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10CV755

Seventh Semester B.E. Degree Examination, June/July 2018

Highway Geometric Design

Time: 3 hrs.

Max. Marks:100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.**
2. Missing data may be suitably assumed.

PART – A

- 1 a. Explain the role of pavement surface characteristics in highway geometric design. What are the factors affecting friction. (10 Marks)
- b. Calculate the minimum SD required to avoid a head on collision of two cars approaching from opposite directions of 90 kmpH and 60 kmpH coefficient of friction of 0.7 and a brake efficiency of 50 percent in either case. Assume any missing data suitably. (10 Marks)
- 2 a. What is PIEV theory? Explain briefly. (08 Marks)
- b. Calculate the safe overtaking sight distance for a design speed of 96 kmpH. Assume all other data suitably and draw a neat sketch of overtaking zone and show the positions of the sign posts. (12 Marks)
- 3 a. Derive an equation for finding super elevation. (10 Marks)
- b. 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. Assume missing data suitably as per IRC. (10 Marks)
- 4 a. Explain off-tracking. (05 Marks)
- b. What are the objects of providing transition curves? (05 Marks)
- c. A national Highway passing through rolling terrain in heavy rain fall area has a horizontal curve of radius 500 m. Design the length of Transition curve. Assuming suitable data as per IRC. (10 Marks)

PART – B

- 5 a. Explain curve resistance and compensation in gradient on horizontal curves. (10 Marks)
- b. A valley curve is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of the valley to fulfill both comfort condition and head light sight distance requirement for a design speed of 80 kmpH. Assume allowable rate of change of centrifugal acceleration $C = 0.6 \text{ m/sec}^3$. (10 Marks)
- 6 a. What are the objective of channelization? What are the features of channelizing islands? (10 Marks)
- b. What are disadvantages and limitation of unchannelized and channelized intersections? (10 Marks)
- 7 a. What is rotary intersection? List the advantages and disadvantages of a rotary intersection. (10 Marks)
- b. What are guidelines for selecting a rotary type of intersections? (10 Marks)
- 8 a. What are requirements of a good drainage system? Indicate how the filter material is designed for use in sub-surface drainage system. (10 Marks)
- b. Explain with neat sketches, how the subsurface drainage is provided to lower the water table and control seepage flow. (10 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.