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CE-7004(1)-CBGS

B.E. VII Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Pavement Design

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Calculate ESWL of a dual wheel assembly carrying 2044 kg each for trial pavement thickness values of 150, 200 and 250 mm centre to centre spacing between the two tyres = 270 mm and clear gap between the walls of the tyres = 110 mm.

   b) Explain various factors affecting the design of flexible pavement.

2. a) Enlist various methods for the design of flexible pavements. Briefly explain the governing factors that influence the design of flexible pavements.

   b) Draw a flow chart indicating the detailed process of mechanistic empirical design of pavement in detail.

3. Explain the plate bearing test procedure for calculation of the modulus of subgrade reaction (K) and how are the correction for the subgrade modulus, K made for a different plate size and for accounting for worst moisture conditions.

4. a) Define Radius of relative stiffness. Estimate the radius of relative stiffness if the thickness of the pavement is 500mm and thickness of slab is 300mm. The elastic modulus of cement concrete is 30,000 MPa and Poisson's ratio of concrete is 0.15 and modulus of subgrade reaction is 60 MPa/m and effective modulus of subgrade reaction is 300MPa/m.

   b) Explain various stresses and strains induced in flexible and rigid pavements. Draw neat sketches indicating critical locations of strains and stresses in both the pavements.

5. a) Explain the working of Benkelman beam for measurement of pavement deflection with the help of a neat diagram.

   b) Explain the following terms:

      i) Alligator cracks

      ii) Reflection cracking

6. Explain the concept of "mud pumping" in CC pavements. How this phenomenon, leads to failure of CC pavement slabs.

7. a) The rebound values of deflection determined at 10 spots are given below. Determine the values of

      i) mean deflection

      ii) standard deviation

      iii) Characteristic deflection for an important highway with heavy traffic.

      Rebound deflection values is mm - are:

      1.50, 1.35, 1.58, 1.68, 1.7, 1.46, 1.59, 1.62, 1.55 and 1.48.

   b) Discuss the various factors to be considered for the design of flexible pavement.

8. a) Compute the radius of relative stiffness of 20 cm thick CC slab using the following data:
Modulus of elasticity of CC = 2.1×10^5 kg/cm^2
Poisson's ratio for concrete = 0.15
Modulus of subgrade reaction 'k' = (i) 3.2 kg/cm^3
(ii) 7.0 kg/cm^3

b) Discuss the advantages and limitations of CBR method of design.

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