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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 neat 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)
