



**PART - B**

- 5 a. Explain the following:
- Modulus of subgrade reaction.
  - Relative stiffness of slab to subgrade.
  - Equivalent radius of resisting section. (10 Marks)
- b. Determine the warping stresses at interior, edge and corner regions in a 25 cm thick concrete pavement with transverse joints at 11 m intervals and longitudinal joints at 3.6 m intervals. The modulus of subgrade reaction (K) is 0.069 N/mm<sup>3</sup>. Assume temperature differential for day conditions to be 0.6°C per cm slab thickness. Assume radius of loaded area as 15 cm for computing warping stress at the corner. Take  $e = 10 \times 10^{-6}$  per°C.  $E = 0.3 \times 10^5$  N/mm<sup>2</sup> and  $\mu = 0.15$ . Use the chart in Fig. Q5 (b) (10 Marks)

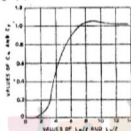


Fig. Q5 (b)

- 6 a. Write a brief note on spacing of expansion and contraction joints. (06 Marks)
- b. Design the size and spacing of dowel bars 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 stresses in dowel bar are 1000 and 1400 kg/cm<sup>2</sup> respectively and permissible bearing stress in CC is 100 kg/cm<sup>2</sup>. (14 Marks)
- 7 a. Explain any four typical flexible pavement failures. (08 Marks)
- b. Benkelman beam deflection studies were carried out on 15 selected points on a stretch of flexible pavement during summer season using a dual wheel load of 4085 kg, 5.6 kg/cm<sup>2</sup> 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 subgrade 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 1.45 mm. (12 Marks)
- 8 Write short notes on any four of the following:
- Rigid pavement failure.
  - Maintenance measures in rigid pavements.
  - Functional evaluation by visual inspection.
  - Uneven measurements.
  - Design factors for runway pavements.
  - Design methods for airfield pavements. (20 Marks)

\*\*\*\*\*