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

2022

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)	Explain the characteristics of road transportation.	5
	b)	Explain the major road development projects of the 21st century.	5
	c)	The area of a certain district in India is 13,400 sq.km and there are 12 towns as per 1981 census. Determine the lengths of different categories of roads to be provided in this district by the year 2001.	10
2.	a)	Calculate the SSD on a highway at a descending gradient of 2% for a design speed of 80 kmph. Assume all other data suitably.	5
	b)	Give the values for width of carriageway for different classes of roads.	5
	c)	Explain the factors affecting skid resistance of pavement.	10
3.	a)	Derive the expression for SSD.	5
	b)	Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from the opposite directions at 90 and 60 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.35 in both cases.	5
	c)	Briefly explain the salient features of following road construction methods i) Roman Roads ii) Tresaguet construction iii) Telford construction iv) Macadam construction	10
4.	a)	The design speed of a highway is 80 kmph. There exists a horizontal curve of radius 200 m. Design the rate of superelevation.	5
	b)	Draw the cross section of NH showing all the details.	5
	c)	Briefly explain the following	10

		i) Central Road Fund ii) Indian Road Congress iii) 20 year road development plans iv) Camber	
5.	a)	Explain different types of roads as per Nagpur road plan.	5
	b)	Explain the effect of centrifugal force on horizontal curves.	5
	c)	Calculate the OSD for a design speed of 100 kmph. Assume all other data suitably. Calculate the length of overtaking zones. Sketch the overtaking zones showing the position of signposts.	10
6.	a)	What are the purposes of extra widening on horizontal curves?	5
	b)	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
	c)	A NH passing through rolling terrain in heavy rainfall area has a horizontal curve of radius 500m. Design the length of transition curve assuming suitable data.	10