U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**

Branch: Civil Engineering **Duration: 3 hrs.**

Course Code: 22CV7PEGDR **Max Marks: 100**

Course: Geometric Design of Roads

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Discuss the factors affecting the Geometric Design of Highways.	*CO1*	*PO 1*	**8**
	b)		Discuss various factors controlling PCU for different design purposes.	*CO1*	*PO1*	**6**
	c)		Explain the different types of camber with neat sketches.	*CO1*	*PO1*	**6**
			OR			
2	a)		Discuss the factors governing the Right of Way.	*CO1*	*PO1*	**7**
	b)		Draw typical cross sections of i) Village road on Embankment ii) Two lane city road in built up area	*CO1*	*PO1*	**6**
	c)		Write Short notes on i) Factors affecting skid resistance ii) Design of Road humps	*CO1*	*PO1*	**7**
			UNIT - II			
3	a)		Explain briefly the restrictions to Sight distance with neat sketches.	*CO1*	*PO1*	**10**
	b)		Calculate the passing sight distance if the design speeds of overtaking and overtaken vehicles are 70 and 50 kmph respectively. Assume suitable data as per IRC standards if the acceleration of overtaking vehicle is given as 2.5 kmph/second.	*CO1*	*PO2*	**10**
			OR			
4	a)		Determine the values of Head light sight distance and Intermediate sight distance for a highway with a design speed of 65 kmph. Assume suitably all the required data.	*CO1*	*PO2*	**6**
	b)		Determine the minimum sight distance to avoid a head on collision of two cars approaching from the opposite directions at	*CO1*	*PO2*	**8**

			90 kmph and 60 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction as 0.7 and a brake efficiency of 50 percent in either case.			
		c)	Discuss briefly about analysis of stopping distance.	*CO1*	*PO1*	**6**
			UNIT - III			
	5	a)	Discuss briefly about the different methods of attainment of superelevation in the field.	*CO2*	*PO1*	**10**
		b)	Calculate the length of transition curve and the shift using the following data: Design speed = 65 kmph, Radius of circular curve = 220m Allowable rate of introduction of superelevation (pavement rotated about the centre line) = 1 in 150 Pavement width including extra widening = 7.5m	*CO2*	*PO2*	**10**
			OR			
	6	a)	Explain briefly about the i) Curve Resistance ii) Cant	*CO2*	*PO1*	**8**
		b)	A Highway consists of horizontal curve of radius 400m and length 200m. The Distance between the centre lines of the road and the inner lane is 1.9 m. Compute the set back distances required from the centre line on the inner side of the curve so as to provide for: i) Non-passing sight distance of 90 m ii) Passing sight distance of 300m	*CO2*	*PO2*	**12**
			UNIT - IV			
	7	a)	Explain briefly different types of gradients for roads.	*CO2*	*PO1*	**10**
		b)	Calculate the length of summit curve for a design speed of 80 kmph so as to have an SSD equal to the IRC standards. The curved road has an ascending gradient of 3% meeting a descending gradient of 5%.	*CO2*	*PO2*	**10**
			OR			
	8	a)	Explain briefly about i) Design criteria adopted for planning hair pin bends ii) Grade compensation on horizontal curves	*CO2*	*PO1*	**10**
		b)	A valley curve is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill both comfort condition and head light sight distance requirements for a design speed of 80 kmph.	*CO2*	*PO3*	**10**
			UNIT - V			
	9	a)	Discuss about the factors considered for Design of Rotary intersections.	*CO3*	*PO1*	**8**

		b)	Discuss about (i) advantages and disadvantages of Grade separated intersections. (ii) Types of Interchanges	*CO3*	*PO1*	**12**
			OR			
	10	a)	Design a Rotary Intersection for the traffic flow in an urban section at the intersection of two highways in the design year are given below in Table 10a.	*CO3*	*PO3*	**8**
		b)	Discuss briefly about Channelised Intersection and Unchannelised Intersection with neat sketches.	*CO3*	*PO1*	**8**
		c)	Explain briefly the specifications considered in toll design.	*CO3*	*PO1*	**4**

Table 10 a

Approach	Left Turning			Straight ahead			Right Turning		
	Cars	**HCV**	**2-Wheelers**	**Cars**	**HCV**	**2-Wheelers**	**Cars**	**HCV**	**2-Wheelers**
North	200	50	100	250	100	150	150	50	80
East	180	60	80	220	50	120	200	40	120
South	250	80	100	150	50	90	160	70	90
West	220	50	120	180	60	100	250	60	100

******