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, DECEMBER -2018
Subject: **FINITE ELEMENT METHODS**
Branch: ME

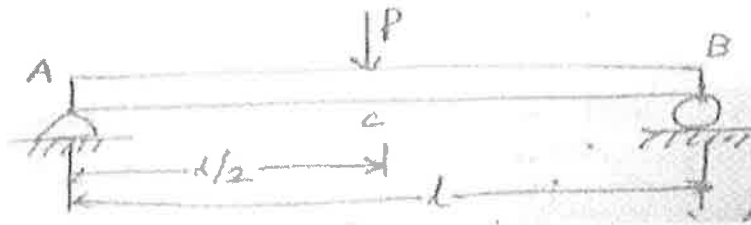Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions of the following   **5x15M=75M**

1. Find the deflection at the centre of simply supported beam of sapn length 'l' subjected to a concentrated load 'p' at its midpoint as shown in figure. Use Rayleigh-Ritz method.


2. For a tapered bar of uniform thickness t = 10mm as shown in figure. Find the displacements at nodes by forming into two element model. The bar has mass density 7800Kg/m^3, E= 2×10^5 MN/m^2. A load at its centre of 1 KN. Also determine reaction forces at the supports.
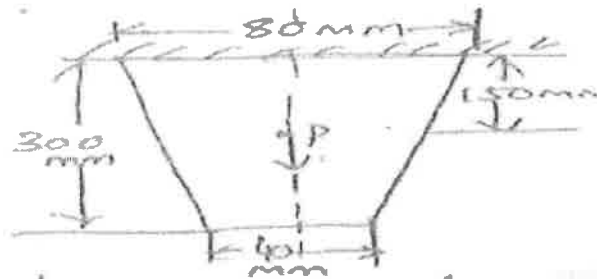
3. The loading and other parameters for a two bar truss element is shown in the figure. Determine the element stiffness matrix for each element, global stiffnes matrix, nodal displacements. Take E= 200GPa.
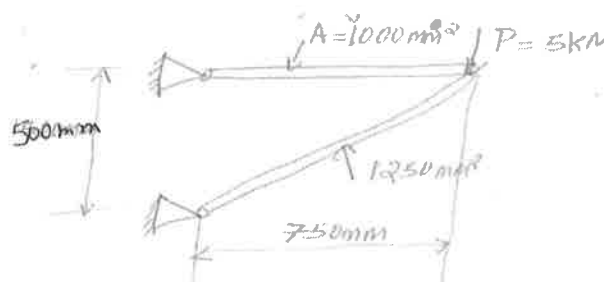
4. The beam is subjected to point load as shown in figure calculate slope and deflection at the centre.

500kN

$EI = 700 \times 10^6 \, N-mm^2$

1 m 1 m
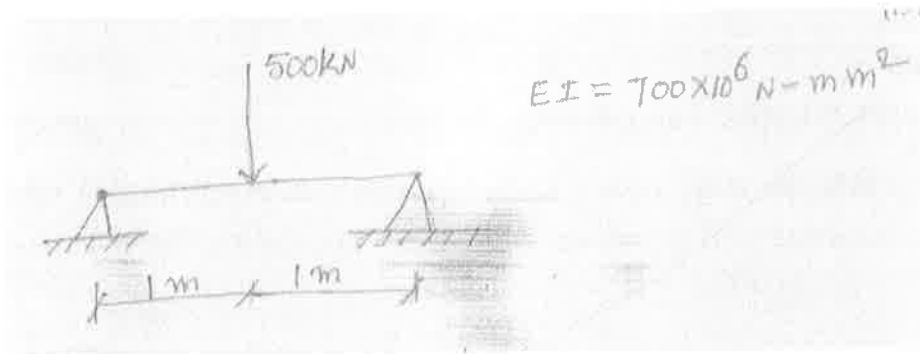
5. Derive shape functions for 2D constant strain triangular element.
6. Explain the various iso-parametric elements and their advantages.
7. Derive heat conduction and heat rate matrices for an one dimensional heat transfer problem.
8. Calculate the natural frequency, displacement of a stepped bar as shown in figure.

$E = 2 \times 10^5 \, N/mm^2$
$\rho = 7200 \, kg/m^3$

500 mm² 250 mm² → 40kN

0.4 m 0.4 m