M.Tech. Structural Engineering & Construction (CBCS Pattern) Semester-II

PSES21 - Finite Element Method

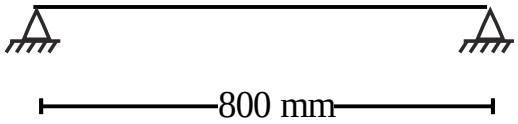
P. Pages : 2 **GUG/W/24/11013**

Time : Three Hours * 4 1 6 3 * Max. Marks : 70

Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Solve **any five.**

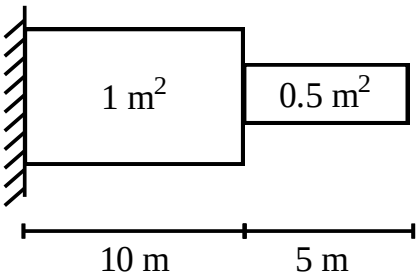
1. Determine all natural frequencies of simply supported beam as shown in figure **14**

$E = 200\,GPa \quad \rho = 7850\,kg/m^3 \quad I = 2000\,mm^4$

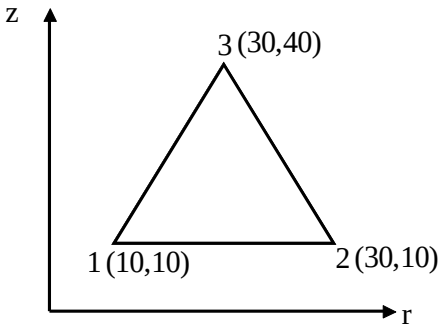


2. Determine Eigen value and Eigen vector for the stepped bar shown in figure **14**

$\rho = 7850\,kg/m^3 \quad E = 30\times10^4\,N/m^2$



3. Nodal Co-ordinate for an axis-symmetric elements are given below evaluate stiffness matrix $E = 2\times10^5\,N/mm^2 \quad \partial = 0.25.$ **14**



4. a) Briefly discuss elimination approach to handle boundary condition for solution of system of equation. **7**

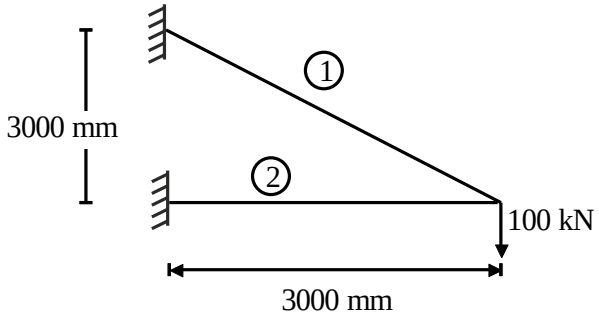
b) Define shape function, derive shape function in term of cartesian co-ordinate. **7**

5. a) Describe procedure involved in finite element method. **7**

b) Write the advantages and disadvantages and application of FEM. **7**

6. For a two bar truss shown in figure determine the displacement and stress **14**

$A_1 = 500\,mm^2 \quad A_2 = 1200\,mm^2 \quad E = 2\times10^5\ N/mm^2$



7. a) Derive the strain displacement relationship for 2D element. **9**

b) Define ISO-parametric, super parametric and sub parametric element. **5**

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