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10CV755

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020
Highway Geometric Design

Time: 3 hrs. Max. Marks:100

Note: ***1. Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Assume suitable data wherever necessary.

PART – A

1 a. Explain design speed and PUC with IRC specifications. **(10 Marks)**

b. Draw the cross section of a road in embankment and show the cross-sectional elements. **(05 Marks)**

c. What is the importance of friction as a highway surface characteristics? Which are the factors affecting the friction? **(05 Marks)**

2 a. What are the objectives of providing the 'camber'? which are the various methods of providing the camber? **(05 Marks)**

b. A parabolic camber for 7m wide high type bituminous surface pavement is to be constructed in an area of heavy rainfall. Given the dimension sketch of the 'camber board'. **(08 Marks)**

c. Explain with a neat sketch 'Right-of-way' with IRC recommended values. **(07 Marks)**

3 a. Explain PIEV-theory with a sketch. **(05 Marks)**

b. Derive an expression for OSD for a two lane two way traffic with usual notations and assumptions. **(10 Marks)**

c. Find the safe OSD for a highway having a design speed of 100kmph. Assume all data suitably. **(05 Marks)**

4 a. Explain the methods of attaining supper elevation at a horizontal curve. **(06 Marks)**

b. What are the objectives of providing mechanical widening? Derive an expression for mechanical widening at a curve with usual notations. **(06 Marks)**

c. A national highway passing through a rolling terrain in a heavy rainfall area has a horizontal curve of radius 450m. Design the length of transition curve assuming suitable data. **(08 Marks)**

PART – B

5 a. Which are the different gradients adopted on a highway? Give the specifications as per IRC. Why it is desirable to have some minimum gradients on roads. **(06 Marks)**

b. Derive an expression for length of valley curve for head light sight distance when the total length of valley curve 'L' is greater than stopping sight distance. **(06 Marks)**

c. A vertical summit curve is formed on the intersection of two gradients. +3 and –3 percent. Design the length of summit curve to provide sight distance for a design speed of 100 kmph. Assume suitable data. **(08 Marks)**

6 a. Differentiate channelized and unchannelized intersections with sketches. **(08 Marks)**

b. What are the advantages of grade separated intersections? **(04 Marks)**

c. Write short notes on the following with sketches (any two) :
i) Median opening ii) Gap in median at junction iii) Channelizing island. **(08 Marks)**

7 a. Draw a neat sketch of clover-leaf junction mention its advantages and disadvantages. (08 Marks)

b. What are the limitations of rotary intersections? (04 Marks)

c. Complete the network of traffic negotiating a rotary and find the total number of weaving traffic on the different weaving sections. (08 Marks)

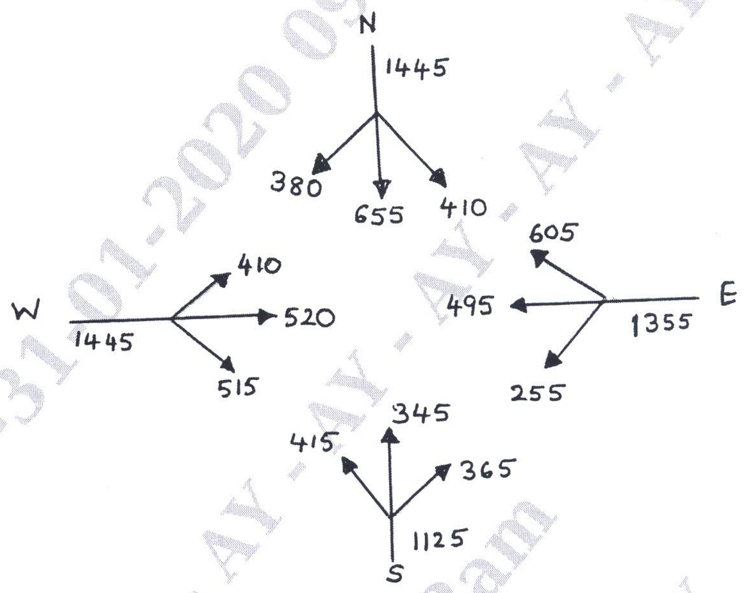

Fig.7(c)

8 a. What are the requirements of a highway drainage system? (05 Marks)

b. Explain the methods to control capillary rise in the case of road embankment. (07 Marks)

c. Write the design steps for the design of longitudinal drains of a road to drain off the surface water. (08 Marks)

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