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10CV56

### Fifth Semester B.E. Degree Examination, July/August 2022

## Transportation Engineering – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

### PART – A

- 1 a. Explain social effects of transportation and its role in rural development. (10 Marks)  
b. Outline the scope of highway engineering. (06 Marks)  
c. What are the objectives of (i) CRF (ii) IRC? (04 Marks)
- 2 a. What are the methods of classification of road? Which among them is more acceptable? Explain. (06 Marks)  
b. Explain how planning survey is carried out in the construction of highways. (08 Marks)  
c. What are the objectives of fourth twenty-year road development plan? (06 Marks)
- 3 a. What is the necessity for re-alignment? Explain the steps involved in re-alignment. (10 Marks)  
b. The speed of overtaking and overtaken vehicles are 100 and 70 kmph respectively on a two-way traffic road. If the acceleration of overtaking vehicle is  $1.23 \text{ m/sec}^2$ . Calculate:  
(i) Safe overtaking sight distance  
(ii) Mention the minimum length of overtaking zone  
(iii) Draw a neat sketch of overtaking zone and show the position of the sign posts. (10 Marks)
- 4 a. What is cross slope? Write its importance. (06 Marks)  
b. What are the objects of providing transition curves on the horizontal alignment highways? (06 Marks)  
c. The radius of the horizontal curve is 110 m. the design speed is 60 kmph and the design coefficient of lateral friction is 0.15.  
(i) Calculate super-elevation required if full lateral friction is assumed to develop.  
(ii) Calculate the coefficient of friction needed if no-super elevation is provided.  
(iii) Calculate the equilibrium super-elevation if the pressure on inner and outer wheels should be equal. (08 Marks)

### PART – B

- 5 a. List and explain desirable properties of road aggregates. (06 Marks)  
b. List various tests on bituminous material along with their applications. (08 Marks)  
c. Following data refers to CBR, experiment on subgrade soil. Calculate CBR value of soil and indicate its importance.

Penetration (mm)	0	0.5	1	1.5	2	2.5	3	4	5	7.5	10	12.5
Load (kg)	0	5	16	28	40	48	57	68	75	89	100	107

(06 Marks)

- 6 a. Explain the meaning of ESWL. How is it determined for dual wheel assembly and what are its applications? (06 Marks)  
b. Draw a sketch for flexible pavement cross-section and show its components. Enumerate the functions and importance of each component of the pavement. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.



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- c. Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using Westerguard's stress equation. Use the following wheel load,  $P = 5100$  kgs, MOE ( $E$ ) =  $3 \times 10^5$  kg/cm<sup>2</sup>. Pavement thickness  $h = 18$  cm, Poisson's ratio of concrete  $\mu = 0.15$ . Modulus of subgrade reaction  $K = 6.0$  kg/cm<sup>3</sup>. Radius of contact area  $a = 15$  cm. (07 Marks)
- 7 a. What do you understand by WBM? Explain construction procedure for WBM briefly. (10 Marks)
- b. Briefly discuss the types of construction joints in cement concrete pavement. (06 Marks)
- c. List out the importance of highway drainage. (04 Marks)
- 8 a. Briefly discuss the benefits to the users and others in the region due to improvement of highways. (08 Marks)
- b. Discuss highway financing in India. (06 Marks)
- c. Write short notes on:
- (i) Annual cost method
- (ii) Benefit cost ratio method (06 Marks)

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