

CE-8042 B.E.
VIII Semester Examination, June 2014
Pavement Design (Elective-II)

Time: Three Hours
Maximum Marks: 70

Note: i) Attempt five questions, selecting one question from each unit.

ii) All questions carry equal marks.

iii) Assume suitable data if found missing.

1. a) What do you understand by frost action? Discuss the effects and factors on which the intensity of frost action depends. Suggest measures to prevent or reduce the adverse effects.

b) Define equivalent single wheel load. How is it calculated graphically?

Or

2. a) Explain how climatic variation affects pavement design and performance.

b) How is effect of repetition of load analysed?

3. a) What is Group Index? What is the basis on which thickness of pavement is determined based on group Index? What are the assumptions involved in the use of the design method based on G.I.?

b) Given the following data from a typical North Dakota cone test on a subgrade soil, calculate the cone bearing value.

Load (Kg)	4.5	9	19	36
Penetration Reading (cm)	2.40	3.59	5.26	7.52

Or

4. a) Explain the CBR method of pavement design. How is this method useful to determine thickness of component layers?

b) Calculate the equivalent C-value of a three layered pavement section having individual C-values as given below.

Material Bituminous concrete Cement treated base Gravel sub-base

5. a) Explain how the elastic moduli of subgrade and base course are estimated using plate bearing test data.

b) Determine the spacing between contraction joints for 3.5 m slab width having thickness of 20 cm and $f = 1.5$ for the following two cases:

- i) For plain cement concrete, allowable $S_c = 0.8 \text{ Kg/cm}^2$.
- ii) For reinforcement cement concrete, 1.0 cm dia bars at 0.30m spacing.

Or

6. a) How temperature stresses are found in rigid pavement?

b) Calculate the stresses at interior, edge and corner regions of a cement concrete pavement using westergaard's stress equations. Use the following data:

Wheel load = 5100 Kg, Modulus of elasticity of concrete = $3.0 \times 10^5 \text{ kg/cm}^2$.

Pavement thickness = 18 cm, Poisson's ratio of concrete = 0.15

Modulus of subgrade reaction = 6.0 kg/cm^3 . Radius of contact area = 15 cm.

7. a) Explain with sketches the functioning of sealer. Discuss the desirable properties of effective sealing compounds.

b) Briefly outline the IRC recommendations for determining the thickness of cement concrete pavement.

Or

8. a) What is present serviceability index? How rigid pavement is designed by AASHTO method? Explain step by step.

b) Explain the concept of reliability of cement concrete pavement giving a neat sketch. Discuss the importance of the reliability analysis.

9. a) Discuss how overlays are designed for the existing flexible pavements.

b) Explain the analysis of data, obtained by Benkelman beam.

Or

10. a) How rebound deflection is determined by Benkelman beam? Discuss.

b) How is rigid over lay designed?