

Government College of Engineering, Aurangabad
(An Autonomous Institute of Government of Maharashtra)

M.E. (Structure) Examination
End Semester Examination 2016

AM 559: FINITE ELEMENT METHODS

Time: Three Hours
Max.Marks:60

24 NOV 2016 24 NOV 2016

“Verify the course code and check whether you have got the correct question paper”

N.B.:-

1. All questions are compulsory
2. Assume suitable data if necessary and state it clearly
3. Use of non-programmable calculator is allowed

Q.NO.1

- a) Explain step by step procedure to analyze structure using finite element method 10
b) State disadvantages of finite element method. 2

OR

Q.NO.1 Explain –derivation of the element stiffness matrix using variational principle and assembly of the algebraic equations for the overall discretized continuum 12

Q.NO.2 Analyze the continuous beam shown in figure 1 below by finite element method. Length of each span is 3 meter. Assume $EI=unity$ 12

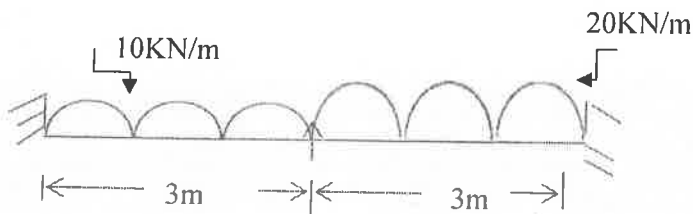


Figure-1

OR

Q.NO.2 Explain following (any four) 12

- a) Nodal degree of freedom
- b) Displacement models
- c) local/global co-ordinate system
- d) Lumped loads
- e) Pascal's triangle

Q.NO.3 calculates nodal displacements and element stresses for the truss shown in figure 2 below. $E=200$ GPa. Cross sectional area 3 cm^2 for all truss members 12

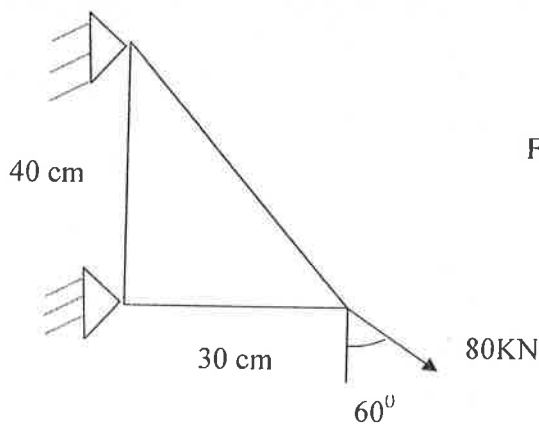


Figure-2

Q.NO.4 Explain following with simple example and state its importance in finite element analysis. 12

- a) Inverse of matrix
- b) Square matrix
- c) Banded matrix
- d) Identity matrix
- e) Skew-Symmetric matrix
- f) Lower triangular matrix

Q.NO.5 Evaluate the shape functions N_1 , N_2 and N_3 at the interior point P for the triangular element shown in figure 3 below. 12

3(5, 7)

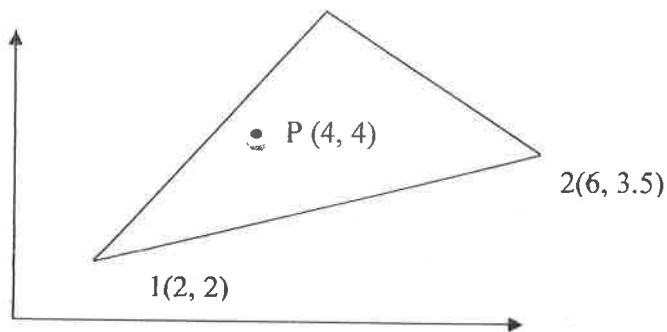


Figure 3