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10CV833

Eighth Semester B.E. Degree Examination, June/July 2017
Pavement Design

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of specified charts and tables is permitted.

PART – A

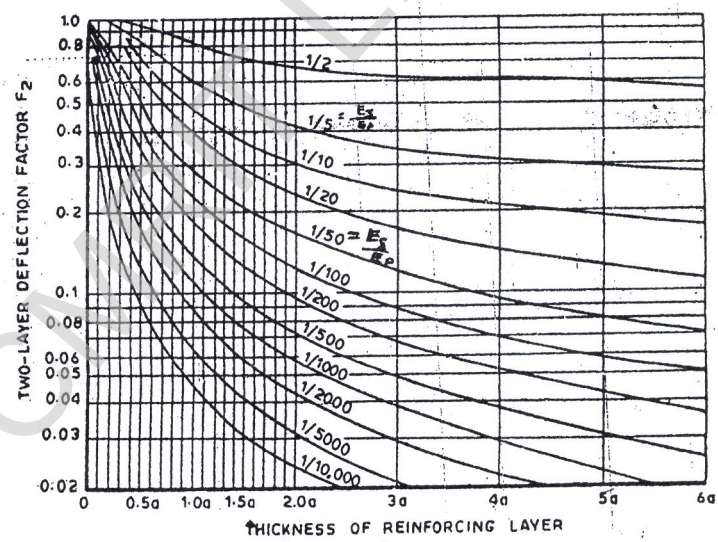
1 a. With a neat sketch of cross-section of flexible type pavement, explain the various components and briefly bring out their functions. **(10 Marks)**

b. Bring out differences between highway pavements and airfield pavements. **(05 Marks)**

c. Explain the differences between rigid and flexible pavements. **(05 Marks)**

2 a. Explain the factors that affect design and performance of highway pavements. **(06 Marks)**

b. Plate bearing tests were conducted with a 75 cm dia plate on soil subgrade and a granular base. The stress noticed, when the deflection was 0.25 cm on the subgrade soil was 0.07 MN/m^2. On the base course, the same plate yield 0.25 cm deflection under a stress of 0.14 MN/m^2. Design the pavement for an allowable deflection of 0.5 cm, under a wheel load of 40 kN and a tyre pressure of 0.5 MN/m^2. **(14 Marks)**



Relationship of F_2 and $\frac{h}{a}$ in a Two-aLyer System (Burmister Method)

Fig.Q2(b)

3 a. Write McLeod's procedure for determining equivalent load factors. **(10 Marks)**

b. Calculate ESWL of a dual wheel assembly carrying 20.44 kN each for pavement thickness of 15, 20 and 25 cms. Centre to centre tyre spacing = 27 cm and distance between the walls of the tyres = 11 cm.
Note : Ordinary graph sheets may be used. **(10 Marks)**

4 a. Explain briefly CBR method by cumulative standard axle load for the design of flexible highway pavements. **(10 Marks)**

b. Design a flexible highway pavement section by triaxial test method (Kansas method) using the following data:

Wheel load = 44 kN — Radius of contact area = 160 mm

Traffic coefficient X = 1.7 — Rainfall coefficient Y = 0.95

Design deflection = 2.8 mm — E-value of subgrade soil $E_s = 100\times10^2$ kN/m^2

E-value of base course material $E_b = 400\times10^2$ kN/m^2

E-value of 75mm thick Bituminous concrete surface course = 1000×10^2 kN/m^2. **(10 Marks)**

PART – B

5 a. Explain the following :

(i) Radius of relative stiffness (ii) Radius of resisting section

(iii) Modulus of subgrade reaction (iv) Fatigue behavior of concrete **(10 Marks)**

b. Calculate the stresses of interior, edge and corner regions of a C.C. pavements using Westergard's stress equations using the following data:

Wheel load = 51 kN ; — Modulus of elasticity of concrete = 0.3×10^8 kN/m^2

Poisson's ratio of concrete = 0.15 ; — Pavement thickness = 18 cm ;

Modulus of subgrade reaction = 6.0×10^4 kN/m^3

Radius of contact area = 15 cm. **(10 Marks)**

6 a. As per IRC explain the stress involved in the design of dowel bars in rigid CC pavements. **(10 Marks)**

b. Determine the spacing between contraction joints for 3.5m slab width having thickness of 20cm. Consider the following two cases:

(i) For plain cement concrete (ii) For reinforced cement concrete.

Take f = 1.5, γ for CC = 24 kN/m^3. Allowable tensile stress in CC = 80 kN/m^2. Allowable tensile stress in steel = 6×10^4 kN/m^2. γ for steel = 75 kN/m^3.

Total reinforcement of 60 N/m^2 is provided and is equally distributed in both the directions. **(10 Marks)**

7 a. Explain any four typical flexible pavement failures with sketches. **(08 Marks)**

b. Discuss the functional evaluation by Benkelman beam deflection method. **(08 Marks)**

c. Discuss briefly design methods for airfield pavements. **(04 Marks)**

8 Write short notes on any four of the following :

a. Maintenance measures in rigid pavements

b. Functional evaluation by visual inspection

c. Unevenness measurements

d. Rigid pavement failures

e. Design factors for runway pavement **(20 Marks)**

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