

Code: 1G573

IV B.Tech. I Semester Supplementary Examinations October 2020

Finite Element Methods

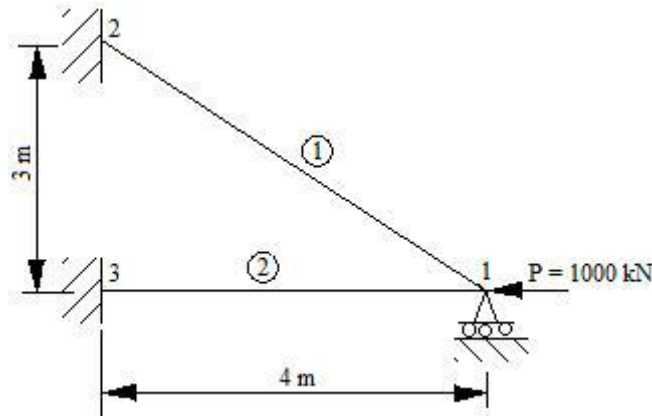
(Mechanical Engineering)

Max. Marks: 70

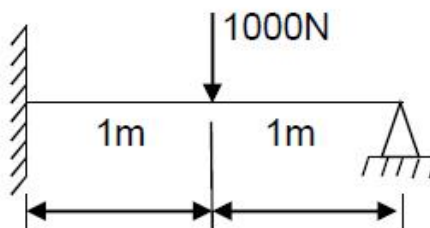
Time: 3 Hours

Answer any **five** questions
All Questions carry equal marks (**14 Marks** each)

- Discuss in detail about the concepts of FEM formulation. How is that FEM emerged as powerful tool
 - List out the advantages and disadvantages of the FEM?
- Derive element strain displacement matrix (B)?
 - Derive the shape functions for Quadratic element
- For the two bar truss shown in Fig. Determine the nodal displacement Take $E=210$ GPa and $A = 600$ mm².



- Solve the following problem using finite element method. Take $E=200$ GPa, $I=10^{-4}$ m⁴



- Discuss the finite element modeling of 2-D stress analysis with CST elements and treatment of boundary conditions.
 - Why the three noded triangular element is called CST? Write the stress strain relations for plane stress and plane strain conditions.
- Derive the strain displacement matrix for 4 noded isoparametric element.
- Define axi-symmetric element and write the constitutive matrix?
 - Derive the strain displacement matrix for an axi-symmetric element?
- Derive the consistent mass matrix for bar and beam element?
