

School of Engineering

B.TECH Mechanical Engineering in E-Vehicles and Autonomous Vehicles
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem VI - G3UC601B - Finite Element Method

General Instructions

Answer to the specific question asked

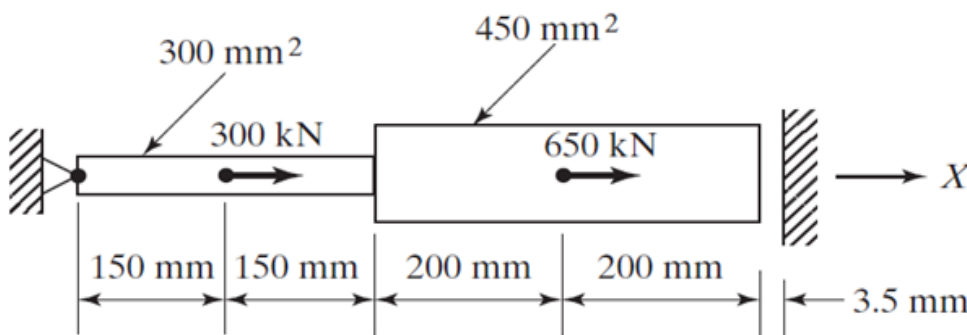
Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Explain the concept of finite elements. K2 (2)
- 2) How does FEM differ from other numerical methods like Finite Difference Method? K1 (3)
- 3) Explain the shape function and their characteristics. K2 (4)
- 4) Relate the fundamental differences between analytical and numerical methods, emphasizing the role of FEM in solving complex engineering problems. K2 (6)
- 5) Plan the key steps involved in the finite element method. K3 (6)
- 6) Identify the differences in the following terms: (i) Nodes, primary nodes, secondary nodes and internal nodes, (ii) Local coordinates, global coordinates, natural coordinates (iii) Higher order elements and lower order elements. K3 (9)
- 7) Using generalized coordinate approach, explain shape functions for two noded bar/truss element. K4 (8)
- 8) Analyse the Galerkin's residual method and its use to derive the one-dimensional bar element equations. K4 (12)

OR

Consider the bar shown in Fig. below. Examine the nodal displacements, element stresses, and support reactions. K4 (12)



$$E = 200 \times 10^9 \text{ N/m}^2$$