M. Tech. Mechanical Engineering Design (CBCS) Semester-II

MED22 - Finite Element Analysis

P. Pages : 2 **GUG/S/25/14194**

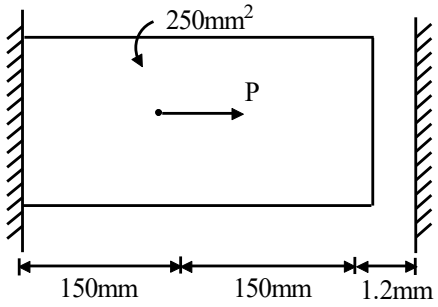
Time : Three Hours * 2 4 8 8 * Max. Marks : 70

Notes : 1. All questions carry equal marks.
2. Answer **Five** questions.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Diagrams and Chemical equation should be given wherever necessary.
6. Illustrate your answers wherever necessary with the help of neat sketches.
7. Solve **any five** questions.

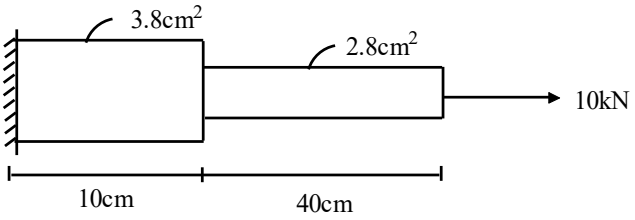
1. A) Explain in brief the principle of minimum potential energy. **7**

B) Explain in brief the type of element used in FEM along with their characteristics. **7**

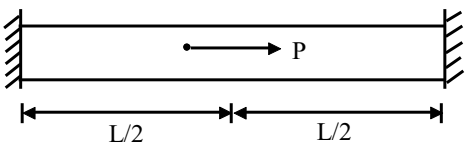
2. A load of $P = 60\times10^3 N$ is applied as shown. Determine the displacement, stresses and support reaction in the body, Take $E = 20\times10^3\ N/mm2$ **14**



3. Find the displacement, reaction force and stresses induced in bar. **14**

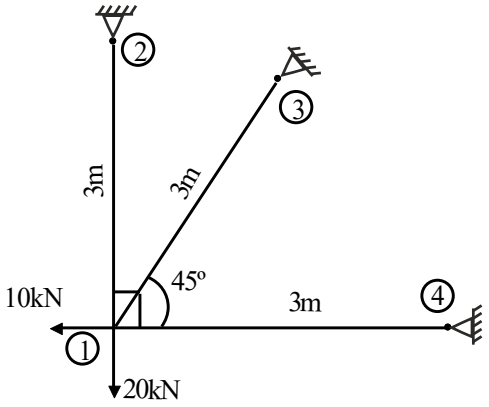


4. Use Rayleigh – Ritz method to determine stresses and displacements in the elastic bar as shown in fig. **14**



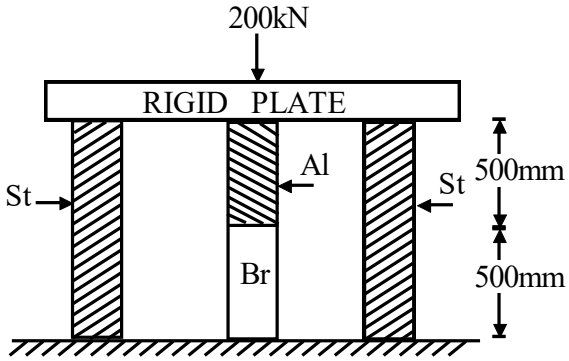
L=1000 mm, A=100 mm2
E = 200 GPa P = 10kN

5. For the plane truss shown in figure, Determine the vertical and horizontal displacement of node (1) and the stresses in all elements. The cross sectional area of all elements is 400 mm^2 and elastic constant is 200 GPa. **14**



6. Figure shows blocks supporting rigid plate loaded with 200 kN. Determine the stresses induced in each element and reactions at support. The material properties are **14**

Material	Area mm^2	Elasticity N/mm^2
Steel (st)	200	2×10^5
Aluminum (A1)	370	7×10^4
Brass (Br)	370	8.8×10^4



7. Write a note on **any two.** **14**

1) Modelling Technique.

2) Iso-parametric Formulation

3) Solution Technique

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