Question Paper Code: U2601

M.E. DEGREE EXAMINATION, MAY 2024

Second Semester

Structural Engineering

21PSE201 - FINITE ELEMENT ANALYSIS FOR STRUCTURAL ENGINEERING

(Regulation 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 20 = 100 Marks)

1. (a) Explain in detail the discretization process involved in finite   CO1- U   (20)
         element method with neat sketch and examples.

                                        Or

    (b) Express the one dimensional heat transfer elements based on the   CO1- U   (20)
         stationary of function.

2. (a) Determine the nodal displacement and stresses to the following   CO3-App   (20)
         system, $A_1 = 2400 mm^2$, $A_2 = 600 mm^2$, $EI = 70 \times 10^3 N/mm^2$, $E_2 = 200 \times 10^3 N/mm^2$, $P = 200 kN$
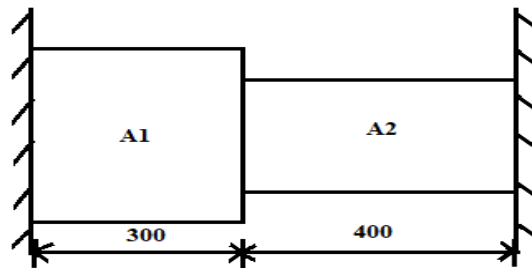
    (b) Construct a safe function by Lechlanche's polynomial methods   CO3-App   (20)

$$\emptyset_k[y_k] = \frac{(y - y_0)(y - y_1)(y - y_1)}{(y_k - y_0)(y_k - y_1)(y_k - y_2)}$$

3. (a) Explain the finite element modeling. CO1- U (20)

        i)   Discretization of structure.
        ii)   Numbering of nodes

<div align="center">Or</div>

   (b) Explain in detail about the shape function and polynomial shape function.   CO1- U   (20)

4. (a) Explain any two applications of thermal analysis by finite element method   CO1- U   (20)

<div align="center">Or</div>

   (b) Explain the step by step procedure of solving a torsion problem by finite element method.   CO1- U   (20)

5. (a) Briefly explain and Sketch a two dimensional differential control element for heat transfer and obtain the heat diffusion equation   CO1- U   (20)

<div align="center">Or</div>

   (b) Describe the FEM software with its application, capabilities and limitations. Illustrate with an example.   CO1- U   (20)

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