Roll No.....

MVSE - 202

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

Examination, July 2015

FEM in Structural Engineering

Time : Three Hours

Maximum Marks : 70

Note : i) Answer any five questions.
ii) All questions carry equal marks.
iii) Assume suitable data, if missing.

1. a) Compare finite element method with other methods.
   b) Describe the steps involved in the finite element analysis procedure.

2. a) Describe the application of FEM in solving the propagation problems.
   b) Describe the Gaussian elimination approach for the solution of large system of simultaneous equation.

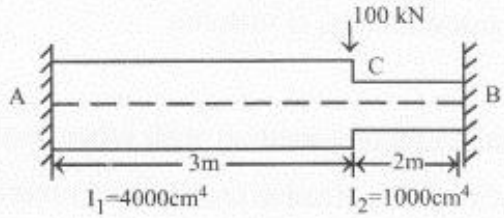
3. Explain Jacobi or Power method for finding eigenvalues and eigenvectors. Find the eigenvalues and eigenvectors of following matrix.

$$A=\begin{bmatrix} 1 & 2 & 0 \\ 2 & 2 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

4. What are the factors to be considered in the selection of interpolation functions? Derive the interpolation function for a rectangular element with coordinate of four corners as (1,1), (4.5, 1), (4.5, 3.5) and (1,3.5).

5. What is the use of Hermitian Interpolation function? Derive shape function for a 6-noded quadrilateral element.

6. Using the Finite Element Analysis, find the displacements and forces for the beam shown in figure below :



E = 200 GPa for both the elements.

7. a) Explain Runge-Kutta method of numerical integration. Take an example and show how it helps in FEM solution?
   b) What are eigenvalue problems and discuss its use in FEM?

8. Write short notes on any four of the following :
   a) Conforming and Non-conforming Elements
   b) Variational approach for FEA
   c) Static condensation
   d) Discretization of domain
   e) Numerical Integration

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