Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U2601

M.E. DEGREE EXAMINATION, NOV 2024

Second Semester

Civil Engineering

21PSE201 - FINITE ELEMENT ANALYSIS FOR STRUCTURAL ENGINEERING

(Regulation 2021)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	What is structural problem?	CO1- U
2.	What is the basic of finite element method?	CO1- U
3.	Define shape function.	CO1- U
4.	How do you calculate the size of the global stiffness matrix?.	CO1- U
5.	Define boundary value problem.	CO1- U
6.	What is meant by discretization and assemblage?	CO1- U
7.	How do you calculate the size of the global stiffness matrix?.	CO1- U
8.	Write down the expression of stiffness matrix for one dimensional bar element.	CO1- U
9.	What meant by plane stress analysis?	CO1- U
10.	Define boundary value problem.	CO1- U

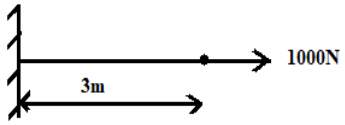
PART B - (5 x 16 = 80 Marks)

11.	(a)	A uniform column is hinged at the both ends is subjected to compressive load P at both the ends. Find out the critical load using Rayleigh's Ritz method. Take y = $\frac{4\,h_x(l-x)}{l^2}$	CO3-App	(16)
		Or		
	(b)	Explain the general steps of the Finite Element Analysis in detail.	CO1-U	(16)

12. (a) Derive the equation for natural co-ordinates in two dimension CO1- U (16)

Or

(b) Calculate the nodal displacement for the following cantilever load CO3- App (16)
$A = 0.9m^2$, $E = 3\times10^{10}$



13. (a) Explain any two applications of thermal analysis by finite element method CO1- U (16)

Or

(b) Write the step by step procedure of solving a torsion problem by finite element method. CO1- U (16)

14. (a) Explain the one dimensional heat conduction equation CO1- U (16)

Or

(b) Explain any two FEM software with its application, capabilities and limitations. CO1- U (16)

15. (a) Define shape function and polynomial shape function. CO1- U (16)

Or

(b) Construct a safe function for three nodal axial elements CO3- App (16)

$N = a_0 + a_1 r + a_2 r^2$