Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B. TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: CE308

Course Name: TRANSPORTATION ENGINEERING -I

Max. Marks: 100   Duration: 3 Hours

Students are permitted to use IRC37-2012 in examination hall

PART A
Answer any two full questions, each carries 15 marks.

Marks

1 a) What are the basic requirements for an ideal highway alignment? Describe the factors considered in finalising the alignment. (5)

    b) Define stopping sight distance. Derive an expression for stopping sight distance on an ascending gradient. (5)

    c) Determine the super elevation required for a horizontal curve of radius 300 m with a design speed of 80kmph under mixed traffic condition in an urban area. (5)

2 a) List out the engineering surveys conducted in fixing the alignment of a highway. What are the different kinds of data that are collected in a detailedsurvey? (5)

    b) Determine the length of overtaking zone required for one-way traffic condition with design speed of 100kmph. Acceleration of overtaking vehicle is 0.9m/sec^2 and speed of slow-moving vehicle is 80kmph. Illustrate the details of overtaking zone witha neat sketch. (10)

3 a) Why are transition curves provided on a horizontal curve? What are the requirements for an ideal transition curve? Identify the steps for determining the length of transition curve? (7)

    b) A descending gradient of 1 in 30 meets an ascending gradient of 1in 25. Determine the length of valley curve required for a design speed of 65 kmph, to satisfy stopping sight distance requirements.Assume coefficient of friction as 0.35. Assume data, suitably, if required. (8)

PART B
Answer any two full questions, each carries 15 marks.

4 a) Explain the effect of various vehicular characteristics on traffic stream behaviour. (7)

    b) A flexible pavement is to be constructed with granular base and sub-base and bituminous surfacing for a state highway in rolling terrain. The existing soil has a

CBR value 5%. The borrow material has a CBR value of 12%. The traffic volume on a two lane single carriage way in both directions at last count is 1200commercial vehicles per day. Design a flexible pavement as per IRC37 - 2012. Traffic growth rate is 6% .

5   a)   Explain the procedure for determination of CBR value of a subgrade soil.   (7)

     b)   Discuss the various causes of failures in flexible pavements. With the help of   (8)
         sketches explain any five types of flexible pavement failures.

6   a)   Describe the specifications of materials and construction steps of bituminous   (7)
         concrete pavements.

     b)   Discuss any five properties of bitumen and their effect on the performance of   (8)
         bituminous mixes in pavements. Explain the laboratory teststo be conducted to assess these properties.

PART C
Answer any two full questions, each carries 20 marks.

7   a)   With neat sketches, explain different at grade intersections.   (6)

     b)   What are the factors that are to be considered for site selection of an airport.   (4)

     c)   Two roads A and B meet at right-angles. The normal flow and saturated flow on road A are 750PCU/hr and 3600 PCU/hr respectively. On road B normal flow is   (10)
         550 PCU/hr and saturated flow is 2700PCU/hr. Theall red time is 10sec. Design a two-phase isolated traffic signal for the intersection and sketch the phase diagram.

8   a)   With sketches,list out any six types of warning signs on highways.   (6)

     b)   What is wind rose diagram? Explain how Type 1 wind rose diagram is used for   (7)
         determination of runway orientation.

     c)   Discuss how various aircraft characteristics influence the planning of airport.   (7)

9   a)   What are the different systems of signal coordination?   (4)

     b)   Discuss the facilities to be provided and factors considered for planning an   (6)
         airport terminal building.

     c)   Runway of an airport is situated at an elevation of 250m and has an effective gradient of 0.3%. Airport reference temperature is 18°C. The basic runway length   (10)
         is 2500m. Determine the actual required length of runway.