CBCS SCHEME

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21CV743

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Pavement Design

Time: 3 hrs. Max. Marks: 100

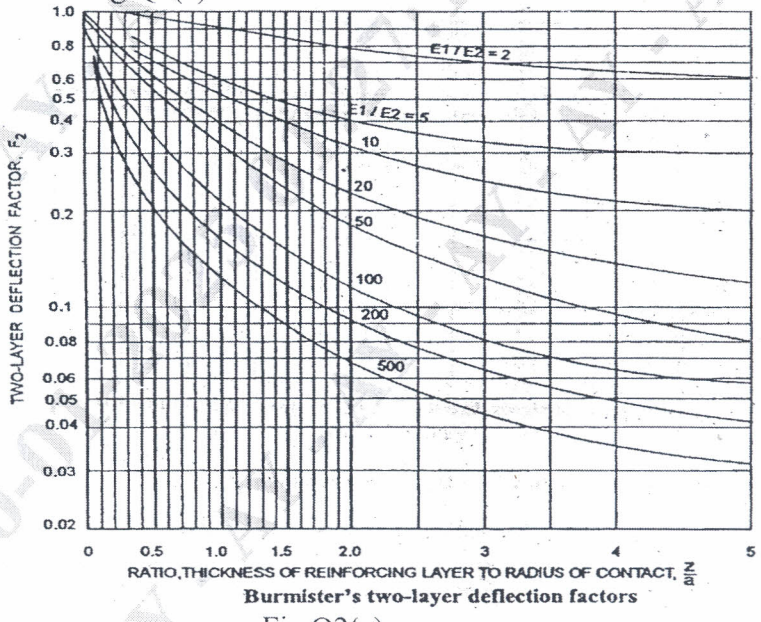
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IRC:37-2001 and IRC:58-2002 is permitted.

Module-1

1 a. Explain the various components of pavements with their function with neat sketch. **(08 Marks)**
b. Write the difference between flexible and rigid pavement. **(06 Marks)**
c. Distinguish between Boussinesq's theory and Burmister theory. **(06 Marks)**

OR

2 a. Compare the salient features of flexible and rigid pavement. **(06 Marks)**
b. Bring out the difference between highway and airport pavement. **(06 Marks)**
c. Plate bearing tests were conducted using 30 cm diameter plates on soil subgrade and over a base course of thickness 45 cm. The pressure yielded at 0.5 cm deflection on the subgrade and base course were 1.25 kg/cm^2 and 8.0 kg/cm^2 respectively.
Design the thickness requirement of flexible pavement for a wheel load at 5100 kg with tyre pressure of 7.0 kg/cm^2 for an allowable deflection of 0.5 cm using Burmister's two-layer deflection factor chart Fig.Q2(c).



Burmister's two-layer deflection factors

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Explain the principle and design steps of McLeod method of pavement design. **(10 Marks)**
b. Explain determination of ESWL by graphical method. Also draw the neat sketch. **(10 Marks)**

OR

4 a. The initial traffic after completion of construction of a four lane divided highway is estimated to be 3500 cv per day. Design the flexible pavement for a life of 15 years using the data given below:
Design CBR value = 8% , growth rate of cv = 6.5% , Average VDF value of cv = 4.0. Use IRC : 37 – 2001. **(10 Marks)**

b. Explain the various factors to be considered for the design of pavement. **(10 Marks)**

Module-3

5 a. Write the principle of Benkelman beam test. Explain the procedure of determining the deflection value at any point on a flexible pavement. **(08 Marks)**

b. Briefly explain the typical types of flexible pavement failures. **(06 Marks)**

c. Explain functional evolution of pavement by unevenness index. **(06 Marks)**

OR

6 a. Write a short note on Falling Weight Deflectometer. **(08 Marks)**

b. Explain briefly the various design factors for runway pavements. **(06 Marks)**

c. Explain maintenance of Bitumenous surfaces. **(06 Marks)**

Module-4

7 a. As per IRC: 58-2002, explain the procedure of design of rigid pavements. **(10 Marks)**

b. Determine the warping stresses at interior edge and corner of a 25cm thick cement concrete pavement with transverse joints at 5.0 interval and longitudinal joints at 3.6m intervals. The modulus of subgrade reaction, k is 6.9 kg/cm^3 and radius of loaded area is 15 cm. Assume maximum temperature differential during day to be 0.6°C per cm slab thickness and maximum temperature differential of 0.4°C per cm slab thickness during the night. Data are given below : $e = 10\times10^{-6}$ per °C ; $E = 3\times10^5$ kg/cm^2 ; $\mu = 0.15$. **(10 Marks)**

OR

8 a. Explain design procedure for design of Tie Bars. **(10 Marks)**

b. The design thickness of a CC pavement is 26 cm considering a design axle load (98th percentile load) of 12,000 kg on single axle and M-40 concrete with characteristic compressive strength of 400 kg/cm^2. The radius of relative stiffness is found to be 62.2 cm. If the elastic modulus of dowel bar steel is 2×10^6 kg/cm^2, modulus of dowel concrete interaction is 41500 kg/cm^3 and joint width is 1.8 cm. Design the dowel bars for 40% load transfer considering edge loading. **(10 Marks)**

Module-5

9 a. List and explain any five types of failures in rigid pavement. **(10 Marks)**

b. With sketches, describe the various types of joints and their requirements, in rigid pavements. **(10 Marks)**

OR

10 a. Explain the desirable properties of subgrade. **(10 Marks)**

b. Explain different methods of pavement evaluation. **(10 Marks)**

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