

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII EXAMINATION – SUMMER 2025

Subject Code:3174022

Date:27-05-2025

Subject Name:Airport and Seaport Engineering

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- | | MARKS |
|--|--------------|
| Q.1 (a) Define: Natural harbour, Wet dock, Free port. | 03 |
| (b) Draw the typical layout of semi-natural harbour with port and show its components. Describe their functions. | 04 |
| (c) Compute the corrected runway length for: Runway length at sea-level, std. atmospheric pressure, temperature and zero gradient = 1750 m, Site elevation = 510 m from MSL, ART = 20° C, effective gradient = 0.15 % | 07 |
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Q.2 (a) Define: Empty operating weight of an aircraft, Minimum circling radius of an aircraft, Supersonic speed. | 03 |
| (b) Draw the typical layout of airport and state function of the components. | 04 |
| (c) Design the dimensions of a general cargo berth for 3 ships, each on one side of a wharf in series, as per the IS provisions. Assume LOA = 260 m, and beam = 25 m of the design ship. Draw the scaled sketch and show all components. | 07 |
| OR | |
| (c) Estimate the bulk cargo for the year 2027 with the help of Incremental Increase Method using the following data. If the design ship has 50,000 Ton DWT capacity, then how many ships may come per day? Consider effective working days are 350 per year. | 07 |

Year	Bulk Cargo DWT (Million Tonne)
2013	22
2014	25
2015	29
2016	34
2017	41
2018	48
2019	56
2020	65
2021	70
2022	80

- Q.3** (a) Define: Spring tide, Break water, Wharf. **03**
 (b) Draw the sketches of typical ship and show its dimensions and components. Also, briefly describe these components. **04**
 (c) Draw the Type-I Wind-rose diagram from the given data and suggest the direction for the runway orientation: **07**

Direction	Duration %	Direction	Duration %
N	4.3	S	6.5
NNE	6.5	SSW	14.6
NE	9.8	SW	11.7
ENE	3.6	WSW	8.1
E	1.6	W	6.5
ESE	1.9	WNW	5.6
SE	2.5	NW	5.8
SSE	1.7	NNW	3.3

OR

- Q.3** (a) Define: Windrose diagram, Wind coverage, ART. **03**
 (b) Draw the detailed sketch of a typical aircraft and show its components. Also, briefly describe functions of three controls. **04**
 (c) If length of design vessel is 300 m and beam is 30 m, determine following as per the IS provisions: (i) Stopping distance in the entrance channel when vessel is fully loaded, (ii) Bottom width of 2 lane channel-draw a sketch, (iii) Diameter of Turning basin without tug assistance, (iv) Minimum width of harbour entrance. **07**

- Q.4** (a) What are the factors affecting in planning of layout of taxiways? **03**
 (b) Show the components in a detailed C/S sketch of typical Runway and Taxiway. **04**
 (c) Describe with sketches: Littoral drift, Graving dock. **07**

OR

- Q.4** (a) Define: NRT, DWT, Liner ship. **03**
 (b) Briefly explain with sketch: Lock gate. **04**
 (c) Determine the (i) Radius of central curve, (ii) Length of entrance curve, (iii) Stopping distance, for the Exit Taxiway joining a runway and a parallel main taxiway. Take turn off speed of an aircraft is 90 kmph, coefficient of friction between tire and pavement is $f = 0.13$, coefficient $C = 0.39$, and deceleration rate = 1 m/sec^2 . **07**

- Q.5** (a) Briefly discuss design aspects of Dock wall. **03**
 (b) Briefly explain with sketch "Bucket Ladder Dredger". **04**
 (c) Describe with sketches: Taxiway lightings, Airport drainage. **07**

OR

- Q.5** (a) Briefly discuss Air Traffic Control Network. **03**
 (b) Briefly describe with sketch Runway markings. **04**
 (c) Describe with sketches: Buoys, Lighthouse. **07**
