

Reg No.: _____

Name: _____

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

Course Code: CE308

Course Name: TRANSPORTATION ENGINEERING - I

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- | | | |
|---|--|-----|
| 1 | a) Explain briefly the classification of highways by Nagpur Road Plan. How is this system of classification modified as per the Third Twenty Year Road Development Plan? | (8) |
| | b) What are the requirements of an ideal alignment? What are the precautions to be observed while aligning hill roads? | (7) |
| 2 | a) What are the factors influencing the geometric design of highways? Explain how these factors influence the geometric design standards of a highway. | (8) |
| | b) Find safe over taking sight distance for a highway having a design speed of 80 kmph. Maximum acceleration of overtaking vehicle is 1.5 kmph per sec. | (7) |
| 3 | a) Enumerate the steps for practical design of super elevation of a highway under mixed traffic conditions. | (4) |
| | b) A National Highway passing through plain terrain (Design speed 100 kmph) in a heavily rainfall area has a horizontal curve of radius 500 m. Design the length of transition curve. Allowable rate of introduction of super elevation is 1 in 150. | (6) |
| | c) A vertical summit curve is formed when an ascending gradient of 1 in 40 meets a descending gradient of 1 in 80. Find the length of summit curve to provide the required stopping sight distance for a design speed of 80 kmph. | (5) |

PART B

Answer any two full questions, each carries 15 marks.

- | | | |
|---|---|-----|
| 4 | a) Explain the desirable properties of aggregates as a highway material. | (9) |
| | b) State the major differences between flexible and rigid pavements. | (6) |
| 5 | a) What are the factors to be considered in design of flexible pavements and indicate their significance. | (8) |

- b) Design the flexible pavement for the construction of a new highway with the following data (Follow guidelines as per IRC 37 2012): (7)

Category of road- Four lane dual carriageway

Number of commercial vehicles in the year of completion of construction- 2400

CVPD per direction

Annual growth rate of commercial vehicles-5%

Design life – 15 years

Design CBR value of subgrade soil – 5%

Vehicle damage factor – 3.5

Lane distribution factor – 0.75

For CBR 5%

Traffic msa	5	10	20	30	50	100
GSB(mm)	250	300	300	300	300	300
GB(mm)	250	250	250	250	250	250
DBM(mm)	55	70	100	120	125	130
BC(mm)	25	40	40	40	50	50

- 6 a) Briefly illustrate the various steps in construction of a bituminous pavement. (6)
 b) Mention the major failures in flexible pavements and their causes. (9)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) What are traffic characteristics? Explain the influence of different traffic characteristics on traffic performance. (10)
 b) The average normal flow of traffic on cross roads A and B during design period are 400 and 250 PCU per hour respectively. The saturation flow values on these roads are estimated as 1850 and 1400 PCU per hour respectively. The all red time required for pedestrian crossing is 16 seconds. Design a two-phase traffic signal by Webster's method. (10)
- 8 a) Explain following aircraft characteristics and their influence in planning and design of an airport: (12)
- (i) Type and size of aircraft
 - (ii) Weight and wheel configuration
 - (iii) Speed of aircraft
 - (iv) Minimum turning radius

- b) What is a wind rose diagram? How is it useful in fixing the best orientation of runway? (8)
- 9 a) Length of a runway at Mean Sea Level (MSL), standard temperature and zero gradients is 1500 m. The site has an elevation of 1000 m above MSL, with a reference temperature of 34⁰C. The runway has to be constructed with an effective gradient of 0.26%. Determine the actual length of the runway at the site. (10)
- b) What are the design considerations applicable to runway lighting? Explain with neat sketches. (10)
