Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

School of Engineering

Mid - Term Examinations - November 2024

Semester: 3 **Date**: 4-11-2024

Course Code: MEC3091 **Time**: 02:00pm – 03:30pm

Course Name: Finite element analysis **Max Marks**: 50

Program: B. Tech **Weightage**: 25%

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. 5Qx2M=10M

1	List at-least four types of analysis done through FEA.	**2 Marks**	**L1**	**CO1**
2	Mention the difference between element and Node.	**2 Marks**	**L1**	**CO1**
3	What do you mean by inherited error and manipulation error?	**2 Marks**	**L1**	**CO1**
4	What are the methods used for formulation of elemental properties?	**2 Marks**	**L1**	**CO2**
5	What do you mean by discretization in FEA?	**2 Marks**	**L1**	**CO2**

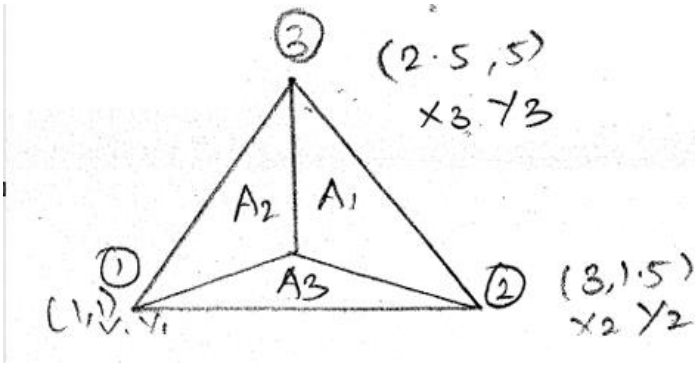
Part B

Answer ALL Questions. Each question carries 10 marks. 4QX10M=40M

6	**6a**	Brief the procedure of FEM.	**5 Marks**	**L2**	**CO1**
	6b	How the properties/behavior of element is defined in FEA?	**5 Marks**	**L2**	**CO1**
		or			
7	**7a**	What are the primary and secondary boundary conditions utilized in FEA.	**5 Marks**	**L2**	**CO2**
	7b	What are the sources of error in FEA?	**5 Marks**	**L2**	**CO2**

8	Briefly discuss the applications of FEM.	**10 Marks**	**L2**	**CO1**

or

9	Briefly explain linear and non-linear analysis performed in FEM.	**10 Marks**	**L2**	**CO2**
10	For the given figure below the interior point P at (2,2) divides the three areas namely A1, A2 and A3, written in the form of $A=\frac{1}{2}\begin{vmatrix} 1 & x_1 & y_1 \\ 1 & x_2 & y_2 \\ 1 & x_3 & y_3 \end{vmatrix}$. Determine A1/A, A2/A and A3/A 	**10 Marks**	**L3**	**CO1**

or

11	The differential equation of physical phenomenon is given by $\frac{d^2y}{dx^2}+500x^2=0$ which is $0 \le x \le 1$ The trial function $Y=a_1(x-x^4)$. The boundary conditions are y(0)=0 and y(1)=0. Calculate the value of parameter of a1 by any three weighted residual methods.	**10 Marks**	**L3**	**CO1**
12	The normal stress in a stressed material in X, Y and Z direction is given by 70, 60 and 50 Mpa respectively. Shear stress in XY, YZ and ZX direction is given by 20, -20 and 0. The values of cos α, β and γ is given by 12/25, 15/25, and 16/25 respectively. Find out 1. Resultant stress 2. Normal stress and 3. Shear stress.	**10 Marks**	**L3**	**CO2**

or

Given, **10 Marks** **L3** **CO2**

13 $A = \frac{1}{2}\begin{vmatrix} 1 & 1 & 1 \\ 1 & 4 & 2 \\ 1 & 2 & 4 \end{vmatrix}$ $d = \begin{Bmatrix} -2 \\ -1 \\ 3 \end{Bmatrix}$

Find, I – A*d^T, where I represents Identity matrix.