Reg. No. :

Question Paper Code: 52U01

M.E. DEGREE EXAMINATION DEC 2020

Second Semester

Structural Engineering

15PSE201 - FINITE ELEMENT ANALYSIS FOR STRUCTURAL ENGINEERING

(Regulation 2015)

Duration: 1.15 hrs   Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The art of subdividing a structure into a convenient number of smaller   CO1- R
   elements is known as

   (a) Assemblage   (b) Differentiation   (c) Discretisation   (d) Integration

2. Global stiffness matrix is a _____matrix because its   CO1- R
   determinant is equal to zero.

   (a) Symmetric   (b) Unsymmetric   (c) Singular   (d) None of the above

3. The coordinate system in which a separate co-ordinate is used for each   CO2 -R
   element is known as

   (a) Local coordinate system   (b) Global coordinate system

   (c) Natural coordinate system   (d) None of the above

4. One of the properties of stiffness matrix is the sum of the elements in any   CO2 -R
   column must be equal to _____

   (a) 0   (b) 1   (c) 2   (d) 3

5. The shape function at node 1 for CST element is_____   CO3- R

   (a) $\alpha_1+\beta_1x+\gamma_1y/2A$ (b) $\alpha_1+\beta_1x+\gamma_1y/3A$ (c) $\alpha_1+\beta_1y+\gamma_1x/2A$ (d) $\alpha_1+\beta_1x+\gamma_1y/4A$

6. Which one of the following triangular element is LST element   CO3- R

   (a) 3 noded   (b) 12 noded   (c) 6 noded   (d) 9 noded

7. In which method of mesh refinement the order of polynomial approximation for all elements is kept constant and the number of elements are increased. CO4 -R

   (a) p method   (b) s method   (c) h method   (d) None of these

8. The band width is calculated from_____. CO4 -R

   (a) (D-1)f   (b) (D+1) f   (c) (f+1) D   (d) (f-1) D

9. If λ is the Eigen value and U is the eigen vecor, then the characteristic equation for eigen value problem is given by CO5- R

   (a) MU=λKU   (b) Kλ= MU   (c) λU=KM   (d) KU=λMU

10. The stress due to temperature difference is given by CO5- R

    (a) $\alpha\Delta T$ (b) $\sigma\alpha\Delta T$ (c) $E\alpha\Delta T$ (d) $E\varepsilon\Delta T$

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Explain the step-by-step procedure to solve a typical problem using FEA. CO1-App (8)

12. Estimate the displacement vector, strains, stresses in the truss structure shown below. CO2- App (8)
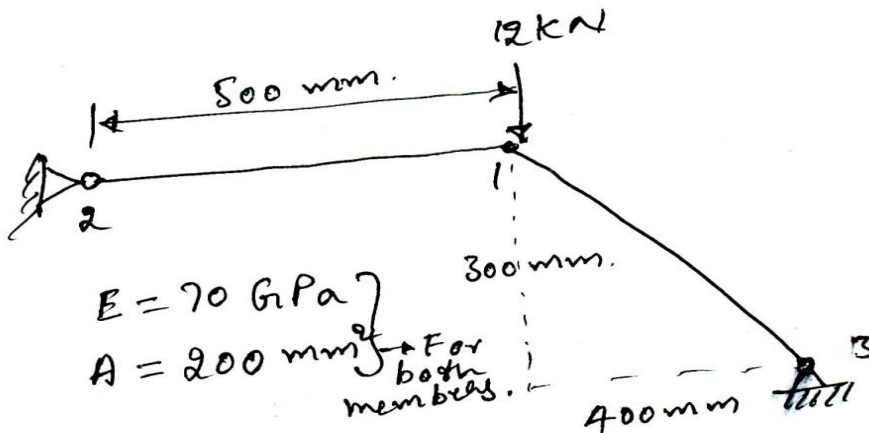
13. Derive the shape functions of an eight noded quadrilateral element. CO3-App (8)

14. Discuss automatic mesh generation techniques and explain how the errors in FEM can be rectified to get accurate results. CO4 - U (8)

15. Discuss about problems with material nonlinearity and explain about solution methods for such problems. CO5 - App (8)

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