Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

FEME 6301(New)

Sixth Semester (Back) Examination – 2013

FINITE ELEMENT METHOD

BRANCH : MECH

QUESTION CODE : B263

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What is meant by Finite element ?

   (b) What is discretization?

   (c) What is meant by degrees of freedom ?

   (d) What is an isoparametric element ?

   (e) What is a truss element ?

   (f) During discretization, mention the places where it is necessary to place a node ?

   (g) What is meant by shape functions ?

   (h) Write down the constitutive law.

   (i) What are the advantages of post processing in FE analysis ?

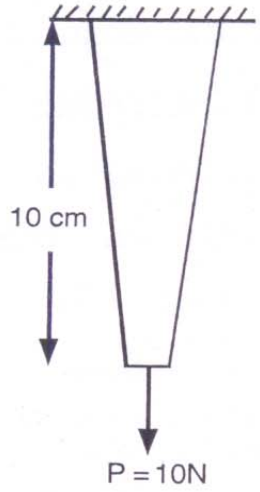
   (j) Name two FEA softwares.

2. Describe the general steps of the finite element method. 10

3. Derive the stiffness matrix for a 2-noded one dimensional bar element. 10

P.T.O.

4. The tapered bar shown in Figure below under an axial load of P = 10 N. The Cross sectional area at root = 4 cm^2, Cross sectional area at end = 1 cm^2. Using two elements find the displacement at nodes.
Take Young's modulus = 2×10^7 N/cm^2 10



5. (a) Define axisymmetric problem with example. 2
(b) Derive the shape functions for a constant strain triangular elements. 8
6. Find out the shape functions for a 2-D frame structure. 10
7. (a) Define natural coordinates. 2
(b) Derive the general finite element equation for force. Extend it for a three elements of two nodded one dimensional bar elements. 8
8. Write short notes on any **two** : 5×2
(a) Advantages and disadvantages of FEM
(b) Plane stress and plain strain problems
(c) Variational methods
(d) Global and local coordinates
