Air traffic control-objectives, control system,control network-visual aids-landing information system, airport markings and lighting.	2	5%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	40	30	0	0	0

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. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros.,Roorkee
2. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi
3. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub.House, Anand
4. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, DhanpatRai& Sons, NewDelhi
5. Airport Engineering, Charotar Publishing House Pvt. Ltd, Anand

Course Outcome:

After learning the course the students should be able to:

- 1) To understand the various elements of Harbour and Airport
- 2) To understand the fundamentals of planning and design of various marine structures
- 3) To make the students aware about the operations in Harbour
- 4) To give knowledge of maintenance techniques at Harbour
- 5) To understand the fundamentals of planning and design of Airport structures.
- 6) To make students aware of design of runway and taxiways at Airport
- 7) To make students aware of the operations at Airport

Technical Visit:

- 1) The visit of any harbour and port structure should be carried out to understand the various structures, its construction and operations.
- 2) The visit of Airport site should be carried out to understand the various structures, its construction and operations.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.