

No. of Pages: 2

C

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2018

Branch: Mechanical Engineering

Stream(s): Machine Design

Course Code & Name: 01ME6103- Finite Element method

Answer any two full questions from each part

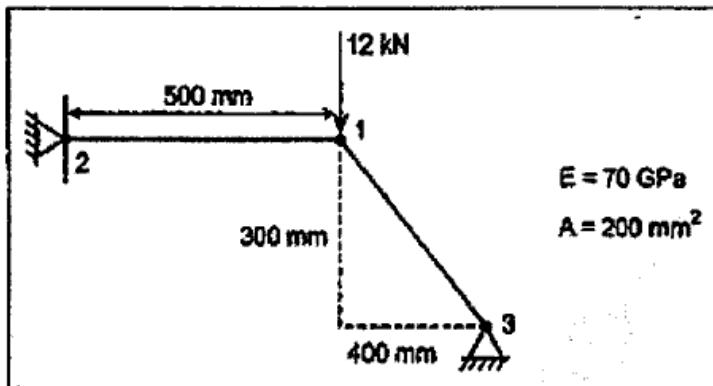
Limit answers to the required points.

Max. Marks: 60

Duration: 3 hours

PART A

1. Derive the stiffness matrix of a truss element. (9)
2. a. Explain the importance of patch test. (4)
b. Explain the various types of refinement methods. (5)
3. For a 2 bar truss shown in figure, determine displacement of node 1 and stress in element 1 to 3. (9)



PART B

4. Derive the stress strain relationship matrix for CST element. (9)
5. Derive the shape function of an LST element. (9)
6. Using Galerkin's method to formulate a finite element for solving the differential equation $\frac{d}{dx} \left(x \frac{dy}{dx} \right) - 4x = 0$ subject to $y(1)=y(2)=0$. (9)

PART C

7. Derive the 1 D shape function for Isoparametric formulation of a bar element. (12)
8. Derive the jacobian matrix for a 4 noded Isoparametric quadrilateral element. (12)
9. Evaluate determinant of J at $\epsilon = \eta = 1/2$ for linear quadrilateral element shown in figure. (12)

