Total number of printed pages: **Civil Engineering (UG)/VI/UCE602**

2024

TRANSPORTATION ENGINEERING II

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Draw the line diagram of an Aeroplane and mention its key components.	5
	b)	Draw the sketches for different aircraft parking systems.	5
	c)	For a 1 km long BG railway track, ensuring a sleeper density of (N + 6), Determine the number of following components required: (a) Rails (b) Fish plates (c) Fish bolts (d) Sleepers (e) Bearing plates (f) Pandrol clips. Also determine the minimum depth of ballast assuming width of sleeper as 25cm.	6+4
2.	a)	Draw the cross section of a super elevated railway track and mention its components	5
	b)	The following data refers to the proposed longitudinal section of runway. End to end of runway — Gradient 0 to 5 chains — +1.0% 5 to 15 chains — -1.0% 15 to 30 chains — +0.8% 30 to 40 chains — +0.2% If one metric chain is of 20 m length, determine the effective gradient of runway.	5
	c)	The length of runway under standard conditions is 1620 m. The airport site has an elevation of 270 m. Its reference temperature is 32.9°C. If the runway is to be constructed with an effective gradient of 0.2 percent, determine the corrected runway length.	10
3.	a)	What would be the gradient for a B.G. track when the grade resistance together with curve resistance due to a curve of 3° shall be equal to the resistance due to a ruling gradient of 1 in 200?	5

	b)	A locomotive on M.G. track has three pairs of driving wheels each carrying 20 tonnes. What maximum load can it pull on level track with curvature of 2° at 50 km per hour?	5
	c)	Find out the hauling power of locomotive having four pairs of driving wheels, carrying an axle load of 28.42 tonnes each, on a B.G. track with a ruling gradient of 1 in 200, and maximum curvature of 3°, at a speed of 48.3 kmph.	10
4.	a)	Draw the layout of an airport with high traffic volume and mention its components.	5
	b)	If the wheel base of a moving vehicle is 4.12 m. The degree of the curve is 5°, the diameter of wheels is 1 m and flanges project 3.2 cm below the top of rail. Determine the extra width required on curve.	5
	c)	Determine the maximum permissible speed on a B.G. track based on following data: Equilibrium speed = 50 kmph Degree of curve = 5° Length of transition curve = 40 m	10
5.	a)	What are the assumptions made in arriving at basic runway length?	5
	b)	Draw the sketches for different types of rail joints.	5
	c)	Derive the expression for super elevation on a railway track.	10
6.	Calculate the maximum permissible train load that can be pulled by a locomotive having four pairs of driving wheels carrying an axle load of 24 tonnes each. The train has to run at a speed of 80 kmph on a straight level track (B.G.). Also calculate the reduction in speed, if train has to climb a gradient of 1 in 200. If train climbs the above gradient with a 2° curve, then what would be reduction in speed?		10+5+5