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10CV755

Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Highway Geometric Design

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Briefly discuss the various design factors to be considered for geometric design of highways. (10 Marks)
- b. Enumerate the concept of PCU in geometric design of Highways. List out the factors governing PCU. Give same typical values as recommended by IRC. (10 Marks)
- 2 a. What is camber? List the functions of camber. Discuss the factors governing the camber. Discuss shapes of camber with the help of neat sketch. (10 Marks)
- b. Write a note on following and mention the IRC standards :
i) Carriage way ii) Right of way. (10 Marks)
- 3 a. With sketches indicate the circumstances in which sight distance is affected, describe how the sight distance required at an uncontrolled intersection is estimated. (10 Marks)
- b. The speed of overtaking and overtakes vehicles are 70kmph and 40kmph, respectively on a two way traffic road. If the acceleration of overtaking vehicles is 0.99 m/sec^2 .
i) Calculate safe overtaking sight distance.
ii) Mention the minimum length of overtaking zone
iii) Draw a neat sketch of overtaking zone and show the position of the sign posts. (10 Marks)
- 4 a. Write note on mechanical widening and psychological widening. (06 Marks)
- b. What is transition curve? Explain types of transition curve. (06 Marks)
- c. Calculate the length of transition curve and the shift using the following data. Design speed of 65 kmph, radius of circular curve = 220m. Allowable rate of introduction of super elevation 1 in 150, pavement is rotated about the centre line and pavement width including extra widening is = 7.5m. (08 Marks)

PART – B

- 5 a. What are the circumstances in which a valley curve is formed? Indicate with sketches. (06 Marks)
- b. Derive the expression for calculating length of valley curve of parabolic shape for comfort condition. (06 Marks)
- c. A vertical summit curve is formed at the intersection of two gradients, +3.0 and -5.0 percent. Design the length of summit curve to provide stopping sight distance for a design speed of 80kmph. Assume data as per IRC. (08 Marks)
- 6 a. Explain the need of grade separated intersection and give advantages and disadvantages of grade separated intersection. (10 Marks)
- b. With a neat sketch, explain channelized intersection also discuss advantages of channelized intersection. (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.



10CV755

- 7 a. Draw a neat diagram of rotary intersection (roundabout) and show the different elements? (10 Marks)
- b. Draw a neat sketch of
- i) Diamond interchange
 - ii) Half clover leaf and explain any two advantages of each. (10 Marks)
- 8 a. With sketches explain the methods of sub surface drainage with respect to
- i) Lowering of water table
 - ii) Control of seepage flow (10 Marks)
- b. A longitudinal channel with a trapezoidal cross section is to be constructed in a cut section. The longitudinal slope is 1 in 2500, soil is clay with Manning's coefficient as 0.024. take discharge of $3\text{m}^3/\text{sec}$ and velocity of flow as 0.6m/s . (10 Marks)

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