Total number of printed pages: **Civil Engineering (UG)/V/UCE502**

2024

TRANSPORTATION ENGINEERING I

Full Marks: 100

Time: Three hours

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

*Answer **any five** questions.*

1.	a)	Calculate the SSD on a highway at a descending gradient of 2% for a design speed of 80 kmph. Assume other data as per IRC recommendations.	5
	b)	Design the rate of superelevation for a horizontal highway curve of radius 500 m and speed 100 kmph.	5
	c)	Explain the characteristics of road transportation.	10
2.	a)	What are the importance of transportation?	5
	b)	What are the recommendations of Jayakar committee report?	5
	c)	A national highway passing through a plain terrain has a horizontal curve of radius equal to the ruling minimum radius. If the design speed is 100 kmph, Calculate Absolute minimum sight distance, Ruling minimum radius, Superelevation, Extra widening and length of transition curve. Assume necessary data suitably.	10
3.	a)	Calculate the extra widening required for a pavement of width 7 m on a horizontal curve of radius 200 m if the longest wheel base of vehicle expected on the road is 6.5 m. Design speed is 65 kmph.	5
	b)	What are the purposes of providing transition curve?	5
	c)	On a two-way traffic road, the speed of overtaking and overtaken vehicles are 65 and 40 kmph respectively. If the average acceleration is 0.92 m/s^2. Determine the overtaking sight distance required indicating the details of overtaking operation. Also sketch the overtaking zones.	10
4.	a)	What are the purposes of widening pavement on horizontal highway curves?	5
	b)	An ascending gradient of 1 in 50 meets a descending gradient of 1 in 80. Determine the length of the summit curve to provide ISD for design speed of 80 kmph. Assume all other data.	5

	c)	What is origin and destination study. Explain its significance. Explain various methods adopted for the study.	10
5.	a)	Derive expression for SSD.	5
	b)	Give the values for width of carriageway for different classes of roads	5
	c)	Define camber. What are the purposes of proving camber? What are different shapes of camber?	10
6.	a)	What are the desirable properties of road aggregates used in highway construction?	10
	b)	A four lane NH passes through a built-up area on a plain terrain which receives scanty annual rainfall. If there is a horizontal curve of radius 200 m (i) Design the total width of road on horizontal curve. (ii) Design the length of horizontal transition curve.	5+5