

Name : .....

Reg. No: .....



## SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, OCTOBER 2012

## CE 09 L10 - HIGHWAY PAVEMENT DESIGN

Time : Three Hours

Maximum : 70 Marks

Instructions: Assume any missing data suitably  
Graph sheet may be supplied on request

**PART A**(Answer **all** Questions)

- I a) What are the various factors to be considered in the performance of pavements?  
 b) Explain the relevance of ESWL.  
 c) List the assumptions made in Burmister's two layer theory.  
 d) List out the different types of joints provided in concrete  
 e) Explain how seasonal corrections are done in overlay design using BBD test.

(5 × 2 = 10 marks)

**PART B**(Answer **any four** Questions)

- II a) Write a short note on depth of frost penetration  
 b) A plate bearing test conducted with a 300 mm diameter plate on a subgrade yielded a pressure of 0.2 N/mm<sup>2</sup> at 2.5 mm deflection. The test when carried out on a base course of thickness 200 mm yielded a pressure of 0.80 N/mm<sup>2</sup> at 2.5 mm deflection. Design the pavement sector for a wheel load of 51 KN with a tyre pressure of 0.70 N/mm<sup>2</sup> using Burmister's approach.  
 c) The loaded weight on the rear dual wheels of a truck is 4100 kg. The centre to centre spacing and clear space in the rear dual wheels are 30 cm and 10 cm respectively. Calculate the ESWL for pavement of thickness 15 cm by graphical method.  
 d) Discuss the critical combination of stresses due to wheel load and temperature effects.  
 e) Outline the IRC recommendations for determining the thickness of cement concrete pavement.  
 f) Write a short note on plate load test

(4 × 5 = 20 marks)

**PART C**(Answer **all** Questions)

- III (a) Differentiate between Highway pavements and airfield pavements. Also add a short note on functions and significance of subgrade properties.  
 Or  
 (b) Explain the method of bituminous mix design by Marshall method. Also explain the various factors to be considered in the design of pavements
- IV (a) Classify the various design methods for flexible pavements.  
 (b) Calculate the Group Index, given LL = 60%, PL = 35%, Passing No.200 sieve = 60%.  
 Or  
 (c) Briefly explain the CBR method of flexible pavement design  
 (d) CBR value of subgrade is 6%. Design a 2 lane flexible pavement using IRC 37 2001 if the present traffic volume consists of 1000 commercial vehicles per day.
- V (a) Differentiate between longitudinal, expansion and contraction joints.

Or

Turn over

(b) Determine the warping stress at the interior, edge and corner of a rigid pavement for the following data.

Spacing of contraction joint = 3.75 m

Width of the slab = 3.75 m

Thickness of CC pavement = 200 mm

Thermal expansion of concrete =  $10 \times 10^{-6}$  per  $^{\circ}\text{C}$

Modulus of elasticity of concrete =  $3 \times 10^4$  N/mm<sup>2</sup>

VI (a) List out and explain the structural and functional requirements of flexible and rigid pavements.

Or

(b) Benkelmen beam rebound deflection studies were carried out during winter season on a stretch of pavement using a dual wheel load of 4084 kg and tyre pressure 5.6 kg/cm<sup>2</sup>. The pavement surface temperature was found to be 30  $^{\circ}\text{C}$ . The pavement was resting on a clayey subgrade. The moisture correction was found to be 1.2. If the present traffic consists of 1000 commercial vehicles/day, design the thickness of flexible overlay using IRC 81 : 1997. Rebound deflection values measured are 1.25, 1.36, 1.85, 1.75, 1.85, 1.90, 1.75, 1.60, 1.55, 2.10, 1.82, 1.35, 1.45, 1.55, 1.65, 1.75, 1.80, 1.90, 2.10, 2.05.

(4 × 10 = 40 marks)

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