

Code No: H8701/R13

M. Tech. II Semester Supplementary Examinations, May-2017

FINITE ELEMENT METHOD

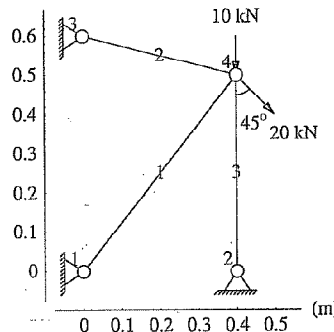
(Common to SE &SD, SM&FE, GE)

Time: 3 Hours

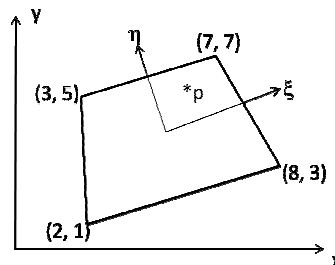
Max. Marks: 60

Answer any FIVE Questions  
All Questions Carry Equal Marks

- Using Rayleigh-Ritz method find the approximate displacement of uniform bar (EA constant) fixed at one end and subjected to a static point load at the other end. The bar is also subjected to a linearly varying axial load  $q(x)=cx$ , where c is a given constant. Compare the linear and quadratic solution. 12 M
- Using minimum potential energy approach, derive the stiffness matrix and consistent load matrix 12 M
- Write the steps involved in FEM for a structural mechanics problems solution with formulations 6M
  - Write the concept of FEM with example. Explain the Software's based on FEM. 6M
- Find the nodal displacement and member forces for the truss shown in figure 12 M

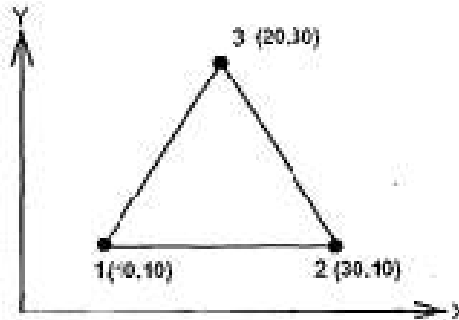


- Define with neat sketch, Iso-parametric, Super-parametric and Sub-parametric elements 6M
  - Determine the Cartesian coordinates of the point P( $\xi=0.7, \eta=0.6$ ) shown in figure 6M



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6. A propped cantilever beam of length 10 m carries a concentrated load of 20kN at the centre of span.  $EI=48 \times 10^5 \text{N-m}^2$ . Determine deflection under the load and shear force and bending moment at mid span. 12 M
7. Derive the shape function for three noded CST element and draw the variation of shape functions. 12 M
8. A plate of dimensions 15cm x 6cm x 1cm is subjected to an axial pull of 15kN. Assuming a typical element is of dimensions as shown in figure. Find shape functions at point (15, 20). Determine the strain displacement matrix and constitutive matrix.  $E=200\text{GPa}$ ,  $\mu=0.3$  12 M



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