

Code: MEMD1T4

I M.Tech-I Semester-Regular Examinations-April 2013

**FINITE ELEMENT METHODS
(MACHINE DESIGN)**

Duration: 3 hours

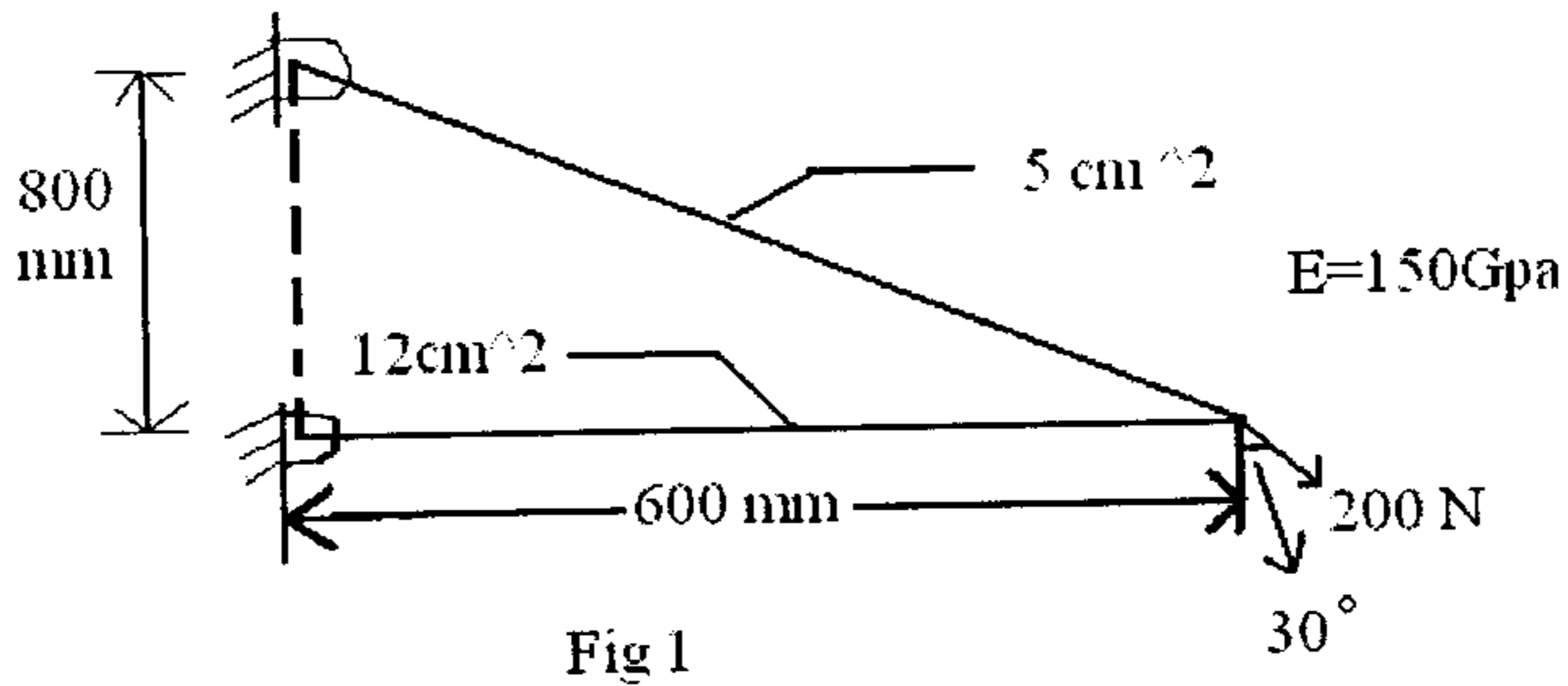
Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

