

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 2131**

Roll No.

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**B.Tech.**

**(SEMESTER-V) THEORY EXAMINATION, 2012-13**

**TRANSPORTATION ENGINEERING – I**

*Time : 2 Hours ]*

*[ Total Marks : 50*

**Section – A**

1. Attempt **all** parts. Each part carries equal marks. **10 × 1 = 10**
- (a) Define highway engineering. Enlist different modes of transportation.
  - (b) Enlist and define the types of roads based on load transported and tonnage.
  - (c) Define National Highway and State Highway.
  - (d) Enlist the various road patterns.
  - (e) Define “Camber”. What is the purpose of providing camber to the road surface ?
  - (f) Define “Over taking sight distance” and “over taking Zones”.
  - (g) Define surface dressing.
  - (h) What is WBM ?
  - (i) Define “Desire Lines”.
  - (j) What is temperature stress ?

**Section – B**

2. Attempt any **three** parts of the following. Each part carries equal marks. **5 × 3 = 15**
- (a) Discuss briefly the classification of traffic signs according to Indian Motor Vehicle Act. Give two examples with neat sketch for each classification.
  - (b) Write the short notes on (i) Thirtieth highest hourly traffic volume (ii) Traffic volume study.

- (c) Enumerate the steps in the construction of cement concrete pavement.
- (d) Determine the spacing between contraction joints for 3.5 metre slab width having thickness of 20 cm and  $f = 1.5$ , for the following two case :
- (i) For plain cement concrete,  $S_c = 0.8 \text{ kg/cm}^2$
- (ii) For reinforcement cement concrete, 1.0 cm dia. bars at 0.30 m spacing.
- (e) Calculate the stresses at interior, edge and corner of a cement concrete pavement by Westergaard's stress equations :
- Modulus of elasticity of concrete =  $3.0 \times 10^5 \text{ kg/cm}^2$
- Poisson ratio for concrete = 0.15
- Thickness of concrete pavement = 18 cm
- Modulus of subgrade reaction =  $8.5 \text{ kg/cm}^2$
- Wheel load = 5100 kg
- Radius of loaded area =  $15 \text{ cm}^2$

### Section – C

Attempt **all** questions. Each question carries equal marks :

$5 \times 5 = 25$

3. Attempt any **two** parts of the following. Each part carries equal marks.  $(2.5 \times 2 = 5)$
- (a) Explain the CBR method of pavement design. How is this method useful to determine thickness of component layers ?
- (b) Discuss the various types of Traffic signals.
- (c) Explain preliminary survey for highway location in brief.
4. Attempt any **two** parts of the following. Each part carries equal marks :  $(2.5 \times 2 = 5)$
- (a) Calculate the length of transition curve for a design speed of 80 kmph at horizontal curve of radius 300 m in rural area. Assume suitable data.
- (b) What is traffic rotary ? What are its advantages and limitations in particular reference to Indian conditions ?
- (c) Explain IRC method of rigid pavement design.

5. Attempt any **two** parts of the following. Each part carries equal marks : (2.5 × 2 = 5)
- (a) Explain Bombay road plan.
  - (b) Explain maximum and minimum super elevation in brief.
  - (c) Calculate the stopping sight distance for design speed of 100 kmph. Take the total reaction time 2.5 seconds and coefficient of friction = 0.35.
6. Attempt any **two** parts of the following. Each part carries equal marks : (2.5 × 2 = 5)
- (a) Explain bituminous bound macadam and Asphaltic concrete.
  - (b) Derive the expression for calculating the overtaking sight distance on a highway.
  - (c) Design the super elevation required at a horizontal curve of radius 300 m for speed of 60 kmph. Assume suitable data.
7. Attempt any **two** parts of the following. Each part carries equal marks : (2.5 × 2 = 5)
- (a) What are the objects of providing transition curves on horizontal alignment of highways ?
  - (b) Explain vertical curves briefly.
  - (c) Write the short notes on the following :
    - (i) Sheet asphalt
    - (ii) Mastic asphalt
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