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06CV755

Seventh Semester B.E. Degree Examination, May/June 2010
Highway Geometric Design

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting at least TWO questions from each part.*
2. *Assume missing data suitably.*

PART – A

1 a. Explain the factors, which control the geometric features of a highway. **(10 Marks)**

b. Discuss the factors, which control the PCU concept for design of a pavement. **(10 Marks)**

2 a. Mention the various cross-sectional elements to be designed for a pavement and explain them briefly. **(12 Marks)**

b. Design the road hump as per IRC recommendations, with a neat sketch. **(08 Marks)**

3 a. Derive an expression for overtaking right distance to be provided in the geometric design of a road. **(10 Marks)**

b. The speed of overtaking and overtaken vehicles are 70 and 40 kmph respectively on a two way traffic road. If acceleration of overtaking vehicle is 0.99 m/sec^2, find safe OSD, minimum length of overtaking zone. Draw a neat sketch of overtaking zone with details. **(10 Marks)**

4 a. Derive an expression for super elevation to be provided for a two lane pavement, assuming necessary data suitably. **(10 Marks)**

b. 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. Assume necessary data suitably. **(10 Marks)**

PART – B

5 a. Explain the different methods to determine the length of transition curve for a highway. **(12 Marks)**

b. A national highway passing through rolling terrain in heavy rainfall area has a horizontal curve of radius 500 m. Design the length of transition curve. Assume data suitably. **(08 Marks)**

6 a. Explain the different cases of finding the length of summit curve for varying SSD and OSD. **(12 Marks)**

b. An ascending gradient of 1 in 100 and a descending gradient of 1 in 120 meet at a point. Design a summit curve for a speed of 80 kmph so as to have a OSD of 420 m. **(08 Marks)**

7 a. Mention the advantages and disadvantages of a rotary intersection required for a city. **(10 Marks)**

b. Explain a rotary intersection, with a neat sketch, showing the direction of traffic movement. **(10 Marks)**

8 a. List the design steps of surface drainage system for a national highway to be constructed assuming necessary data suitably. **(12 Marks)**

b. The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is 0.9 m^3/sec. Design the cross-section and longitudinal slope of trapezoidal drain assuming the bottom width of trapezoidal section to be 1 m and cross-slope to be 1 vertical to 1.5 horizontal. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02. **(08 Marks)**

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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.