

(b) Enlist the factors affecting traffic stream flow characteristics. Further, discuss the relationships between traffic speed, travel time, traffic density and traffic volume with the help of neat diagrams. 5

7. Explain the load transfer mechanism for both flexible and rigid pavements with the help of neat and clean diagrams. Further, highlight the differences between empirical and mechanistic design approach for the design of pavements. 15



Roll No.

Total Pages : 04

002403

May 2025

B. Tech. (Civil) (Fourth Semester)
Highway Engineering (PCC-CED206)

Time : 3 Hours]

[Maximum Marks : 75

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

- | | | |
|--------|-----------------------------|-----|
| 1. (a) | Explain Grade Compensation. | 1.5 |
| (b) | Define Obligatory Points. | 1.5 |
| (c) | Explain Warning Signs. | 1.5 |
| (d) | Define Camber. | 1.5 |
| (e) | Explain Kerbs. | 1.5 |
| (f) | Define Bitumen Emulsion. | 1.5 |
| (g) | Explain Practical Capacity. | 1.5 |
| (h) | Explain PIEV theory. | 1.5 |
| (i) | Define Cutback Bitumen. | 1.5 |
| (j) | Enlist tests on bitumen. | 1.5 |

Part B

2. (a) Calculate the length of transition curve as well as the shift of curve with the following data : 10
Design speed = 80 kmph, Radius of curve = 220 m, Pavement width with widening = 7.5 m, Allowable rate of introduction of super-elevation = 1 in 100, Pavement is rotated about (i) centre line; (ii) outer edge.
- (b) Discuss requirement from Bitumen as a binding material. Further explain procedure for determination of softening point of bitumen. 5
3. (a) Explain the design philosophy and procedure of IRC method for design of flexible pavement. 5
- (b) Identify different layers in flexible and rigid pavements by clean diagrams. Further briefly discuss these layers and materials used for construction. 10

4. The following data is given for a cement concrete pavement :

Given modulus of elasticity of concrete = 3×10^5 kg/cm²

Poisson's ratio of concrete = 0.14, thickness of concrete pavement = 25 cm, modulus of subgrade reaction 4 kg/cm³, wheel load 4000 kg, Contact pressure kg/cm², coefficient of sub-grade friction = 1.5, width of pavement = 7 m, coeff. of expansion of C.C. = 8×10^{-6} per °C, temperature differential = 20°C.

Find the nature and value of combined stresses at the top and bottom of CC pavement, warped up and contracting. 15

5. (a) Discuss the concept of PCU and Level of Service. 5
- (b) List out the factors considered for the design of pavement. Further explain EAL and EWSL and how they are employed in pavement analysis and design. 10
6. (a) Explain the conditions and the respective expressions for calculating length of a horizontal transition curve with the help of neat diagrams. 10