USN | | | | | | | | | | 　　　　　　　　　　　**21CV743**

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025
Pavement Design

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

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

Module-1

1　a.　What is Pavement? Describe the desirable characteristics of pavement.　　(10 Marks)
　　b.　Distinguish between highway pavement and airfield pavement.　　(10 Marks)

OR

2　a.　Explain the design strategies of variables for pavement design.　　(06 Marks)
　　b.　List the principle. Assumptions and limitations of the Boussinesq's theory.　　(06 Marks)
　　c.　Design the thickness of flexible pavement by Burmister's 2-layers analysis, for a wheel load of 40 kN and a tyre pressure of 0.5 MN/m^2. The modulus of elasticity of pavement material is the 150 MN/m^2 and that of the subgrade is 30 MN/m^2. The value of F_W, the displacement factor can be taken from the chart.　　(08 Marks)

Module-2

3　a.　With a neat sketch, explain the ESWL concept of dual wheel assembly.　　(10 Marks)
　　b.　Calculate the design repetitions for 10 years period equivalent to 2268 kg wheel load if the mixed traffic in both directions is 1860 vehicles per day. The details of distribution of different wheel loads of commercial vehicles are given below.

Wheel load, kg	2268	2722	3175	3629	4082	4536	4990
% Total traffic volume	25	12	9	6	4	2	1

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(10 Marks)

OR

4　a.　Write a note on CBR method of pavement design by cumulative standard axle load.
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　(10 Marks)
　　b.　List and explain factors influencing the pavement design.　　(10 Marks)

Module-3

5　a.　Explain the typical failures of flexible pavement.　　(10 Marks)
　　b.　Write a short notes on:
　　　　i)　Design factors for runway pavements
　　　　ii)　Maintenance measures in flexible pavements.　　(10 Marks)

OR

6　a.　Briefly explain the common causes of flexible pavement.　　(10 Marks)
　　b.　What is the principle of Benkelman beam test? Explain the procedure for determining the deflection value at any point on the flexible pavement.　　(10 Marks)

Module-4

7   a.   Explain the procedure for design of rigid pavement as per IRC 58-2002.   **(10 Marks)**
    b.   Calculate the stresses at interior. Edge and corner regions of CC pavement using Westergaard's analysis. Use the following data:
    Wheel load = 4100 kg
    $E_c = 2.1 \times 10^5$ kg/cm^2
    Pavement thickness = 20 cm
    Poisson's ratio of concrete = 0.15
    Modulus of subgrade reaction ; $K = 2.5$ kg/cm^3
    Radius of contact area, a = 8.91 cm.   **(10 Marks)**

OR

8   a.   Determine the warping stress at interior, edge and corner regions in a 25 cm thick concrete pavement with transverse joints at 11 m interval and longitudinal joints at 3.6 m, $K = 6.9$ kg/cm^3, t = 0.6°C per cm, slab thickness a = 15 cm, e = 10×10^{-6} per °C, $\mu = 0.15$, $E = 3 \times 10^5$ kg/cm^2.   **(10 Marks)**
    b.   Explain the procedure for "design of Dowel bar" in rigid pavement as per IRC.   **(10 Marks)**

Module-5

9   a.   List the typical failures in rigid pavement. Explain any 3 of them.   **(10 Marks)**
    b.   Write a short note on:
    i)   Properties of subgrade and its function
    ii)   Properties of concrete.   **(10 Marks)**

OR

10 a.   Explain different types of joints in rigid pavement, with the help of neat sketches.   **(10 Marks)**
    b.   What are the necessity of functional evaluation in rigid pavement? Explain briefly the types of functional evaluation of rigid pavement.   **(10 Marks)**

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