53 (CE 502) TREN

2014

TRANSPORTATION ENGG-I

Paper : CE 502

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* What are the salient features of early Roman Roads ? How do these differ from the present day Road Construction ? 5

   (b) What are the various objectives of preliminary survey for highway alignment ? Enumerate the details to be calculated and the various steps in the conventional method. 10

   (c) Calculate the safe overtaking sight distance for a design speed of 96*kmph*. Assume $t = 2 sec$, $A = 2 \cdot 5 kmph/sec$. 5

2. *(a)* Explain total reaction time of driver and the factor on which it depends. Explain PIEV theory. 10

(b) Explain briefly the modified classification of road system in India as per the Third Twenty Year Road Development Plan 1981-2001. 5

(c) Design the rate of super elevation for a horizontal highway curve of radius 500*m* and speed 100*kmph*. 5

3. *(a)* Write short notes on : 2×7=14

(i) Traffic separators

(ii) Kerbs

(iii) Road margin

(iv) Pavement uneveness

(v) Shoulders

(vi) Width of formation

(viii) Right of way

(b) Derive an expression for finding the extra widening required on horizontal curve. 6

4. *(a)* Calculate the stresses at interior, edge and corner region of a cement concrete pavement using Westergaard's stress equation, use the following data :

Wheel load $P = 5100\,kg$,

$E = 3{\cdot}0 \times 10^5\,kg/cm^2$, Pavement thickness $h = 18$, $\mu = 0{\cdot}15$, Modulus of subgrade reaction $K = 6{\cdot}0\,kg/cm^3$. Radius of contact area = $15cm$. 8

(b) Discuss the various traffic studies and their importance. 6

(c) Explain flexible and Rigid pavement and bring out the points of difference. 6

5. *(a)* Derive an expression for finding stopping sight distance at level and at grades. 6

(b) Write down the construction steps for water bound macadam road. 6

(c) Calculate the length of transition curve and the shift using following data

Design Speed $=65 kmph$, Radius of Circular Curve $=220m$, Allowable rate of introduction of super elevation = 1 in 150, Pavement width including extra widening = $7{\cdot}5m$. 8

6. *(a)* Discuss the desirable properties of bitumen. Compare tar and bitumen. 6

(b) A vehicle was stopped in 1·4 second by fully Jamming the brakes and the skid marks measured $7{\cdot}0m$. Determine the average skid resistance. 4

(c) Explain origin and destination study. 5

(d) A valley curve is formed by a descending grade of 1 in 25 meeting an ascending grade of 1 in 30. Design the length of valley curve to fulfil both comfort condition and head light sight distance requirement for a disign speed of 80 *kmphr*. Assume allowable rate of change of centrifugal acceleration C=0·6 m/sec^3, $t = 2{\cdot}5 sec$, $f = 0{\cdot}35$. 5