PVP 12

Code: **MEMD1T4**

I M.Tech - I Semester - Regular Examinations – March 2014

FINITE ELEMENT METHODS
(MACHINE DESIGN)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. Using Raleigh-Ritz method find the displacement of the mid point of the rod shown in fig.1. Take E=200 GPa, A=40mm^2 and density of the rod material as 7800 kg/m^3. 14 M

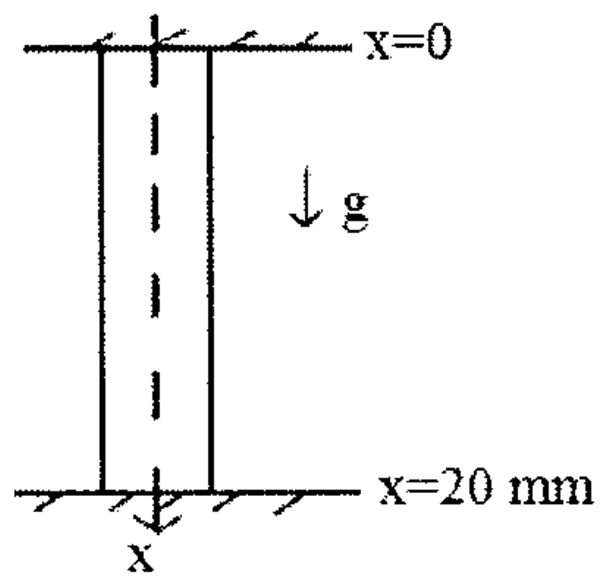


Fig.1

2. Derive the stiffness matrix for a 3 noded bar element using quadratic shape functions. 14 M

3. Calculate the nodal displacements, stresses and reactions for the truss subjected to a force P= 5KN shown in fig. 14 M

Element	Area(sq.mm)	Length(mm)
1	20	600
2	10	400

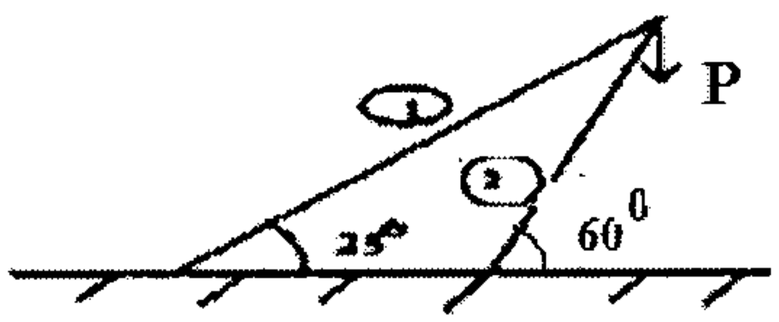
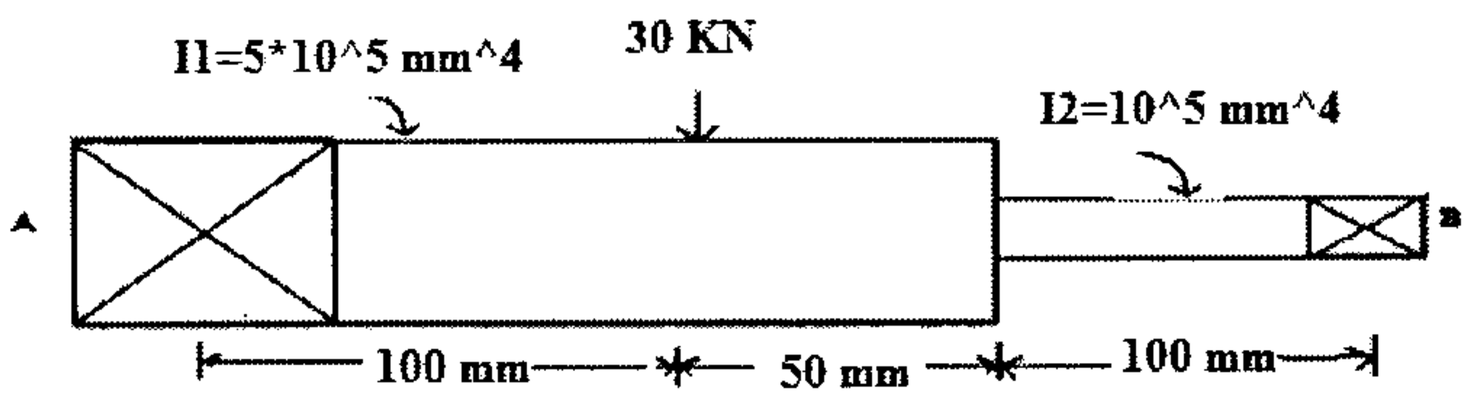


Fig.2.

