

Roll No .....

## MVSE-202

M.E./M.Tech., II Semester

Examination, December 2016

### FEM in Structural Engineering

Time : Three Hours

Maximum Marks : 70

- Note : i) Attempt any five questions.  
ii) All questions carry equal marks.  
iii) Assume suitable data, if necessary.

1. Find the approximate deflection of a simply supported beam under a centrally loaded concentrated load using Rayleigh-Ritz, Galerkin, finite difference and finite element method. 14
2. Explain Jacobi and power method for finding Eigen values and Eigen vectors. Find Eigen values and Eigen vectors of following matrix : 14

$$A = \begin{bmatrix} 1 & 3 & 0 \\ 3 & 3 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

3. What is the use of Hermitian Interpolation function? Derive shape functions for a 6-noded quadrilateral element. 14
4. Differentiate between : 14
  - a) Global co-ordinates and local co-ordinates
  - b) Primary nodes and secondary nodes.

5. Explain Runge-Kutta method of numerical integration, show how it helps in FEM solution by an example? 14
6. Describe in detail "Discretisation of the domain" in FEM. 14
7. a) Describe the Gaussian elimination method for solving simultaneous equation.  
b) Describe the application of FEM in solving the propagation problems. 14
8. Write short notes on any four of the following : 14
  - a) Incorporation of Boundary conditions
  - b) Isoparametric, sub-parametric and super-parametric elements.
  - c) Plane stress and plane strain element
  - d) Static condensation
  - e) Iterative method of solution
  - f) Aspect ratio

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