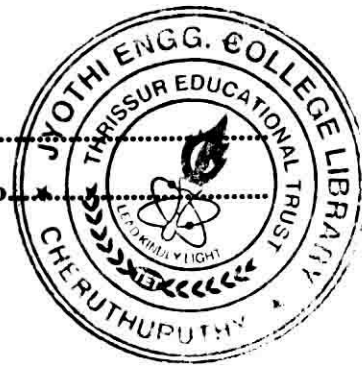


**C 61487**

(Pages 2)

Name.....

Reg. No.....



**SIXTH SEMESTER B.TECH. (ENGINEERING)  
DEGREE EXAMINATION, APRIL 2014**

(2009 Scheme)

**ME/PTME 09 602—FINITE ELEMENT METHOD**

(Regular/Supplementary/Improvement)

Time : Three Hours

Maximum : 70 Marks

**Part A**

*Answer all questions.*

*Each question carries 2 marks.*

1. Define element stiffness matrix for a plane truss element.
2. What is meant by pre processing ?
3. Differentiate local and global co-ordinate system.
4. What is weak formulation ?
5. What is Gauss quadrature ?

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

*Each question carries 5 marks.*

6. Derive element stiffness matrix for a beam element.
7. Explain bandwidth of a stiffness matrix.
8. Derive the strain displacement matrix for a bar element..
9. How do we arrive at global stiffness matrix ? What is its importance ?
10. Which are the two major methods of mesh refinement ? Also explain its importance in FEA.
11. "Isoparametric elements uses shape functions to interpolate displacement field and element geometry" – Explain.

(4 × 5 = 20 marks)

**Turn over**

**Part C**

*Answer all questions.*

**MODULE I**

12. Explain in detail the steps involved in the structural problem of FEM with a suitable example.

*Or*

13. Briefly describe the historical development of FEM as a numerical tool. Explain the advantages and limitations of FEM.

**MODULE II**

14. Explain a constant strain triangular Element. Write the displacement in terms of nodal displacements. Also write the strain components in terms of nodal displacements.

*Or*

15. What are the properties of Shape functions ? Explain Lagrange's one dimensional linear and quadratic interpolation formulae with a plot.

**MODULE III**

16. Derive the conductance matrix for two dimensional heat transfer and explain its boundary conditions.

*Or*

17. Determine the deflection of a cantilever beam of length  $L$  and loaded with a vertical load  $P$  at the free end by Rayleigh Ritz method. Use a trial function,  $y = a \left( 1 - \cos \left( \frac{\pi s}{2L} \right) \right)$ .

**MODULE IV**

18. Describe the derivation of Finite Element equations using Galerkin Approach.

*Or*

19. Write short notes on any *three* of the following :—

- (a) Isoparametric Elements.
- (b) Gaussian Quadrature.
- (c) Jacobian Matrix.
- (d) Weighted Residual Methods.

(4 × 10 = 40 marks)