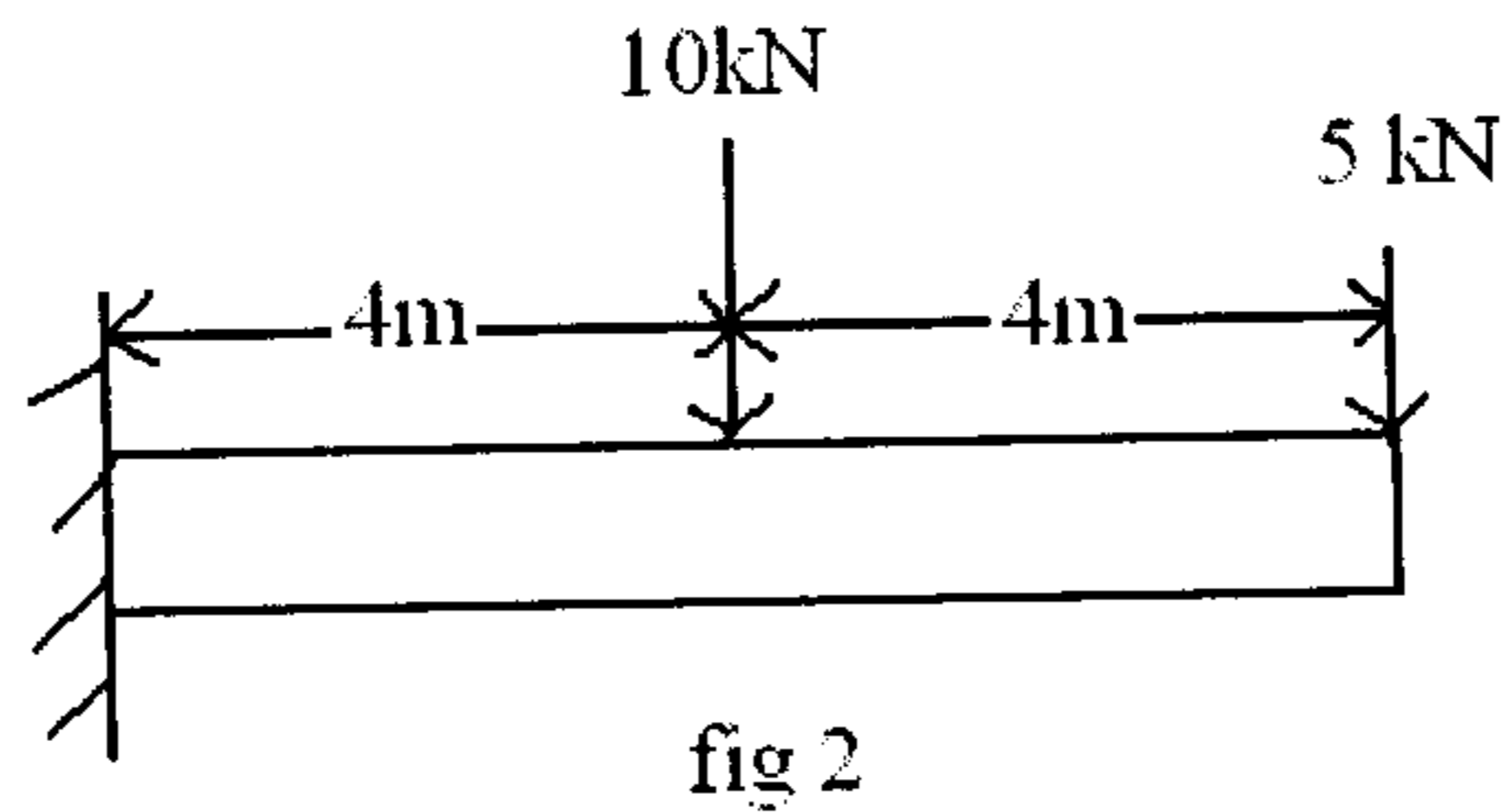
1. a) Clearly explain the variational formulation in finite element analysis to obtain the solution for a one dimensional axial element in solid mechanics. 7 M
- b) Distinguish plane stress and plane strain problems. 7 M

2. a) Distinguish between local, natural and global co-ordinates taking one dimensional linear element. 7 M
- b) Derive the material matrix [D] for a plane stress problem using generalized Hooke's law relations. 7 M

3. Calculate the nodal displacements, stress and support reactions for the truss shown in Fig.1. 14 M



4. Calculate the nodal displacements for the beam loaded as shown in Fig.2. 14 M



5. Clearly explain the axisymmetric formulation using Galerkin's approach. 14 M

6. Discuss the formulation of 2D quadrilateral isoparametric finite element. Indicate its applications in machine structures.

