[Total No. of Questions - 9] [Total No. of Printed Pages - 3] (2125)

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B. Tech 5th Semester Examination

Transportation Engineering-I (NS)

CE-315

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) There are Nine (9) questions in five parts of this paper. All questions carry equal marks.

(ii) Attempt FIVE (5) questions carrying at-least one from each part. Question nine is compulsory.

(iii) Assume any missing data.

SECTION - A

1. (a) What are the different Road Development Plans in India? Discuss them in detail. (10)

   (b) Explain the necessity and objectives of highway planning? (10)

2. (a) What are planning surveys? Explain the objective of each survey with regards to road planning. (10)

   (b) Explain the basic requirements of an ideal highway alignment. Discuss the various factors controlling it. (10)

SECTION - B

3. (a) Derive an expression for finding the extra widening required on horizontal curve. (10)

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   (b) The stopping sight distance required for a highway is 80m. Find the required set back distance from center line of a circular curve of radius 300 m assuming the length of the curve is greater than the sight distance. (10)

4. (a) What are the objectives and uses of traffic volume study? Explain the various methods of traffic volume count. (10)

   (b) Explain traffic control devices. Differentiate between active and passive traffic control devices with the help of examples. (10)

SECTION - C

5. (a) Design the pavement for construction of a new two lane carriageway for design life 15 years using IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and growth rate is 5%. Vehicle damage factor based on axle load survey = 2.5 standard axle per commercial vehicle. Design CBR of subgrade soil = 4%. (10)

   (b) Find the spacing between the contraction joints for a 3.5 m slab width having a thickness of 22 cm for (a) plain concrete slab (b) R.C.C. slab. The allowable tensile stress values in concrete and steel are 0.8 and 1400 kg/cm^2, coefficient of friction is 1.50. (10)

6. (a) What are the desirable properties of the bitumen mixes? What are the steps on bituminous mix design? Discuss briefly. (10)

   (b) Explain the CBR and the test procedure for the laboratory and field tests. How are the results of the test obtained and interpreted? (10)

SECTION - D

7. (a) How is soil cement base course constructed? Give details. (10)

   (b) List out the different methods of road construction. Discuss their advantages and limitations. (10)

8. What are the factors that contribute to select the alignment of roads in plains as well as hilly terrain? How do geological conditions affect the location? (20)

SECTION - E

9. (a) Briefly explain IRC and CRRI and their role in highway development.

   (b) Enlist the various road network patterns.

   (c) Determine the length of transition in a horizontal alignment for a speed of 96 kmph and radius of curve as 345 m.

   (d) Discuss the necessity of providing super elevation on roads.

   (e) Calculate stopping sight distance for a road for which the design speeds is 50 kmph. The brake efficiency is 40 % and reaction time of the driver is 2.5 seconds.

   (f) Discuss relative merits and demerits of parallel and angle type of kerb parking.

   (g) List the various tests conducted on aggregates to be used for highways.

   (h) Briefly discuss different types of drains used in hill roads.

   (i) Briefly explain mud pumping and bleeding.

   (j) Explain briefly Plate Load Test. (2x10=20)