20MSM608T					Finite Element Method					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To be able to understand the advantage of finite element method.
- To be able to obtain weak form of the mathematical models.
- To be able to analyse the process of finite element method.
- To be able to formulate and solve various mathematical equations using finite element method.

UNIT 1 INTRODUTION TO FINITE ELEMENT METHOD **08 Hrs.**

Introduction of Finite Element Method - Comparison of finite element method with other methods of analysis - Engineering applications of FEM - Discretization of the domain- Basic element shapes - Discretization process - mesh generation.

UNIT 2 STEPS IN FINITE ELEMENT METHOD **12 Hrs.**

Interpolation models, polynomial form of the interpolation functions - degree of freedom, convergence requirement - linear interpolation polynomial in terms of local and global coordinates - higher order and isoparametric elements quadratic elements - continuity and compatibility- numerical integration- Derivation of element matrices and vectors.

UNIT 3 SOLUTION PROCEDURE OF FEM **10 Hrs.**

Week form of the mathematical models - variational approach - Rayleigh-Ritz method - derivation of finite element equations using variational approach - weighted residual approach - assembly of element matrices and vectors- Numerical solution of finite element equations, Gauss elimination method - solution of propagation problem- basic equations and solution procedure.

UNIT 4 SOLUTION OF DIFFERENTIAL EQUATIONS USING FEM **10 Hrs.**

Solution of one and two dimensional problems using Finite Element Method.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Identify the use of continuity and convergence of solution of mathematical problems.
CO2 – Understand the concept of finite element method in aspect of real world problems.
CO3 – Apply finite element method in various physical problems of science and engineering.
CO4 – Analyze the obtained solution in context with theory.
CO5 – Appraise mathematical problems from real to complex domain.
CO6 – Develop problems on real world using finite element method.

TEXT/REFERENCE BOOKS

1. S. S. Rao, The finite element method in engineering, 4th edition, Elsevier, 2004.
2. J. N. Reddy, An Introduction to the Finite Element Method (Engineering Series), 3rd edition, McGraw Hill Education, 2005.
3. Young W. Kwon and Hyochoong Bang, The Finite Element Method Using MATLAB, 2nd edition, CRC Press; 2000.
4. Desai C.S, Introduction to The Finite Element Method - A Numerical Method for Engineering Analysis, CBS Publishers & Distributors, 2005.