4. Find the deflection at the load and slopes at the ends for the steel shaft shown in fig.3 below. Consider the shaft to be simply supported at bearings A and B. 14 M



E for shaft material = 200GPa

Fig. 3.

5. Compute the element matrices and vectors of 2-D triangular element shown in fig 4, for a steady state heat conduction transfer . 14 M

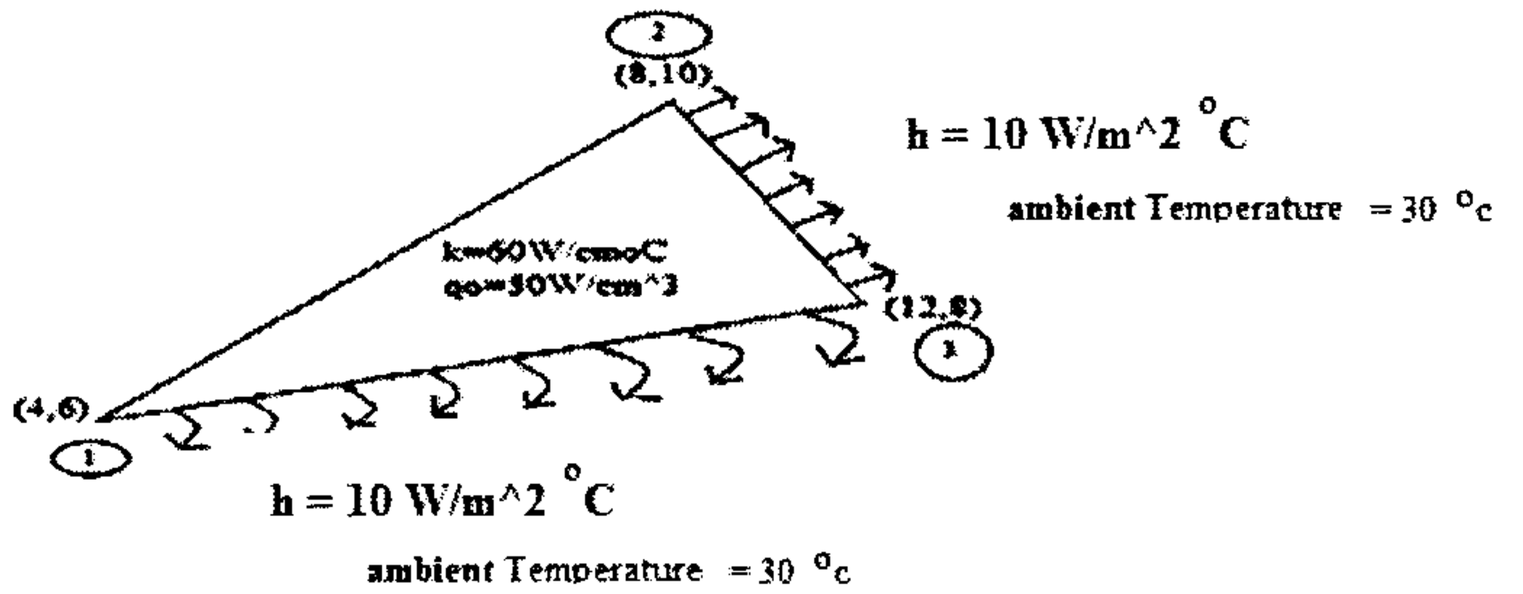


Fig 4

6. a) How the use of Isoparametric finite element is more effective in the practical engineering analysis? Explain. 4 M

b) Compute the Strain-displacement matrix for the Isoparametric four node finite element. 10M

7. Calculate the first two Eigen values and the corresponding Eigen modes for simply supported beam of length l, density ρ and cross sectional area A and moment of inertia I. 14 M

8. Explain the following:-
   a) h-refinement and p-refinement. 7 M
   b) Pascal's triangle. 7 M