

School of Engineering
B.TECH Mechanical Engineering
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem VI - G3UB604C - FEM PBL Mode

General Instructions

Answer to the specific question asked

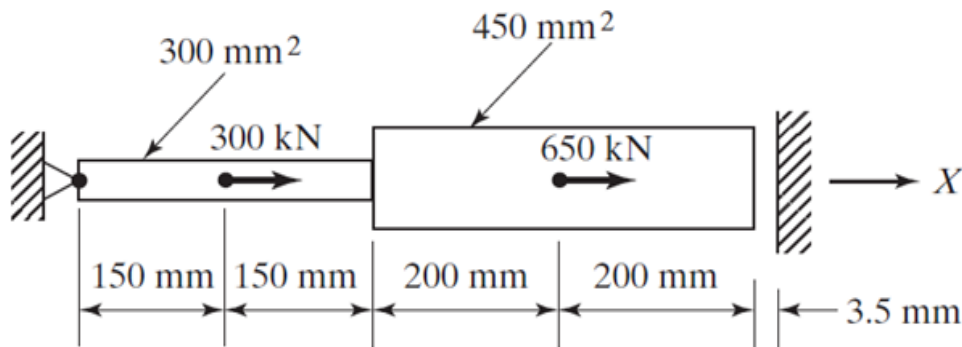
Draw neat, labelled diagrams wherever necessary

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

- 1) Explain the different methods for element equations derivations. K2 (2)
- 2) What is the role of elasticity theory in engineering applications? K1 (3)
- 3) Demonstrate a typical three-dimensional element and indicate state of stress in their positive senses. Also write the Equations of equilibrium. 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 (8)
- 6) Develop the process of deriving element stiffness matrices and load vectors for various types of finite elements, illustrating with examples from structural mechanics. K3 (9)
- 7) Using generalized coordinate approach, examine 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)



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