



PimpriChinchwad Education Trust's
**Pimpri Chinchwad College of
Engineering**
Sector No. 26, Pradhikaran,Nigdi, Pune – 411044



Department: Mechanical

Academic Year: 2023- 2024

Semester: II

Class – Final Year Btech

Course name : Finite Element Analysis (PEC V) BME8505B

1. Course relevance in mechanical engineering

Finite Element Analysis (FEA) is a major subject in mechanical engineering. While applying the concepts of solid Mechanics , we did the analysis for simple geometries. As the geometries become more complex, the Design and Analysis becomes very difficult and hence it is required to have the knowledge of FEA for doing the safe and appropriate design and analysis.

2. Prerequisite

Mechanics of Materials,Design of Machine Element I & II, Engineering Graphics, Engineering Mathematics,Heat transfer,Numerical methods, Programming Languages

3. Teaching and Examination Scheme

Lectures : 3 hrs/week

IE1/IE2: 20 marks

MTE : 30 Marks (2 hrs)

ETE : 50 Marks (2½ hr.)

4. Course outcomes with method of assessments

On completion of the course, students will be able to -

■ Apply the FEA method and develop finite element formulations of engineering problems from a variety of application areas- PO1,PO5 PSO1,PSO2

Method of assessment -IE1,MTE,ETE

■ Solve 1D problem like spring, bar, beam, and Plane frame for displacements and stresses- PO1, PO2, PO3,PO4,PO5,PO6 ,PSO2

Method of assessment - IE1,MTE,ETE

Derive and use 2-D element stiffness matrices and load vectors from various methods to solve for displacements- PO1, PO2, PO3,PO4,PO6, PSO2

Method of assessment - MTE,ETE

Apply numerical integration methods to solve isoparametric element problems- PO1, PO2, PO3,PO4,PO5, PSO1

Method of assessment – IE2,ETE

Solve 1D Steady State Heat Transfer Problems- PO1, PO2, PO3,PO4,PO5, PSO1,PSO2

Method of assessment – IE2,ETE

Solve Dynamic problems and will learn to formulate Mass matrices of bar and beam element PO1, PO2, PO3,PO4,PSO2

Method of assessment - ETE

Mapping of CO,PO and PSO

	Course Outcomes statements	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Blooms level	BLM
CO 1	Apply the FEA method and develop finite element formulations of engineering problems from a variety of application areas	.				.								.	.		3	0.7
CO 2	Solve 1D problem like spring, bar, beam, and Plane frame for displacements and stresses.	.	.	.	.	.	.								.		4	0.8
CO 3	Derive and use 2-D element stiffness matrices and load vectors from various methods to solve for displacements	.	.	.	.	.	.								.		5	0.9
CO 4	Apply numerical integration methods to solve isoparametric element problems.	.	.	.	.	.								.			3	0.7
CO 5	Solve 1D Steady State Heat Transfer Problems.	.	.	.	.	.									.		4	0.8
CO 6	Solve Dynamic problems and will learn to formulate Mass matrices of bar and beam element.	.	.	.	.										.		4	0.8

5. Internal Evaluation

- Internal Evaluation 1 on 1,2 units
- Internal Evaluation 2 on 4,5 units

6. Activity/Visits/Mini projects/Posters planned

- Case study based on practical application in *Ansys/Matlab*

7. Reference books/Online content(Website)/Research journals/Online courses available

Reference books

- Daryl L, A First Course in the Finite Element Method,. Logan, 2007.
- Chandrupatla T. R. and Belegunda A. D., —Introduction to Finite Elements in Engineering||,

- Prentice Hall India
- Seshu P., —Text book of Finite Element Analysis, PHI Learning Private Ltd. New Delhi, 2010
- Bathe K. J., —Finite Element Procedures, Prentice-Hall of India (P) Ltd., New Delhi

Online content (Website)

- NPTEL videos on Finite Element Analysis are available on <http://www.nptel.ac.in>