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10CV755

Seventh Semester B.E. Degree Examination, June/July 2019
Highway Geometric Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Explain the objects of Highway Geometric Design and list all the elements in it. **(10 Marks)**

b. Write a note on Design speed. Mention the IRC recommended values with a neat sketch. **(10 Marks)**

2 a. Explain in detail, the significance of pavement surface characteristics in Highway Geometric Design. Also explain the factors affecting skid resistance. **(08 Marks)**

b. List the various objectives for providing (i) Medians (ii) Kerbs **(06 Marks)**

c. Write a note on Road humps, indicating the design as per IRC standards. **(06 Marks)**

3 a. With a neat sketch, explain the factors affecting safe sight distance at intersections. **(06 Marks)**

b. Calculate the SSD for a vehicle having design speed of 100 kmph on a level road, upgrade of 2% and downgrade of 2%. **(06 Marks)**

c. Explain the importance of overtaking zone? Draw a net sketch, indicating overtaking zones with suitable sign post position. **(08 Marks)**

4 a. Find the total width of a pavement on a horizontal curve for a new National highway to be aligned along a rolling terrain with a ruling minimum radius from the following data: Design speed = 80 kmph, Number of lanes = 2, Normal pavement width = 7 m, Length of wheel base. **(08 Marks)**

b. Calculate the set-back distance on a National highway having a horizontal curve of radius 300m and length 180m. Assume a speed of 80 kmph and coefficient of friction of 0.35. **(06 Marks)**

c. Derive an expression for providing extra widening of pavement on a horizontal curve. **(06 Marks)**

PART – B

5 a. What is critical length of Gradient? Explain. Find the grade compensation for a Radius of 50m if the limiting gradient is 5%. **(06 Marks)**

b. Derive an equation for length of valley curve for (i) Comfort condition (ii) Headlight sight distance when (i) L > SSD (ii) L < SSD. **(08 Marks)**

c. An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 80 kmph so as to have an overtaking sight distance of 470 metres. **(06 Marks)**

6 a. Briefly explain the channelized and unchannelized intersections and their advantages and disadvantages. **(12 Marks)**

b. Write a note on gap in median at junctions. **(08 Marks)**

7 a. Explain briefly the various components of a rotary with neat sketch. What are the different shapes adopted? **(10 Marks)**

b. Draw neat sketches of (i) Diamond crossing (ii) Half cloverleaf and list any two advantages of each. **(10 Marks)**

8 a. What are the requirements of highway drainage system? **(06 Marks)**

b. Write the procedure for design of filter material for subsurface drainage system for road pavements. **(06 Marks)**

c. A longitudinal channel with a trapezoidal cross section is to be constructed in a cut section. The longitudinal slope is 1 in 2500. The soil is clay, with Manning's Rugosity coefficient of 0.024. The maximum allowable velocity is 0.6 m/s. Design the channel for a discharge of 3 cu m/sec. **(08 Marks)**

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