Faculty of Engineering and Technology
Master of Technology (Semester II / First Year)
In Effect from Academic Year 2023-24

Branch Name:	Mechanical Engineering (CAD/CAM)
Program Code:	ET201
Course Name:	Finite Element Methods
Course Code:	2ET2010202T
Pre-requisite Course:	Knowledge of Applied Mathematical Techniques, Numerical Methods

Course Objectives:

1. Acquire fundamental understanding of the principles of CAD/CAM, including engineering drawing, geometric and surface and feature-based design
2. Applying CAD/CAM concept to product design and manufacturing
3. Exposure to CAD/CAM softwares.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
					SEE		CCA		SEE		CCA		
	L	T	P	Total	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Approaches of FEM- Discrete, Variational and Weighted Residual;	05	15
2	Direct Problems- Spring, Hydraulic Network; Resistance Network and Truss Systems;	08	25
3	1-D Field and Beam Bending Problems-Formulation using Galerkin and Raleigh-Ritz approaches, Derivation of elemental equations and their assembly, Solution and its post processing;	08	25
4	2-D and Axisymetric Field and Stress Problems-Formulation using Galerkin and Raleigh-Ritz approaches, Derivation of elemental equations and their assembly, Solution and its post processing;	07	20
5	3-D Field and Stress Problems Formulation using Galerkin and Raleigh-Ritz approaches, Derivation of elemental equations and their assembly, Solution and its post processing; Eigen value and time dependent problems; Discussion about preprocessors, postprocessors and finite element packages.	07	15

Review Presentation:

The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) asmedigitalcollection.asme.org (2) springer.com (3) sciencedirect.com (4) ieeexplore.ieee.org (5) scholar.google.co.in or others of similar repute.

List of Reference Books:

1. An Introduction to the Finite element Method, Reddy, J.N, McGraw – Hill
2. Finite Element Method in Engineering , Rao, Pergammon Press
3. Introduction to Finite Elements in Engineering, Chandrupatla T. R. and Belegunda A. D., PHI
4. Text book of Finite Element Analysis, Seshu P., PHI

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Learn the mathematical formulation of the finite element method and its applications	2 Understanding
CLO2	Learn how to implement the finite element method efficiently in order to solve 1D, 2D problems.	2 Understanding 3 Applying
CLO3	Formulate simple problems into finite elements.	2 Understanding
CLO4	Apply the capabilities of finite element software to solve the structural engineering and heat transfer Problems	3 Applying 4 Analyze
CLO5	Interpret and evaluate the quality of results obtained using FE software.	5 Evaluating
CLO6	Appreciate the importance of ethical issues pertaining to the effective utilization of FEA.	2 Understanding

Mapping of CLOs with POs & PSOs:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	M	M				L							M	
CLO2			M	M									M	
CLO3			M		M								H	
CLO4					M		L		M		M			M
CLO5					H					L				M
CLO6								M			M	H		H

H: High, M: Medium, L: Low