GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Engineering

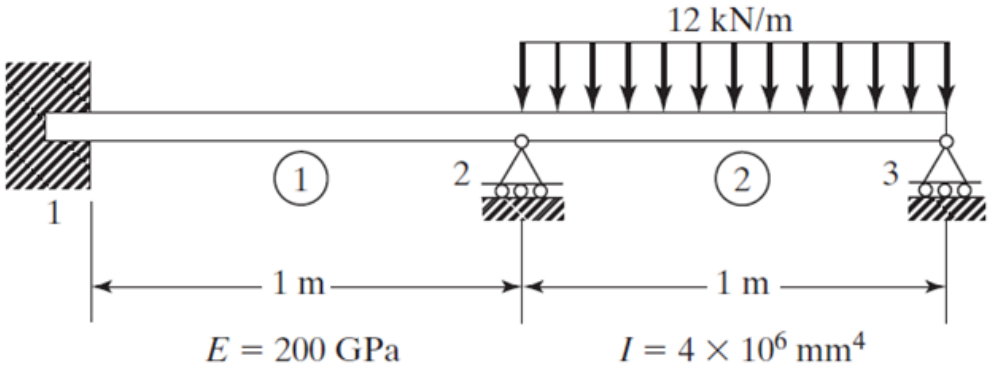
B.TECH Mechanical Engineering in E-Vehicles and Autonomous Vehicles
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem VI - G3UC601B - Finite Element Method

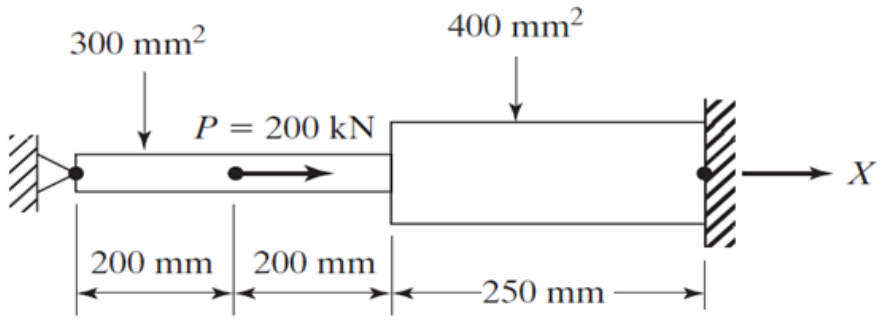
General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	What is Finite Element Method (FEM)?	K1(2)
2)	Explain the different solution techniques in finite element analysis.	K2(4)
3)	Demonstrate the concept of discretization, explaining how continuous problems are approximated into discrete systems.	K2(6)
4)	Develop the strain matrix for a beam element. Use shape functions in natural coordinates form.	K3(9)
5)	Make use of boundary conditions typically defined in finite element analysis of torsional problems.	K3(9)
6)	For the beam and loading shown in Fig. below, Estimate (1) the slopes at 2 and 3 and (2) the vertical deflection at the midpoint of the distributed load	K5(10)



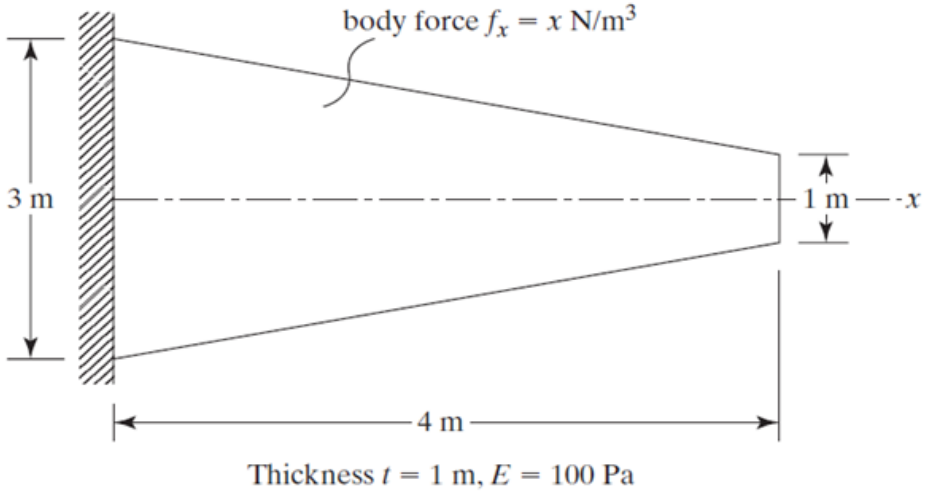
7)	Consider the bar in as shown in figure below. Analyse the nodal displacements, element stresses, and support reactions. Solve this problem by adopting the elimination method for handling boundary	K4(12)

conditions.

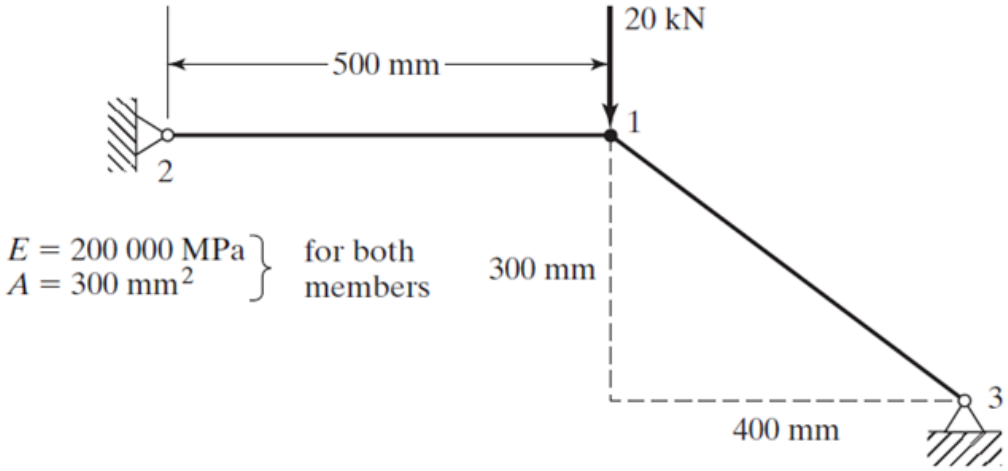


$E = 123 \times 10^3$ N/mm²

8) A tapered plate of uniform thickness of 1 m shown below is subjected to a body force of fx = x acting in the x direction. Solve the problem using two elements. Determine stresses at x= 1.5 m and x= 3m. K5(15)



9) For the two-bar truss shown in Fig. below, determine the displacements of node 1 and the stress in elements 1–3. K5(15)



10) Using Langrange functions, develop shape function for hexahedron (brick) element. K6(18)