10CV755

Seventh Semester B.E. Degree Examination, Aug./Sept. 2020
Highway Geometric Design

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1   a. What are the design control criteria, and explain in design applications of traffic volume measurement units with at least one example.   **(12 Marks)**
    b. Define Unevenness Index (UI) and explain criteria for classifying road conditions as per IRC.   **(08 Marks)**

2   a. What are the factors affecting skid resistance? List important four factors and implications on slip on skid.   **(10 Marks)**
    b. A vehicle moving at 40Kmph speed was stopped by applying the brake and the length of skid mark was 13.5m. If the average skid resistance of the pavement is known to be 0.65, determine the brake efficiency of the test vehicle.   **(10 Marks)**

3   a. Define safe sight distance as per IRC guidelines. List three important factors causing restrictions to sight distance.   **(08 Marks)**
    b. The speed of overtaking and overtaken vehicles are 85 Kmph and 35 kmph respectively on a two way traffic road. If the acceleration of overtaking vehicle is $1.09 m/sec^2$.
        i)   Calculate safe overtaking sight distance
        ii) Mention the minimum length of overtaking zone and
        iii) Draw a neat sketch of the overtaking zone and show the position of the sign posts.
                                                                                            (12 Marks)

4   a. What are different types of transition curves? Which is the property of clothoid curve that fulfils ideal transition curve and IRC recommends the use in horizontal alignment? Explain with neat sketch?   **(12 Marks)**
    b. A national highway passing through rolling terrain in heavy rain fall area has a horizontal curve of radius 550m, design speed 90 kmph. Design the length of transition curve assuming suitable data.   **(08 Marks)**

PART – B

5   a. Explain with neat sketches due to changes in grade types of vertical curves. What are the important factors considered in valley curve design?   **(12 Marks)**
    b. An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. A summit curve is to be designed for a speed of 85 kmph so as to have an overtaking sight distance of 500m.
                                                                                            (08 Marks)

6 a. Classify different types of intersections? What are different types of traffic manoeuvers involved in intersection at grade? List out with neat sketch total number of traffic manoeuvres in two lane bi-directional decided intersection at grade for urban city, along with number of conflict possibilities? **(12 Marks)**

b. Explain four important basic requirements of intersection at grade. **(08 Marks)**

7 a. Describe briefly at least four mandatory sign to road user for safety and legal offence. **(08 Marks)**

b. Explain with neat sketch directional movement of traffic in 3 lane half clover leaf and describe how crossing conflicts are avoided with locational suitably and advantages over full clover leaf intersections. **(12 Marks)**

8 a. Explain the significance of highway drainage for rural road on urban roads. **(08 Marks)**

b. Describe with neat sketch of cross section and longitudinal section by adopt cross drain and longitudinal drain pipes, how lowering of high water table is permeable soil is achieved with sub-surface drain. **(12 Marks)**

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