



## Pimpri Chinchwad Education Trust's Pimpri Chinchwad College of Engineering

**Department:** Mechanical

**Academic Year:** 2021 2022

**Semester:** I

**Class – BE**

**Course name :** Finite Element Analysis (ELE I) 402044A

### **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**

**Practical :** 2 hrs/week

**Lectures :** 3 hrs/week

**Term Work :** 25 Marks

**In-Semester Exam :** 30 Marks (1 hr.)

**Theory Paper :** 70 Marks (2½ hr.)

### **4. Course outcomes with method of assessments**

On completion of the course, students will be able to

<b>CO No.</b>	<b>CO Statement</b>	<b>No. of Lectures Planned</b>	<b>No. of Practical planned</b>	<b>Content Delivery method</b>	<b>Assessment tools Planned</b>
1	Understand the different techniques used to solve mechanical engineering problems.	11	1	Presentation, Lecture with Interaction,	Unit Test 1, Assignment 1
2	Derive and use 1-D and 2-D element	10	3	Presentation,	Unit Test 1,

	stiffness matrices and load vectors from various methods to solve for displacements and stresses.			Lecture with Interaction,	Assignment 2,TW
3	Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.	8	2	Presentation, Lecture with Interaction,	Unit Test 1, Assignment 3,TW
4	Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.	6	2	Presentation, Lecture with Interaction,	Unit Test 2, Assignment 4,TW
5	Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.	5	2	Presentation, Lecture with Interaction,	Unit Test 2, Assignment 5,TW
6	Interpret the results of finite element analyses and make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.	5	2	Presentation, Lecture with Interaction,	Assignment 6,TW

## 5. Assignment:

Assignment Planned	CO Mapped	Tentative schedule
Assignment on each Unit	CO1,CO2, CO3, CO4, CO5, CO6	All the assignments are floated at the start of semester.

## **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>



**Course Faculty BE A/B**  
**Mr. I.R.Sathone**



**Course Faculty BE B/C**  
**Mrs.Rita Pimpalkar**  
Course Coordinator



**Course Faculty BE C**  
**Mr.S.R.Wankhede**

**Module Co-ordinator sign : Mr.L.V.Awadhani**