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Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
Highway Geometric Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1 a. List and discuss the various design control elements for roads. State the IRC values wherever applicable. (10 Marks)
- b. List the factors affecting friction or skid resistance of a pavement surface. (10 Marks)
- 2 a. Draw the typical cross section of NH and SH passing through areas in banks cutting. (10 Marks)
- b. Explain factors affecting sight distance on a road and also explain PIEV theory briefly. (10 Marks)
- 3 a. Find out OSD required for a design speed of 80 kmph for a 2 lane and 2 way traffic road. Assume $a = 1.6$ kmph/sec. Calculate and draw sketch showing overtaking zone. (10 Marks)
- b. Explain with a neat sketch sight distance criteria at an uncontrolled intersection. (10 Marks)
- 4 a. Derive an equation for finding the super elevation for a curve of radius 'R' having a design speed of V kmph, if the design coefficient of lateral friction is 'f'. Also mention the minimum value of super elevation to be provided. (10 Marks)
- b. Calculate the length of transition curve for a design speed of 80 kmph at a horizontal curve of radius 250m. Assume pavement rotated about inner edge. (10 Marks)

PART – B

- 5 a. Define the different types of gradient and also state their IRC values. (10 Marks)
- b. Design a valley curve formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfill, both comfort condition and head light sight distance requirements for a design speed of 80 kmph. The rate of change of centrifugal acceleration is $C = 2.6\text{m/sec}^3$. (10 Marks)
- 6 a. With neat sketches explain unchannelized and channelized intersection. What are the advantages and limitations of such intersections? (10 Marks)
- b. List the design steps involved in designing a rotary intersection. (10 Marks)
- 7 a. List the importance of a highway drainage system. (10 Marks)
- b. Bring out the design steps involved in filter material of a sub-surface drainage. (10 Marks)
- 8 Write short notes on any four:
 - a. Types of interchange.
 - b. Design standards for hilly road.
 - c. Design of road humps as per least IRC provisions.
 - d. Passenger car unit.
 - e. Right of way.
 - f. Gap in median. (20 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.