

Code : 011619

B.Tech 6th Semester Exam., 2016

TRANSPORTATION ENGINEERING—I

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the most suitable option (any seven) :

2×7=14

(a) The road connecting capitals of State is known as

- (i) NH
- (ii) SH
- (iii) provincial highway
- (iv) MDR

(b) The portion of the road surface which is used by the vehicular traffic is known as

- (i) carriageway
- (ii) shoulder
- (iii) expressway
- (iv) All of the above

(c) As per IRC, the camber on cement concrete road should be

(i) 1 in 45 to 60

(ii) 1 in 20 to 24

(iii) 1 in 12 to 16

(iv) 1 in 60 to 72

(d) For the relationship $u=55-0.44k$, where u is the speed in kmph and k is the density in vpkm, what will be the maximum flow in vph?

(i) 625

(ii) 1250

(iii) 1718

(iv) 125

(e) Ratio of width of the car parking area required at kerb for 30° parking relative to 60° parking is approximately

(i) 0.7

(ii) 0.5

(iii) 0.8

(iv) 2.0

(f) As per IRC, the minimum length of transition curve for a mountainous terrain road with radius of curvature 100 m and design speed of vehicle 100 kmph is

(i) 270 m

(ii) 200 m

(iii) 170 m

(iv) 100 m

(g) In the design of highways, expansion and contraction joints should respectively be provided at

(i) 50 m and 32 m

(ii) 50 m and 10 m

(iii) 25 m and 10 m

(iv) 25 m and 32 m

(h) The result of ring and ball softening point test on asphalts is given in terms of

(i) viscosity

(ii) time

(iii) temperature

(iv) flow

(i) Excessive deformation in foundation course of a flexible pavement is known as

- (i) base course failure
- (ii) wearing course failure
- (iii) subgrade failure
- (iv) pavement failure

(j) Reinforcement in cement concrete pavement is kept

- (i) 5 cm high from the bottom level
- (ii) 5 cm below from the top level
- (iii) in the centre of the slab
- (iv) in the bottom of the slab

2. (a) What is the importance of Nagpur Road Plan in highway planning of our country? 6

(b) Briefly outline the main features of various road patterns commonly in use. Explain with sketches the star and grid patterns. 8

3. (a) Differentiate between camber and super-elevations. 4

(b) Find the length of transition curve and extra width of pavement required on a horizontal curve of radius 300 m of a two-lane highway passing through rolling terrain for a design speed of 80 kmph. Assume all other data as per IRC recommendations. 10

4. (a) Explain PIEV theory. What are the factors on which the stopping sight distance depends? 7

(b) On a two-way traffic road, the speed of overtaking and overtaken vehicles are 65 kmph to 40 kmph respectively. If the average acceleration of overtaking vehicle is 0.92 m/sec^2 , determine (i) safe overtaking sight distance and (ii) the minimum length of overtaking zone. 7

5. (a) Discuss spot speed, running speed, space-mean speed, time-mean speed and average speed. How are spot-speed studies carried out? 8

- (b) A helicopter pilot recorded the travel time of five vehicles on a 3.2 km segment of a highway. Estimate the time-mean speed and space-mean speed of the vehicles : 6

Vehicle	Travel Time (sec)
1	161
2	173
3	145
4	159
5	182

6. (a) Differentiate between flexible and rigid pavements. 5

- (b) Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations using the following data : 9

Wheel load = 4100 kg

E of concrete = 3.3×10^5 kg/cm²

Pavement thickness = 18 cm

Poisson's ratio = 0.15

Modulus of subgrade reaction
= 25 kg/cm³

Radius of contact area = 12 cm

7. (a) Discuss the advantages and disadvantages of traffic rotaries. 6
- (b) Explain the following terms : 8
ESWL; Tyre inflation pressure;
CBR; Dowel bar
8. (a) What are the functions of prime coat, tack coat and seal coat in bituminous construction? 7
- (b) Enumerate the steps for preparation of WBM layer. Explain all steps in brief. 7
9. (a) What are the various types of failure in flexible pavement? Explain the causes. 7
- (b) Indicate how the filter material is designed for use in subsurface drainage system. 7
