

**B.Tech. MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

December, 2018

00065

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 notations and symbols have their usual meaning.

1. (a) What are the various types of analyses carried out by using FEM ? Explain in detail. 7
- (b) What do you understand by a finite element model ? Explain, with an example, modelling of a mechanical component. 7
2. Discuss in detail about the concepts of FEM formulation. Explain with step by step procedure. Also discuss the major applications of FEM. 14

3. (a) Using Galerkin approach, derive the element stiffness matrix for a 1-D bar problem. 7
- (b) How do you classify the elements used in FEM ? Describe their features and characteristics. 7
4. (a) Define shape function. Write the shape function of a four-noded quadrilateral element. 7
- (b) Distinguish between 7
- (i) Essential boundary condition and Natural boundary condition
- (ii) Boundary value problem and Initial value problem
5. (a) Explain the steps involved in the analysis of beams. 7
- (b) Two rods of stiffness 12 kN/mm and 8 kN/mm are connected as shown in Figure 1 given below and are subjected to a load of 6 kN at node 3. The system is fixed at node 1. Determine the displacement at node 2 and node 3. 7

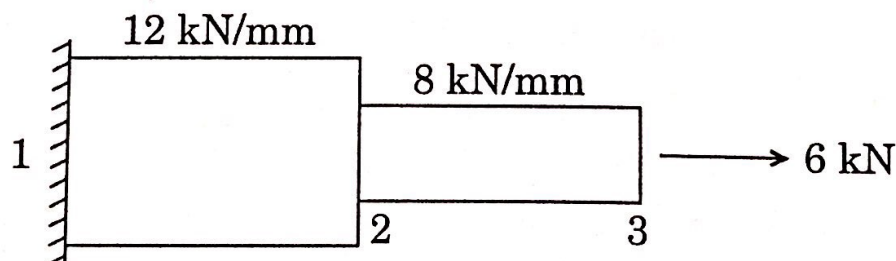


Figure 1

6. (a) How can a three-dimensional problem be reduced to a two-dimensional approach ? Explain in detail. 7
- (b) Distinguish between a truss and a frame. 7
7. Write short notes on any **four** of the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Degree of Freedom
 - (b) Co-ordinate System
 - (c) Influence Coefficients
 - (d) Mesh Generation
 - (e) Static and Dynamic Analysis
 - (f) Weight Factors
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