

ADVANCE FINITE ELEMENT METHODS

(CORE COURSE-IV)

II Semester: AEROSPACE ENGINEERING								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
B27606	CC	L	T	P	C	CIE	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 60		Tutorial Classes:		Practical Classes:		Total Classes: 60		
UNIT-I	INTRODUCTION						Classes: 12	
Review of various approximate methods – Rayleigh-Ritz, Galerkin and Finite Difference Methods - Stiffness and flexibility matrices for simple cases - Basic concepts of finite element method - Formulation of governing equations and convergence criteria.								
UNIT-II	DISCRETE ELEMENTS						Classes: 12	
Structural analysis of bar and beam elements for static and dynamic loadings. Bar of varying section – Temperature effects Program Development and use of software package for application of bar and beam elements for static, dynamic and stability analysis.								
UNIT-III	CONTINUUM ELEMENTS						Classes: 12	
Plane stress, Plane strain and Axi-symmetric problems – CST Element – LST Element. Consistent and lumped load vectors. Use of local co-ordinates. Numerical integration. Application to heat transfer problems. Solution for 2-D problems (static analysis and heat transfer) using software packages.								
UNIT-IV	ISOPARAMETRIC ELEMENTS						Classes: 12	
Definition and use of different forms of 2-D and 3-D elements. - Formulation of element stiffness matrix and load vector. Solution for 2-D problems (static analysis and heat transfer) using software packages.								
UNIT-V	SOLUTION SCHEMES						Classes: 12	
Virtual work principle, Formulation of governing equation based on virtual work principle for static and dynamic problems.								
Text Books:								
1. Segerlind, L.J. "Applied Finite Element Analysis", Second Edition, John Wiley and Sons Inc., New York, 1984.								
2. Tirupathi R. Chandrupatla and Ashok D. Belegundu, Introduction to Finite Elements in Engineering, Prentice Hall, 2002								
3. S.S.Rao, "Finite Element Method in Engineering", Butterworth, Heinemann Publishing, 3rd Edition, 1998								
4. Robert D. Cook, David S. Malkus, Michael E. Plesha and Robert J. Witt "Concepts and Applications of Finite Element Analysis", 4th Edition, John Wiley & Sons, 2002.								
Reference Books:								
1. K.J. Bathe and E.L. Wilson, "Numerical Methods in Finite Elements Analysis", Prentice Hall of India Ltd., 1983.								
2. C.S. Krishnamurthy, "Finite Elements Analysis", Tata McGraw-Hill, 1987.								