USN | | | | | | | | | | |

10CV755

Seventh Semester B.E. Degree Examination, July/August 2021
Highway Geometric Design

Time: 3 hrs. Max. Marks:100

Note: **1.** ***Answer any FIVE full questions.***
2. ***Assume missing data suitably.***

1 a. Describe the factors controlling geometric design of highways. State the IRC and AASHTO values wherever applicable. **(12 Marks)**

b. Explain PCU with its importance in geometric design. Give typical values based on IRC guidelines. **(08 Marks)**

2 a. List the factors affecting Right of Way (RoW). **(05 Marks)**

b. A vehicle travelling at 50 kmph was stopped after 2 seconds. Determine the Skid Resistance. **(05 Marks)**

c. With a neat sketch, explain Design of Road humps as per IRC specifications. **(10 Marks)**

3 a. Derive an expression for calculating the Overtaking Sight Distance (OSD) on a highway. **(12 Marks)**

b. Calculate Minimum Sight distance for a speed 100 kmph as per IRC and AASHTO. **(08 Marks)**

4 a. Explain the effect of Centrifugal Force on Horizontal curve having no super elevation. **(08 Marks)**

b. A National Highway 2 lane road passing through a rolling terrain has a Horizontal Curve of radius equal to ruling minimum radius.
(i) Design all geometric features of this curve, assuming suitable data.
(ii) Specify the minimum set back distance, so that SSD is available, assuming length of circular curve greater than the sight distance. **(12 Marks)**

5 a. Explain Design Considerations for the length of Summit and Valley curves. **(12 Marks)**

b. An ascending gradient of 1 in 50 meets a descending gradient of 1 in 80. Determine length of Summit curve to provide Intermediate Sight Distance for a design speed of 80 kmph. **(08 Marks)**

6 a. Differentiate between unchannelized and channelized intersection. **(10 Marks)**

b. Write short notes on: (i) Gap in medians at junctions (ii) Median opening **(10 Marks)**

7 a. With a neat sketch, mention advantages and disadvantages of clover leaf interchange. **(08 Marks)**

b. Design the Rotary Intersection for data given below, with suitable assumptions. The highway Intersect at right angles and have a carriage way width of 15 mts. Also draw the diagram of Rotary Designed.

Approach	Left Turning			Straight Ahead			Right Turning		
	Car	CV	TW	Car	CV	TW	Cars	CV	TW
N	200	50	100	250	100	150	150	50	80
E	180	60	80	220	50	120	200	40	120
W	250	80	100	150	50	90	160	70	90
S	220	50	120	180	60	100	250	60	100

CV = Commercial Vehicle TW = Two Wheeler **(12 Marks)**

8 a. Explain significance and requirements of Highway Drainage System. **(10 Marks)**

b. Briefly explain Surface and Sub-surface Drainage. **(10 Marks)**

* * * * *

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.