

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

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| 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 detailed survey? | (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 with a 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 1 in 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.

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| 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 | (8) |

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 1200 commercial 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 sketches explain any five types of flexible pavement failures. (8)
- 6 a) Describe the specifications of materials and construction steps of bituminous concrete pavements. (7)
- b) Discuss any five properties of bitumen and their effect on the performance of bituminous mixes in pavements. Explain the laboratory tests to be conducted to assess these properties. (8)

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 750 PCU/hr and 3600 PCU/hr respectively. On road B normal flow is 550 PCU/hr and saturated flow is 2700 PCU/hr. The all red time is 10 sec. Design a two-phase isolated traffic signal for the intersection and sketch the phase diagram. (10)
- 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 determination of runway orientation. (7)
- 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 airport terminal building. (6)
- 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 is 2500m. Determine the actual required length of runway. (10)