D 50488 (Pages : 2) Name...

Reg. No....................................

SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION NOVEMBER 2013

CE 09 L 10—HIGHWAY PAVEMENT DESIGN

Time : Three Hours   Maximum : 70 Marks

Use of design charts, tables codes are permitted.

Part A

*Answer **all** questions.*
Each question carries 2 marks.

1. (a) What are the different types of pavements ?

   (b) Explain the terms flow and stability.

   (c) Explain EWL.

   (d) Explain the function of joints in cement concrete pavements.

   (e) What is meant by characteristic deflection ?

                                                              (5 × 2 =10 marks)

Part B

*Answer any **four** questions.*
Each question carries 5 marks.

2. (a) Compare the performance characteristics of flexible and rigid pavements.

   (b) Discuss the advantages and limitations of CBR method of flexible pavement design.

   (c) Distinguish between expansion joints and contraction joints in concrete pavements.

   (d) Explain ESWL.

   (e) Explain equivalent radius of resting section and radius of relative stiffness.

   (f) What are the attributes that has to be considered for functional evaluation of pavements ?

                                                              (4 × 5 = 20 marks)

Part C

*Answer **all** questions.*
Each question carries 10 marks.

3. (a) Explain the factors affecting the design and performance of flexible pavements.

   Or

   (b) Discuss the Marshal method of design of bituminous mixes.

4. (a) Explain the McLoed method of design of flexible pavements.

   Or

                                                              Turn over

(b) Design flexible pavement using IRC 37 2001 for the following data :—

    Subgrade soil CBR = 5.0 %

    Laterite sub-base CBR = 12 %

    WBM base course CBR = 95 %

    Present ADT of commercial vehicles = 180

    Design life = 10 years

    Annual growth rate 5.75 %

    Vehicle damage factor = 4.0

    Lane distribution factor = 0.75.

5. (a) Determine the spacing of between contraction joints for a 4 m wide, 20 cm. thick cement concrete slab having a unit weight of 2400 kg/m^3 for the following conditions. Assume co-efficient of friction as 1.4.

    Plain CC slab with tensile stress in concrete 0.8 kg/cm^2.

        Slab reinforced with 1 cm dia. Bars at 30 cm c/c.

    Assume the tensile strength of steel as 1400 kg/cm^2.

Or

(b) State the conditions under which the tension, compression, shear, bending and warping stresses occur in road pavements.

    Calculate the warping stress at interior, edge and corner for a concrete pavement of thickness 20 cm. with transverse joints at 4.5 m spacing. The width of slab is 3.5 m. For concrete $E = 3 \times 10^5$ kg/cm^2 and $\mu = 0.15$, subgrade reaction $k = 5$ kg/cm^3, temperature differential is 0.9° C/cm. Assume thermal co-efficient for concrete as 10×10^{-6}/ °C. Values of warping stress co-efficient C_x and C_y are 1.03 and 0.55 respectively.

6. (a) What is meant by distresses ? What discuss different types of distresses developed on flexible pavement surfaces ?

Or

(b) What are the factors affecting structural condition of pavements ? What are the different measures or parameters representing the structural adequacy of the pavement ?

                                                    (4 × 10 = 40 marks)