14 M

7. Determine the Eigen values for a stepped bar in axial vibrations shown in fig 3.

$E=200\text{GPa}$

$\rho=7800\text{Kg/m}^3$

14 M

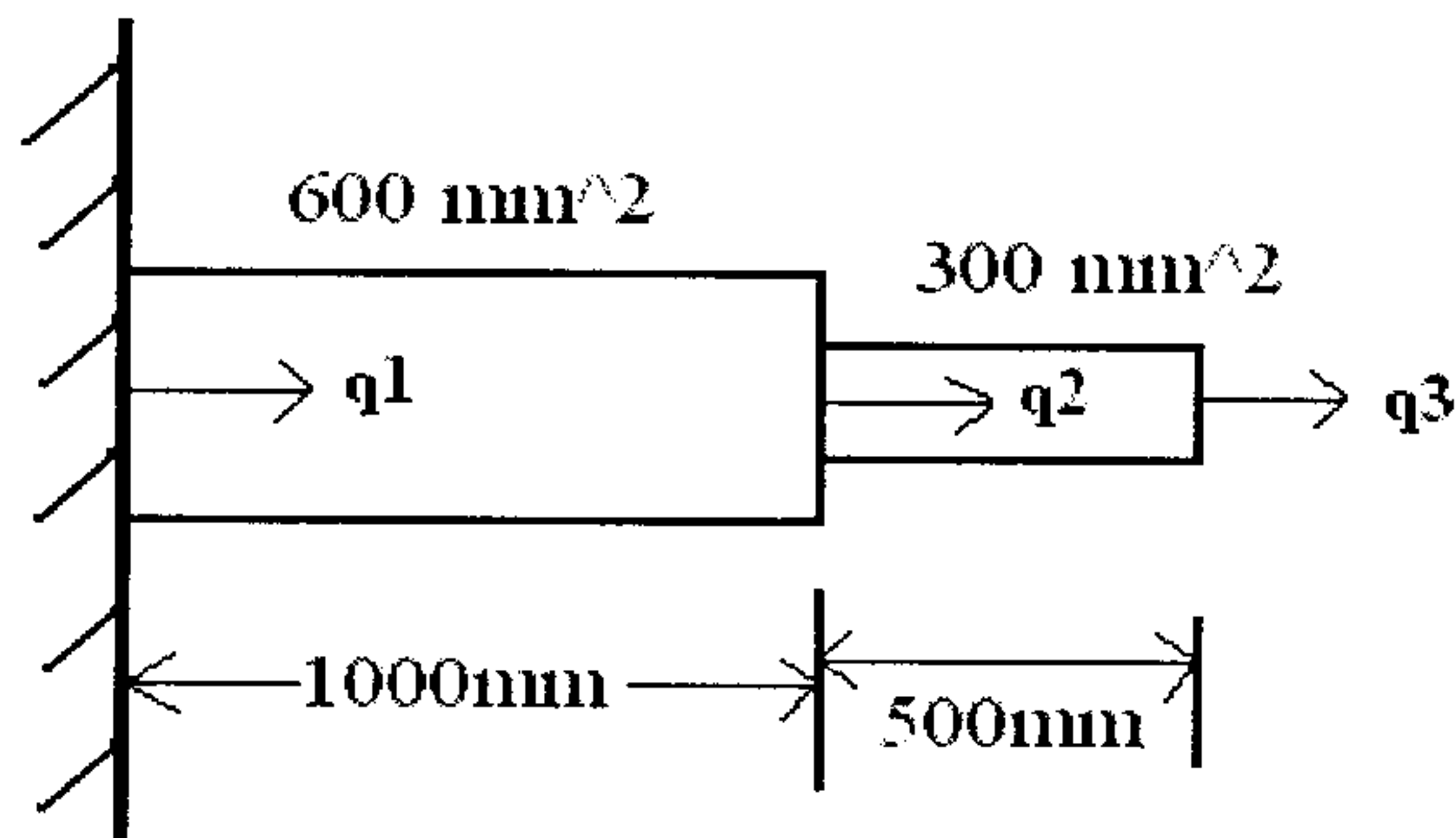


fig 3

8. Explain the following:-

a) Convergence requirements of an interpolating polynomial

7 M

b) Serendipity formulation

7 M