AE323: Finite Element Methods and Applications										
L	**T**	**P**	**Credit**	**Area**		**CWS**	**PRS**	**MTE**	**ETE**	**PRE**
3	0/1	2/0	4	DEC		15/25	25/-	20/25	40/50	-

Objectives: To introduce the student with fundamentals of finite element method, Parametric element stresses and strains, application of FEM in various mechanical field and use a software to perform analysis.

AE323: Finite Element Methods and Applications		Contact Hours
Unit-1	Fundamental concepts of the Finite Element Method. One Dimensional Problem (Bar of uniform and variable cross sections), The Galerkin Approach, The potential –Energy Approach, shape Functions, Derivation of stiffness matrix and load vector for the element and for the entire domain. Evaluation of displacement, stresses and reaction forces.	8
Unit-2	Trusses: Introduction, Plane Trusses, Local and Global coordinate Systems, Element Stiffness Matrix and Stress calculations	6
Unit-3	Beam Elements-Analysis of Beams and Frames: Beam elements, Reduced integration, Elements based on Bernoulli and Timoshenko theory of beams Two –Dimensional problem using Constant strain triangles (CST), Two dimensional isoparametric elements and numerical integration, element stiffness matrix, Force vector. Three dimensional element.	8
Unit-4	Heat Transfer *and* Fluid Flow: Steady state heat transfer, heat conduction governing equation, boundary conditions, Functional approach for heat conduction, Galerkin approach for heat conduction, heat flux boundary condition, Basic differential equation for fluid flow in pipes and around solid bodies.	8
Unit-5	Dynamic analysis: Element mass matrices, Evaluation of Eigenvalues and Eigenvectors.	6
Unit-6	Electromagnetic simulation using FEM. Application of finite element method to electrical systems. Use of Softwares such as MAT LAB/ABAQUS/ANSYS/ NASTRAN/IDEAS. Basic feature of these softwares.	6
	Total	**42**

Reference Books:
1 Finite Element Procedures, K.J. Bathe, Prentice Hall of India.
2 Finite Elements in Engineering by Chandrupatla and Belegundu.
3 Finite element Method by J.N.Reddy.
4 Finite element Method,O.C. Zienkiewicz& R.A. Taylor
5 Finite element Analysis,C.S. Krishnamurthy
6 Finite element Method, Kenneth H. Hubener
7 Finite Element Method, Desai & Abel

Course Outcomes

CO1	To understand Fundamental concepts of the Finite Element Method.
CO2	To understand ISO parametric elements Element stresses and strains.
CO3	To understand Derivation of force and displacement vectors for the entire domain. Boundary conditions, Solution of the overall problems
CO4	To understand Applications of finite element method to various field problems
CO5	To understand Use of Software such as ANSYS/ NASTRAN/IDEAS.
CO6	

CO-PO/PSOMatrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2