U.S.N.										

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

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 21CV7PEGDR **Max Marks: 100**
Course: Geometric Design of Roads **Date: 28.02.2023**

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

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

1	a)	Discuss the factors affecting the Geometric Design of Highways.	**08**
	b)	Discuss various factors controlling PCU for different design purposes.	**06**
	c)	Explain briefly about Pavement unevenness and Light reflecting characteristics.	**06**

UNIT - II

2	a)	Explain briefly the restrictions to Sight distance with neat sketches.	**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.	**10**

UNIT - III

3	a)	Discuss briefly about the different methods of attainment of superelevation in the field.	**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	**10**

OR

4	a)	Explain briefly about i) Curve Resistance ii) Cant	**08**
	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	**12**

UNIT - IV

5	a)	Explain briefly about different types of gradients.	**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%.	**10**

OR

6	a)	Explain briefly about i) Types of valley curves ii) Grade compensation on horizontal curves	**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.	**10**

UNIT - V

7	a)	Discuss about the factors considered for the design of Rotary intersections.	**08**
	b)	Discuss about (i) Advantages and disadvantages of Grade separated intersections (ii) Types of Traffic signs	**12**

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