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10CV833

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Pavement Design

Time: 3 hrs. Max. Marks:100

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

PART – A

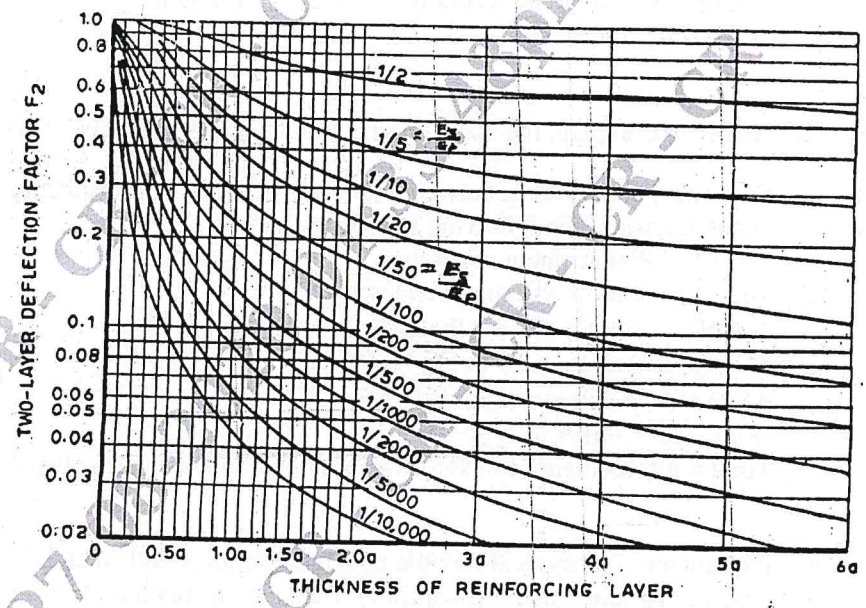
1 a. With a neat sketch of cross section of flexible type pavement, explain the various components and briefly bringout their functions. **(10 Marks)**

b. Bring out the 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 75cm diameter plate on soil subgrade and a granular base. The stress notices, when the deflection was 0.25cm on the subgrade soil was 0.07MN/m^2. On the base course, the same plate yielded 0.25cm deflection under a stress of 0.14MN/m^2. Design the pavement for an allowable deflection of 0.5cm, under a wheel load of 40kN and a tyre pressure of 0.5MN/m^2. **(14 Marks)**



Relationship of F_2 and h in a Two-aLyer System (Burmister Method)

Fig.Q.2(b)

3 a. Explain the following : i) Contact pressure ii) ESWL concept. **(10 Marks)**

b. Write Mc-Leod's procedure for determining equivalent load factors. **(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	= 44kN
Radius of contact area	= 160mm
Traffic coefficient X	= 1.7
Rainfall coefficient Y	= 0.95
Design deflection	= 2.8mm
E value of subgrade soil, E_s	= 100×10^2 kN/m^2
E value of base course material, E_b	= 400×10^2 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 at the interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Assume the following:

Wheel load	= 42 kN
Modulus of elasticity of concrete	= 0.28×10^8kN/m^2
Pavement thickness	= 0.18m
Poisson's Ratio of concrete	= 0.15
Modulus of subgrade reaction	= 2.7×10^4kN/m^3
Radius of contact area	= a = 0.15m

(10 Marks)

6 a. As per IRC explain the steps 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 = 24kN/m^3

Allowable tensile stress in CC = 80kN/m^2

Allowable tensile stress in steel = 6×10^4kN/m^2

γ for steel = 75kN/m^3

Total reinforcement of 60kN/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. Mention design factors for runway pavements and explain any one. **(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. Design methods for airfield pavements

d. Unevenness measurements

e. Rigid pavement failures. **(20 Marks)**

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