

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)

Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad

III B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, MAY-2018Subject: Finite Element Methods

Branch: ME

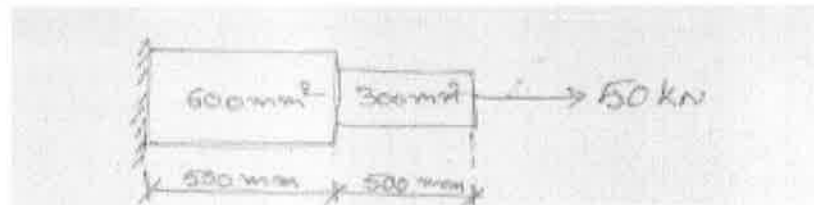
Time: 3 hours

Max. Marks: 75

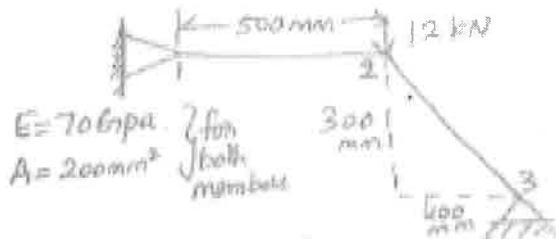
Answer Any 5 questions of the following

5 x 15M=75 M

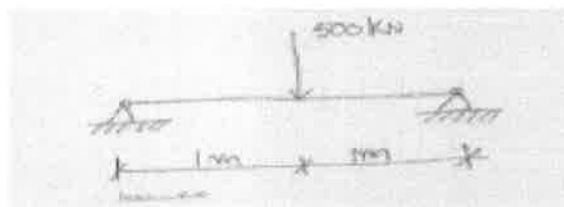
1. a) Derive the stress strain relation matrix for 2-D elastic body for plane strain condition. [8]
b) Write a short note on Weighted Residual Methods. [7]
2. Calculate the displacements, stresses, strains, strain energy and reactions of a stepped bar as shown in figure. $E = 2 \times 10^{11} \text{ N/m}^2$



3. For a two bar truss as shown in figure. Determine displacements at node 2 and stresses in both elements.



4. The beam is subjected to point load as shown in figure. Calculate slope and deflection at the centre. $EI = 700 \times 10^6 \text{ N-mm}^2$



5. a) What are the advantages of CST element. [3]
b) Derive element stiffness matrix for CST element. [12]

6. Calculate the following integral evaluation using 1-point, 2-point, 3-point formulae and compare with exact solution.

$$I = \int_{-1}^{+1} (e^{3x} + x^2 + \frac{1}{x+2}) dx$$

7. a) Write about the modes of heat transfer. [5]
b) Derive the shape function for 1D element by assuming linear variation of temperature [10]
8. Derive the Dynamic equations of motion using Newton's second law for spring mass system.