National University of Sciences and Technology

Course Description

Course Title	Course Code	Credit Hours
Finite Element Methods	**ME 802**	3 – 0

Textbook:

- O. C. Zienkewicz, R. L. Taylor. The Finite Element Method

Reference Books:

- F. L. Stasa, Applied Finite Element Analysis for Engineers, Int'l Thomson Pub.
- S. S. Rao. Finite Element Method in Engineering, 3rd ed., Pergamon Press.
- I. M. Smith, Programming the Finite Element Method. John Wiley & Sons

Course Objective:

- Develop students' proficiency in the finite element method, equipping them with the analytical and computational skills to solve complex engineering problems in structural, thermal, and fluid dynamics applications.

Course Outline:

- General concepts of FEM, Galerkin/weighted residual method, RayleighRitz/ variational method, Shape functions, Iso-parametric elements, 1D problems: trusses, beams and frames, 2D problems: plane stress, plane strain and axisymmetric problems, 3D stress analysis, Heat transfer, Fluid flow problems, Numerical integration: Gaussian quadrature, Reduced integration, The Patch test, Finite element error analysis, Error estimates, Convergence and accuracy of solutions, Infinite and singularity elements, Time Dependant problems, Semi-discrete FEM, Time approximations, Computer implementation.

ASSESSMENTS

Description	Percentage Weightage (%)
Assignments	05-10%
Quizzes	10-15%
Mid Semester Exams	30-40%
End Semester Exam	40-50%