

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

Term-End Examination

June, 2016

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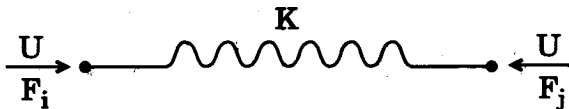
BIMEE-013 : FINITE ELEMENT ANALYSIS

Time : 3 hours

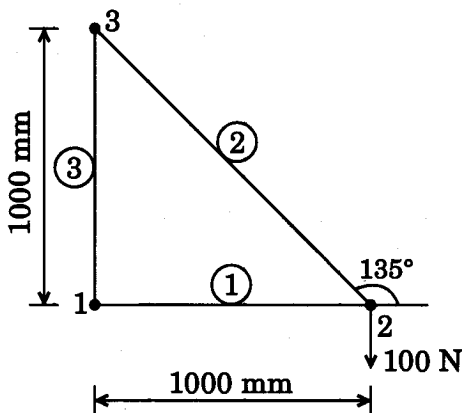
Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks. Standard notations and symbols have their usual meaning.

1. (a) Define FEM. Give the details of element shapes usually employed for modelling components. 7
- (b) What are the various types of analyses carried out by using FEM ? Explain in detail. 7
2. (a) How would you formulate a frame element that would be able to model a buckling problem ? Explain. 7
- (b) Derive the stiffness matrix for a spring element consisting of 2 nodes with a single degree of freedom (axial deflection) at each node. 7



3. (a) Discuss about Isoparametric elements. Describe its features and characteristics. 7
- (b) Describe the following briefly : 7
- (i) h and p versions of FEM
- (ii) Rayleigh-Ritz method
4. The figure given below shows a truss consisting of three elements whose $\frac{EA}{L}$ value is 1000 N/mm. Calculate the deflection at node 2. 14



5. (a) Distinguish between a truss and a frame. 7
- (b) How can a three-dimensional problem be reduced to a two-dimensional approach? Explain in detail. 7

6. (a) Explain the steps involved in the analysis of beams. 7
- (b) Compare the variational and weighted residual methods in detail. 7
7. Write short notes on the following : $4 \times 3 \frac{1}{2} = 14$
- (a) Degree of Freedom
- (b) Boundary Condition
- (c) Co-ordinate System
- (d) FEA Software Packages
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