CBCS SCHEME

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15CV833

Eighth Semester B.E. Degree Examination, Feb./Mar. 2022
Pavement Design

Time: 3 hrs. Max. Marks: 80

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

Module-1

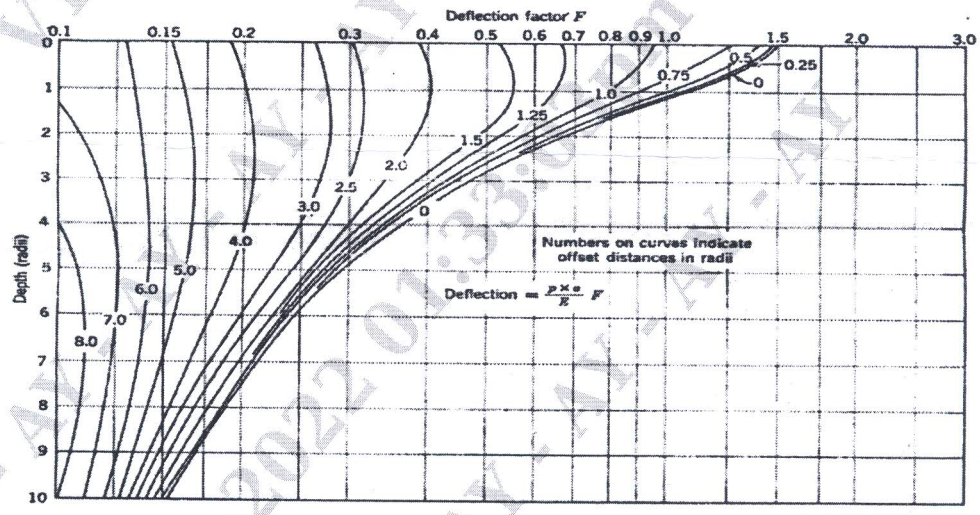
1 a. Compare and differentiate the flexible and rigid pavements. **(08 Marks)**

b. State the assumptions and limitations of Elastic Single Layer theory. **(08 Marks)**

OR

2 a. What are the different layers of Flexible pavements? Explain the functions of each. **(08 Marks)**

b. A dual wheel load assembly with 70KN load on each wheel and contact pressure of 0.7 KN/mm^2 is applied on a homogeneous mass with modulus of elasticity 12N/mm^2. If the centre to centre distance between the two wheels is 600mm, determine the deflection value at a depth of 0.5m at four points, at the centre of dual wheels and at radial distance of 300, 600 and 900mm from this centre along the line joining centres of two wheel loads. Use deflection factor chart given below. **(08 Marks)**



Module-2

3 a. Calculate the ESWL of a dual wheel assembly carrying 2044kg each for pavement thickness of 15cm, 20cm and 25cm. Centre to centre spacing is 27cm and distance between the walls of the tyres is 11cms. (Use Graphical method). **(06 Marks)**

b. Explain the procedure for calculating ESWL for dual wheel tandem axle wheel assembly. **(05 Marks)**

c. Explain the various reasons for frost action in rigid pavements and how it is over come. **(05 Marks)**

OR

4 a. Explain the principle and Mc Leod method of pavement design and indicate how it is different from Triaxial method. **(08 Marks)**

b. Design the pavement section by using Triaxial Kansas method using the following data :
Wheel load = 41 KN ; Design deflection = 2.5mm ;
E value for base course = 4×10^4 KN/mm^2 ; E value for subgrade soil = 10 N/mm^2 ;
E value for wearing course = 100N/mm^2 ; Radius of contact area = 150mm.
Also sketch the pavement section. **(08 Marks)**

Module-3

5 a. Explain the step by step procedure of conducting Benkelman beam deflection studies for evaluation of flexible pavement surface condition. **(08 Marks)**

b. Explain the typical flexible pavement failures with respect to their causes. **(08 Marks)**

OR

6 a. What are the causes of formation of waves and corrugations in flexible pavement? Suggest remedial measures. **(08 Marks)**

b. Benkelman beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer seasons using a dual wheel load of 4085 kg at 5kg/cm^2 pressure. The deflection values obtained in mm after making the necessary lag corrections are given below. If the present traffic consists of 750 commercial vehicles per day, determine the thickness of bituminous overlay required. If the pavement temperature during the test was 39°C and the correction factor for subsequent increase in sub grade moisture content is 1.3. Assume annual rate of growth of traffic as 7.5%. Adopt IRC guidelines.
1.40 , 1.32 , 1.25 , 1.35 , 1.48 , 1.60 , 1.65 , 1.55 , 1.45 , 1.40 , 1.36 , 1.46 , 1.50 , 1.52 and 1.45mm. **(08 Marks)**

Module-4

7 a. Calculate the stresses of interior , edge and corner regions of a CC pavement using Westergaard's Stress equations using the following data :
Wheel load = 5100 kg , E of concrete = 0.3 × 10 E6 kg/cm^2 , μ for concrete = 0.15 , Pavement thickness = 18cm , Modulus of sub grade reaction = 6kg/cm^3 , Radius of contact area = 15cm. **(08 Marks)**

b. Write a note on Combination of stresses for pavement design during different seasons. **(08 Marks)**

OR

8 a. A cement concrete pavement has a thickness of 20cm on a 2 lane road of 7.5m with a longitudinal joint along the centre. Design the dimensions and spacing of tie bars for the following data : Working stress in tension, S_s = 1400 kg/cm^2 density of concrete , W = 2500 kg/m^3 , Friction coefficient = 1.5. Allowable bond stress in concrete S_b = 24.6 kg/cm^2. **(08 Marks)**

b. Explain the functioning of dowel bars with neat sketches, the road transfer mechanism. **(08 Marks)**

Module-5

9 a. Explain with a neat sketch, the mechanism of mud pumping in C.C. pavements constructed on clayey strata. Indicate the remedial measures. **(08 Marks)**

b. Write a note on Pavement Evaluation in detail. **(08 Marks)**

OR

10 a. List the typical failure in rigid pavements and explain any three of them. **(08 Marks)**

b. Explain the causes and maintenance of the following in rigid pavements :
i) Joints ii) Cracks. **(08 Marks)**

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