

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018**

**Course Code: CE 308**

**Course Name: TRANSPORTATION ENGINEERING –I (CE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) What are the special considerations to be taken while aligning roads on hilly areas? (5)  
b) What are the objectives of preliminary survey for highway alignment? (5)  
c) Enumerate the factors governing the width of carriage way. State the IRC specifications for width of carriage way for various classes of roads. (5)
- 2 a) Why are overtaking Zones provided? Draw a neat sketch showing the signs to be installed and their positions. (5)  
b) A valley curve is formed by a descending gradient of 1 in 40 which meets a ascending gradient of 1 in 30. Design the total length of valley curve if the design speed is 100 km/hr so as to fulfil both comfort condition and head light sight distance requirements after calculating stopping sight distance required. Assume rate of change of change of centrifugal acceleration as  $0.6\text{m/sec}^3$ , reaction time 2.5 sec and coefficient of friction 0.35. (10)
- 3 a) While aligning a highway in a built up area, it was necessary to provide a horizontal curve of radius 300 m for a design speed 65Km/hr, length of wheel base-6m and pavement width 10.5m. Assume rate of introduction of super elevation as 1 in 100 and super elevation is provided by rotating about centre line. Design super elevation, extra widening of pavement and length of transition curve. (12)  
b) What are the points to be kept in view while selecting the alignment between two terminal stations? (3)

**PART B**

*Answer any two full questions, each carries 15 marks.*

- 4 a) Outline the IRC 37-2012 recommendations for determining the thickness of Flexible pavements. (8)  
b) Explain with sketches the various types of failures and their causes in rigid pavements? (7)
- 5 a) List out the desirable properties of aggregates to be used in pavement construction. Also specify various tests for judging the suitability of aggregates. (3)

- b) The soil subgrade sample was obtained from the project site and the CBR tests conducted at field density gave the following readings. Draw the load penetration curve and determine the CBR value and find the total thickness of the pavement by CBR method as recommended by IRC for commercial vehicles 1500 per day, with 7% growth rate. The pavement construction is to be completed in three years after last traffic count. **(Use design chart provided in the question paper, page 4)**

Penetration (mm)	Load (Kg)	Penetration (mm)	Load (Kg)
0.0	0.0	3.0	58.0
0.5	5.0	4.0	70.0
1.0	16.0	5.0	77.0
1.5	30.0	7.5	89.0
2.0	42.0	10.0	100.0
2.5	50.0	12.5	110.0

(12)

- 6 a) What is OD survey? List the methods of OD survey. Explain any one method in detail. (5)
- b) List out the various factors which affect the road user characteristics in traffic engineering. What are the effects of road user characteristics in traffic performance? (8)
- c) What are the requirements of a good highway drainage system? (2)

### PART C

*Answer any two full questions, each carries 20 marks.*

- 7 a) What are the basic requirements of Intersection at Grade? (5)
- b) What are the advantages and disadvantages of traffic signals? (5)
- c) Explain with sketches the basic patterns of runway configurations. (10)
- 8 a) What is (i) Saturation flow, (ii) Lost time, and (iii) Phase in a signal design? (3)
- b) Enumerate the various factors which would be kept in view while selecting suitable site for an airport. (5)

- c) A fixed time 2-phase signal is to be provided at an intersection having four arms. The design hour traffic and saturation flow are

