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BIMEE-013

B. TECH. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2019

BIMEE-013 : FINITE ELEMENT METHOD

Time : 3 Hours *Maximum Marks : 70*

Note : *Attempt any five questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. (a) Define FEM. Give the details of element shapes employed for modelling components. 7

   (b) What are the various types of analyses carried out by using FEM ? Explain in detail. 7

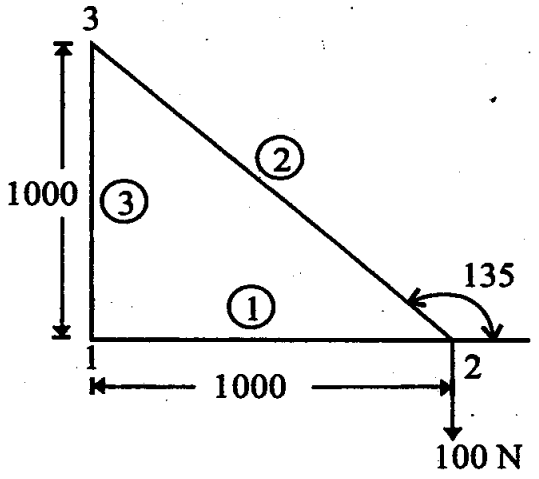
2. (a) Define shape function. Write the shape function of a four-noded quadrilateral element. 7

   (b) Derive one-dimensional steady state heat conduction equation. 7

3. (a) Discuss about isoparametric elements. Describe features and characteristics. 7

   (b) What do you understand by finite element model ? Explain modelling of mechanical components with suitable example. 7

4. Figure shows a truss consisting of three elements with $\frac{EA}{L}$ valve of each as 1000 N/mm. Calculate the deflection at node 2. 14



All dimensions are in mm.

5. (a) Distinguish between a truss and a frame. 7

   (b) Explain the steps involved in the analysis of beams. 7

6. (a) Determine the matrix relating strain and nodal displacement for an axisymmetric triangular element. 7

   (b) What is connectivity in finite element models ? Explain with a suitable example. 7

7. Write short notes on any *four* of the following : $3\frac{1}{2}$ each

   (a) Boundary condition

   (b) Galerkin approach

   (c) Influence coefficients

   (d) Mesh generation

   (e) Degree of freedom