CBCS SCHEME

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18CV825

Eighth Semester B.E. Degree Examination, June/July 2024
Pavement Design

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Describe the desirable characteristics of pavements. **(10 Marks)**

b. Explain the five important design strategies of pavements. **(10 Marks)**

OR

2 a. Bring out a comparison between the important characteristics of flexible and rigid pavements. **(10 Marks)**

b. List the principles, assumptions and limitations of Boussinesq's theory. **(10 Marks)**

Module-2

3 a. Describe the significance of wheel load and tyre pressure in pavement design. **(10 Marks)**

b. Calculate the design repetitions for 20 years period for various wheel loads equivalent to 22.68 kN wheel load using the following survey data on a 4 lane road.

Wheel load (kN)	ADT, both directions	% of traffic volume
22.68		13.17
27.22	Traffic volume considering growth = 215	15.30
31.75		11.36
36.29		14.11
40.82		6.21
45.36		5.84

(10 Marks)

OR

4 a. Explain the principle and design steps of McLeod method of pavement design. **(10 Marks)**

b. Design a flexible pavement consisting of 80 mm thick bituminous surface with 100 N/mm^2, WBM base course of E value 40 N/mm^2 and 200 mm moorum sub-base course with E value 20 N/mm^2 by Kansas method using the following data:
Design wheel load = 60 kN
P = 0.7 N/mm^2
E value of subgrade = 9 N/mm^2
Traffic coefficient = 11/9
Rainfall coefficient = 0.9 **(10 Marks)**

Module-3

5 a. Describe the general causes of flexible pavement failures. **(10 Marks)**

b. Explain the following: (i) Alligator cracking (ii) Reflection cracking **(10 Marks)**

OR

6 a. Describe the step by step procedure of conducting Benkelman beam deflection studies for structural evaluation of flexible pavement and subsequent determination of overlay thickness. **(10 Marks)**

b. Describe the step-by-step procedure for falling weight deflectometer. **(10 Marks)**

Module-4

7 a. With a sketch, explain how warping stresses are developed in cc pavements. Indicate the Bradbury's equations used to determine warping stresses at the three critical locations. **(10 Marks)**

b. A cc pavement of 200 mm thickness has longitudinal joint at 3.5 m and transverse joint at 4.5 m spacing, modulus of subgrade reaction is 0.1 N/mm^3 and modulus of elasticity of cc is 3×10^4 N/mm^2. Find the wheel load stress at interior, edge and corner regions of the slab due to wheel load of 51 kN with radius of contact area 150 mm. Use Westergaard's equations. **(10 Marks)**

OR

8 a. What are the uses of tie bars in cc pavements? Indicate the steps in design of tie bars. **(10 Marks)**

b. The design thickness of a cc pavement is 260 mm considering a design axle load (98^{th} percentile load) of 120 kN on single axle and M40 concrete with characteristic compressive strength of 40 N/mm^2. The radius of relative stiffness is found to be 622 mm. If the elastic modulus of dowel bar steel is 2×10^5 N/mm^2 modulus of dowel concrete interaction is 415 N/mm^3 and joint width is 18 mm, design the dowel bars for 40% load transfer considering edge loading. **(10 Marks)**

Module-5

9 a. Explain the causes and maintenance of the following in rigid pavements:
(i) Cracks (ii) Joints **(10 Marks)**

b. Explain the common types of failures in rigid pavements. **(10 Marks)**

OR

10 a. Define joint. Explain the types of joints. **(10 Marks)**

b. Explain the functional evaluation of rigid pavement by visual inspection and unevenness measurements. **(10 Marks)**

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