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BIMEE-013

B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

December, 2017

00502

BIMEE-013 : FINITE ELEMENT ANALYSIS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted. Standard symbols and notations have their usual meaning.*

1. (a) What are the various types of analysis carried out by using FEM ? Elaborate. 7

   (b) What are the reasons to apply FEM in a thermal analysis problem ? Explain in detail, choosing your own example. 7

2. (a) Discuss Isoparametric Element. Describe its features and characteristics. 7

   (b) Describe the following : 7

   (i) Rayleigh-Ritz method

   (ii) Galerkin approach

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

(b) Determine the constant load vector for a CST element under the action of gravity acting in the plane of the element. 7

4. (a) How can a three-dimensional problem be reduced into a two-dimensional approach ? Explain in detail. 7

(b) Compare the variational and weighted residual methods in detail. 7

5. (a) Develop stiffness matrix equation and shape functions for an axi-symmetric triangular element. 7

(b) Distinguish between the following : 7

(i) Essential boundary condition and Natural boundary condition

(ii) Boundary value problem and Initial value problem

6. Figure 1 shows a truss consisting of three elements whose $\frac{EA}{L}$ value is 1000 N/mm. Calculate the deflection at node 2. *14*

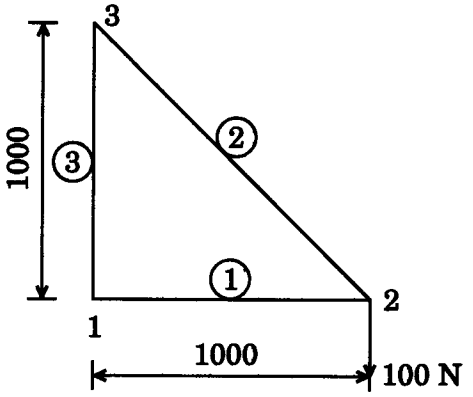

Figure 1

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Post Processing

(b) Co-ordinate System

(c) Degree of Indeterminacy

(d) Static and Dynamic Analysis

(e) Variational Functions

(f) Dimensionability