

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/m². The modulus of elasticity of the pavement materials is 150 MN/m² and that of the subgrade is 30 MN/m². (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/cm². The plate load test conducted on subgrade soil using 30 cm dia plate yield a pressure 2.8 kg/cm² 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/mm² and c/c wheel spacing 410 mm. The load is placed on a pavement 500 mm thick. The subgrade characterized by E = 20 N/mm² 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)