CBCS SCHEME

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15CV833

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

Time: 3 hrs. Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Briefly explain the Pavement Components and functions of components. **(04 Marks)**

b. Write comparison between Flexible and Rigid Pavement. **(04 Marks)**

c. Explain briefly Design factors to be considered in the design of pavement. **(08 Marks)**

2 a. List and briefly explain the assumptions and limitations of Bousinerq's theory. **(08 Marks)**

b. Design the thickness of a flexible pavement by Bunmister's two layer analysis for a wheel load of 40 kW and a tyre pressure of 0.5 MN/m^2. The modulus of elasticity of the pavement materials is 150 MN/m^2 and that of the subgrade is 30 MN/m^2. **(08 Marks)**

Module-2

3 a. With a sketch describe the significance of design wheel load and contact pressure in design of pavement. **(04 Marks)**

b. Explain the concept of Equivalent Single Wheel Load (ESWL). **(04 Marks)**

c. Calculate the design repetition for 20 years period for wheel load equivalent to 2268 kg wheel load using the following traffic survey data on a four lane road.

Wheel load (kg)	Average daily traffic ADT in both directions	% of total traffic volume
2268		13.17
2722	Total volume	15.30
3175	215	11.76
3629	Considering traffic growth	14.11
4082		6.21
4532		5.84

(08 Marks)

4 a. Design a highway pavement using McLeod method of wheel load 6000 kg with tyre pressure of 6 kg/cm^2. The plate load test conducted on subgrade soil using 30 cm dia plate yield a pressure 2.8 kg/cm^2 after 10 load repetitions at 0.5 cm deflection. **(08 Marks)**

b. In a dual wheel assembly the load on each wheel is 32 kN tyre pressure is 0.6 N/mm^2 and c/c wheel spacing 410 mm. The load is placed on a pavement 500 mm thick. The subgrade characterized by E = 20 N/mm^2 and $\mu = 0.5$. Calculate the deflection on the top of subgrade at the radial distance of 0.15 and 250 from the centre of left wheel measured towards other wheel using deflection chart. **(08 Marks)**

Module-3

5 a. Explain typical failures of flexible pavement. **(08 Marks)**

b. Briefly explain the various maintenance works of bituminous surfaces. **(08 Marks)**

6 Write notes on:
a. Roughness measurement **(04 Marks)**
b. Falling Weight Deflectometer **(04 Marks)**
c. Benkelman beam deflection method **(08 Marks)**

Module-4

7 a. Explain:
(i) Radius of relative stiffness
(ii) Equivalent radius of resisting section
(iii) Critical load position **(08 Marks)**
b. A cement concrete pavement of 25 cm thickness is constructed over a granular surface having modulus of reaction 10 kg/cm^3. The maximum temperature different between the top and bottom of the slab during winter is found to be 15°C. The spacing between the transverse joint is 7.5 m. Find the worst combination of stresses at the edge and corner regions. **(08 Marks)**

8 a. Write the step by step procedure for the design of concrete pavement as recommended by IRC 52.2002. **(08 Marks)**
b. Design the size and spacing of dowel bar at the expansion joints of a cement concrete pavement of thickness 25 cm with radius of relative stiffness 80 cm. For a design wheel load of 5000 kg. Assume load capacity of the dowel system as 40% of the design wheel load joint width is 2 cm, permissible shear and flexural stress in the dowel bar are 1000 and 1400 kg/cm^2 and permissible bearing stresses in cement concrete is 100 kg/cm^2 diameter of dowel bar = 2.5 cm. **(08 Marks)**

Module-5

9 a. Explain the failures in Rigid Pavement. **(08 Marks)**
b. Explain different methods of pavement evaluation. **(08 Marks)**

10 a. List the types of joints and explain briefly. **(08 Marks)**
b. List and explain the desirable properties of subgrade. **(08 Marks)**

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