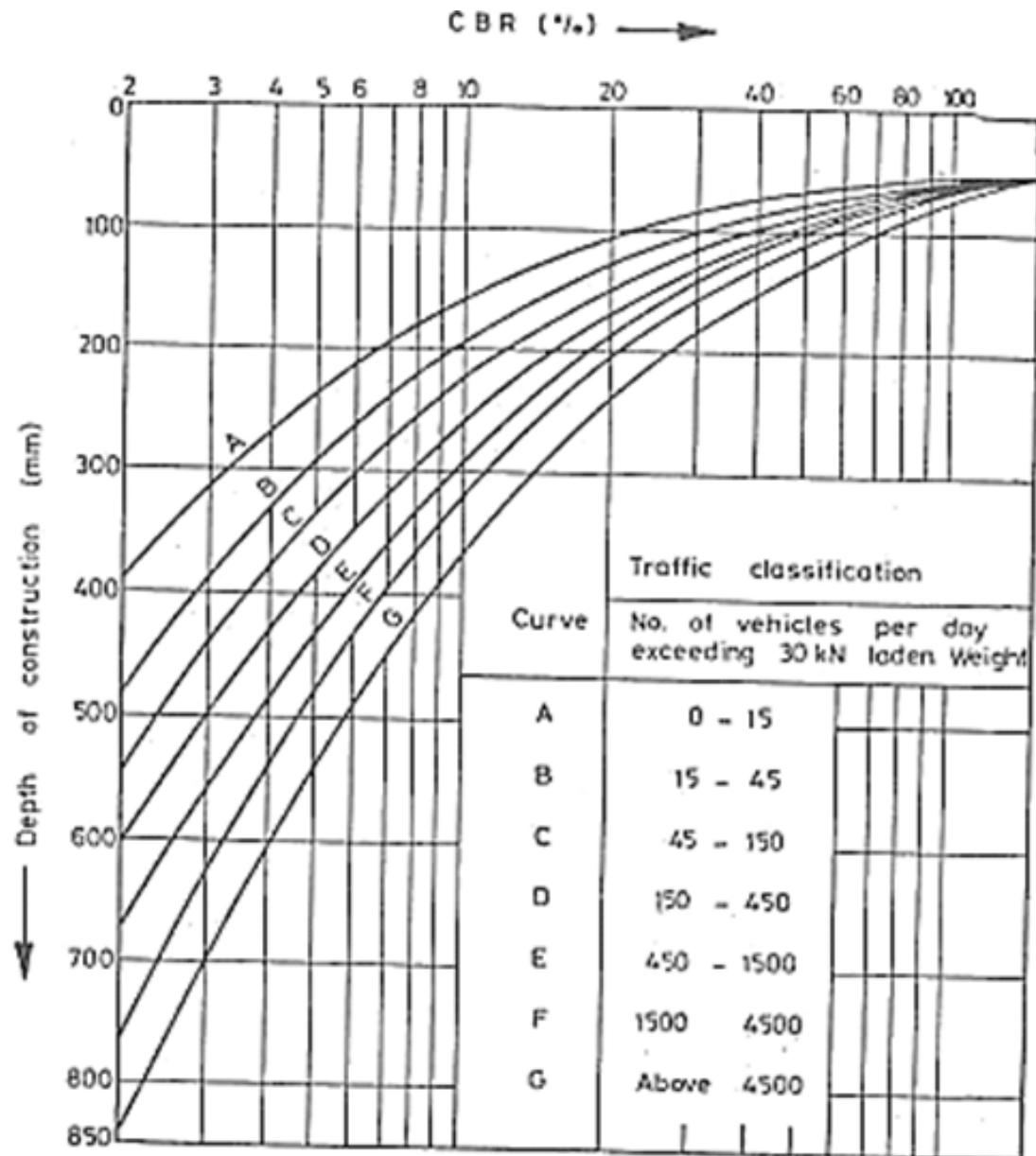
	North	South	East	West
Design hour flow (pcu/hr)	800	400	750	600
Saturation flow (pcu/hr)	2400	2000	3000	3000

Time lost per phase due to starting delay is 2 sec and All red period is 4 sec. (12)  
Design two phase traffic signal using Webster's method. Draw the phase diagram also.

- 9 a) Describe the various markings on runways with sketches. (5)
- b) What are the primary functions of air traffic control? (3)
- c) The length of a runway under standard conditions is 1500m. The airport is to be provided at an elevation of 110m above mean sea level. The airport reference temperature is 32°C. Following data refers to the proposed longitudinal section of runway. Determine the corrected length of runway.

End to end of runway (m)	Grade(%)	End to end of runway (m)	Grade(%)
0 to 300	+1	1500 to 1800	+1
300 to 900	-0.2	1800 to 2100	-0.3
900 to 1500	+0.5		

(12)



**CBR Design chart**