Course Title: Finite Element Method			
As per Choice Based Credit System (CBCS) scheme]			
SEMESTER:VI			
Subject Code	15CV664	IA Marks	20
Number of Lecture Hours/Week	03	Exam Marks	80
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS –03		Total Marks- 100	

Course objectives: This course will enable students to;
1. Develop analytical skills.
2. Learn principles of analysis of stress and strain.
3. Develop problem solving skills.
4. Understand the principles of FEM for one and two dimensional problems.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
Theory of elasticity concepts, Energy principles, Rayleigh - Ritz Method, Galerkin method and finite element method, steps in finite element analysis, displacement approach, stiffness matrix and boundary conditions	8 hours	L1,L2
Module -2		
Discritisation; finite representation of infinite bodies and discritisation of very large bodies, Natural Coordinates , Shape functions; polynomial, LaGrange and Serendipity , one dimensional formulations; beam and truss with numerical examples	8 Hours	L1,L2
Module -3		
2D formulations; Constant Strain Triangle, Linear Strain Triangle, 4 and 8 noded quadrilateral elements, Numerical Evaluation of Element Stiffness -Computation of Stresses, Static Condensation of nodes, degradation technique, Axisymmetric Element	8 Hours	L1,L2,L3
Module -4		
Isoparametric concepts; isoparametric, sub parametric and super parametric elements, Jacobian transformation matrix, Stiffness Matrix of Isoparametric Elements, Numerical integration by Gaussian quadrature rule for one, two and three dimensional problems	8 Hours	L1,L2,L3
Module -5		
Techniques to solve nonlinearities in structural systems; material, geometric and combined non linearity, incremental and iterative techniques. Structure of computer program for FEM analysis, description of different modules, exposure to FEM softwares.	8 Hours	L1,L2,L3

Course outcomes: The student will have the knowledge on advanced methods of analysis of structures

Program Objectives:
- Engineering knowledge
- Problem analysis
- Interpretation of data

Question paper pattern:
- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:
1. Krishnamoorthy C.S., "Finite Element analysis" -Tata McGraw Hill
2. Desai C &Abel J F.," Introduction to Finite element Method" , East West Press Pvt. Ltd.,
3. Cook R D et.al., "Concepts and applications of Finite Element analysis ", John Wiley

Reference Books:
1. Daryl L Logan," A first course on Finite element Method " , Cengage Learning
2. Bathe K J - " Finite Element Procedures in Engineering analysis "- Prentice Hall