Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170619 Date:19-12-2023

Subject Name: Railway and Airport Engineering

Time: 10:30 AM TO 01:00 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 permanent way and elaborate the requirements of ideal permanent way.	**03**
	(b)	Demonstrate various types of stresses induced in a rail section. Explain briefly how these are evaluated.	**04**
	(c)	Discuss the role of Indian Railways in the social and economic development of the country. Briefly mention the strengths and weaknesses of the Indian Railways.	**07**
Q.2	**(a)**	Explain the functions of fish plates and fish bolts.	**03**
	(b)	If the ruling gradient is 1 in 250 on a particular section of B.G. and at the same time a curve of 4° is situated on this ruling gradient, what should be the allowable ruling gradient?	**04**
	(c)	Calculate the superelevation and the maximum permissible speed for a 2° BG transitioned curve on a high-speed route with a maximum sanctioned speed of 110 km/h. The speed for calculating the equilibrium superelevation as decided by the chief engineer is 80 km/h and the booked speed of goods trains is 50 km/h.	**07**
		OR	
	(c)	Derive the expressions for equilibrium superelevation.	**07**
Q.3	**(a)**	Explain different types of station yards.	**03**
	(b)	Classify and briefly explain types of railway switch.	**04**
	(c)	Outline different facility requirements of a railway station. Classify the railway stations. Draw a neat sketch of layout of any one type of station.	**07**
		OR	
Q.3	**(a)**	Summarize the necessity of marshalling yards. Describe the layout of a typical marshalling yard.	**03**
	(b)	Describe the main constituents of a crossing. Draw neat sketches to show a point rail and a splice rail.	**04**
	(c)	Draw a neat sketch of a left-hand turn out and name its various components. Describe any one method of designing a turnout and give the detailed procedure for calculating the lead.	**07**
Q.4	**(a)**	Classify the airport as per ICAO.	**03**
	(b)	Describe the airport terminal building with help of the sketch.	**04**
	(c)	Describe various components of air traffic control network.	**07**
		OR	

Q.4	**(a)**	Explain the aircraft dimensions height, wingspan and length using the necessary sketch.	**03**
	(b)	Discuss factors that affect the necessary size of an airport.	**04**
	(c)	State the purposes for installing the visual aids at the airport and the requirements of pilots for the visual aids.	**07**
Q.5	**(a)**	Discuss the points to be considered in the geometric design of a runway	**03**
	(b)	Outline the functions of taxiway in airports. Draw cross sections of taxiway showing all components.	**04**
	(c)	At an airport site at sea-level with standard atmospheric conditions, the runway lengths required for take-off and landing are 2000 m and 2400 m respectively. The proposed airport is situated at an altitude of 150 m. If the airport reference temperature is 25°C and if the effective runway gradient is 0.35 per cent, calculate the length of runway to be provided.	**07**

OR

Q.5	**(a)**	Sketch various orientation of runway with label	**03**
	(b)	Explain the basic requirements and objectives of surface drainage.	**04**
	(c)	Design an exit runway joining a runway and a parallel main taxiway. The total angle of turn is 35° and the maximum turn-off speed is 80 kmph. Radius of entrance curve = 731m, Runway width = 45m, Taxiway width = 22.5m. Suggest the maximum separation clearance.	**07**

****