Code No.: **20322** **MR12**

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-2019

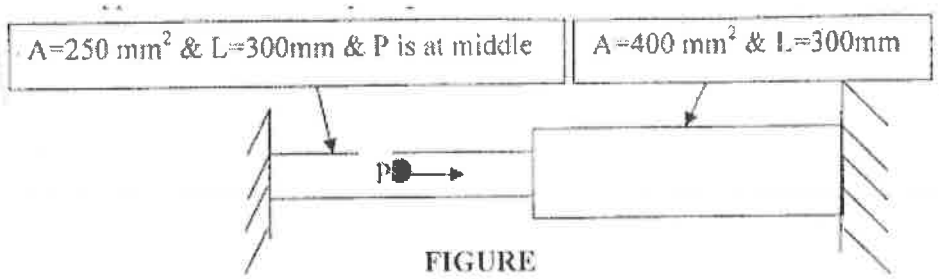
Subject: **Finite Element Methods**

Branch: **ME**

Time: 3 hours **Max. Marks: 75**

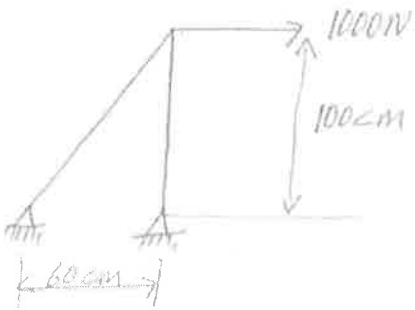
Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

1. a) Stating their applications explain different types of elements used in FEM [5M]
   b) Explain the steps involved in solving a structural problem using FEM with an example. [10M]
2. a) Differentiate between local stiffness matrix and global stiffness matrix and what are the properties of global stiffness matrix. [7M]
   b) Consider the bar in figure loaded as shown. Determine the nodal displacements, element stresses and support reactions. Take young's modulus $E = 2\times10^5 N/mm^2$ and P=300KN. [8M]

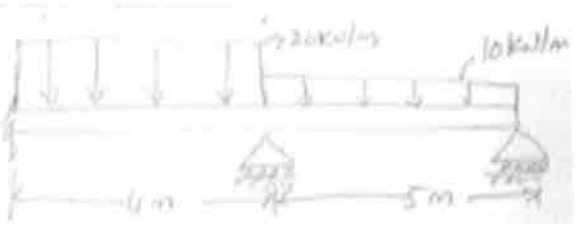


FIGURE

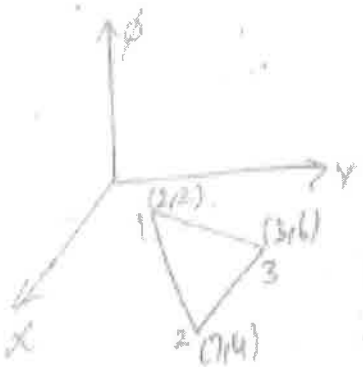
3. The members (1) and (2) are circular in cross section with diameters of 10cm and 20cm respectively. Determine the displacement at the node where load is acting as shown in figure. Take $E= 2\times10^6 N/cm^2$.



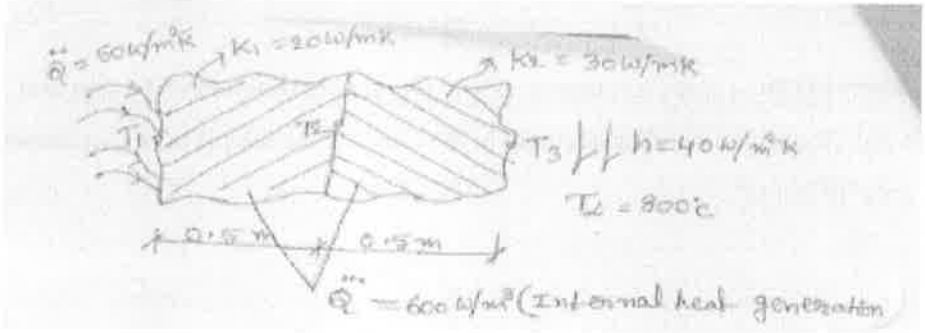
4. For the beam shown in figure. Compute slope at the hinged support points Modulus of Elasticity E= 200GPa and I=4×10^{6} m^4. Use two beam element.



5. Derive the Stiffness matrix for 3-Noded Triangular element.
6. Derive shape functions for 3 noded triangular element for the figure. The temperature at node 1, 2 and 3 are 75°C, 90°C and 60°C. Find the temperature at point P(4,3).



7. Calculate the temperature at the junction points of a composite wall shown in figure.



8. Find the natural frequencies of longitudinal vibration of the unconstrained stepped bar as shown in figure.