

B.Tech 6th Semester Exam., 2019

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 correct answer of the following

(any seven) :

2×7=14

- (a) In India the modes of transportation, in the order of their importance are
- (i) air transport, shipping, roads, railways
 - (ii) shipping, roads, railways, air transport
 - ~~(iii) roads, railways, air transport, shipping~~
 - (iv) shipping, railways, roads, air transport

(b) Length of vehicles does not affect

- (i) extra widening
- (ii) minimum radius of turning
- (iii) passing sight distance
- ~~(iv) width of shoulders~~

(c) The advantage of providing super-elevation on roads is

- (i) increased volume of traffic
- (ii) reduced maintenance cost of the roads
- ~~(iii) higher speed of vehicles~~
- (iv) All of the above

(d) Camber in pavements is provided by

- (i) straight line method
- (ii) parabola method
- (iii) straight at the edges and parabolic at the crown
- (iv) All of the above

(e) A camber of 1 in 30 means that for a 30 m wide road, the crown of the road will be _____ above the edge of the road.

- (i) 0.5 m (ii) 1.0 m
(iii) 2.0 m (iv) 3.0 m

(f) The maximum rate of super-elevation (e) is given by

~~(i) $e = \frac{V^2}{225R}$~~

(ii) $e = \frac{V^2}{424R}$

(iii) $e = \frac{V^2}{540R}$

(iv) $e = \frac{V^2}{1000R}$

where V = Speed of vehicle in kmph and
 R = Radius of curvature in meters.

(g) In CBR test, the value of CBR is calculated at

(i) 2.5 mm penetration only

(ii) 5.0 mm penetration only

~~(iii) both 2.5 mm and 5.0 mm penetration~~

(iv) None of the above

(h) If W is the wheel load and σ is the unit stress in tension, then the thickness of concrete pavement (t) is given by

(i) $t = \sqrt{\frac{W}{\sigma}}$

(ii) $t = \sqrt{\frac{2W}{\sigma}}$

~~(iii) $t = \sqrt{\frac{3W}{\sigma}}$~~

(iv) $t = \sqrt{\frac{4W}{\sigma}}$

(i) The traffic volume is equal to

(i) $\frac{\text{Traffic density}}{\text{Traffic speed}}$

(ii) $\frac{\text{Traffic speed}}{\text{Traffic density}}$

(iii) Traffic density \times Traffic speed

(iv) None of the above

(j) The length of the side of warning signboards of road is

(i) 30 cm

~~(ii) 45 cm~~

(iii) 60 cm

(iv) 75 cm

2. (a) What are the different modes of transportation? Explain the specific function of each of them.

(b) What are the various objectives of preliminary survey for highway alignment? Enumerate the details to be collected and the various steps in the conventional method. 7

3. (a) Explain camber. What are the objects of camber? Discuss the factors on which the amount of camber to be provided depends. 7

(b) Calculate the stopping sight distance for a design speed of 100 km/hr. Take the total reaction time 2.5 second and the coefficient of friction is 0.35. 7

4. (a) Enumerate the various design factors controlling the vertical alignment of highways. 7

(b) While aligning a highway in a built-up area, it was necessary to provide a horizontal circular curve of radius 325 meter. Design the following geometric features : 7

(i) Superelevation

(ii) Extra widening of pavement

(iii) Length of transition curve

[Given that, Design speed = 65 kmph, Length of wheel base of largest truck = 6 m, Pavement width = 10.5 m]

5. (a) What are the objects and scope of traffic engineering? Explain briefly. 7

(b) A vehicle skids through a distance equal to 40 m before colliding with another parked vehicle, the weight of the vehicle is 75% of the former. After collision if both the vehicles skid through 14 m before stopping, compute the initial speed of the moving vehicle. Assume friction coefficient of 0.65. 7

6. (a) Explain the traffic manoeuvres and their applications. 7

(b) With neat sketches, show various types of traffic signals and classify them in proper group. 7

7. (a) Sketch typical cross-sections of a flexible pavement and a rigid pavement, and explain the functions of the various components. 7

(b) Explain soil stabilization and its scope in road construction. 7

8. (a) What is traffic volume? Why are traffic volume studies conducted? 7

(b) A truck travelling at 30 km/hr was stopped in 1.25 seconds after applying the breaks. Determine the average skid resistance of the road surface. 7

9. Write short notes on any four of the following : 3 × 4 = 12

- (a) Shoulders
- (b) Tie-bars
- (c) Crushing value test
- (d) Traffic volume
- (e) Surface dressing
- (f) Wet mix macadam
