INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	**Finite Element Analysis**	Course Code				
Dept./ Specialization	Mechanical Engineering	Structure (LTPC)	3	1	0	4
To be offered for	UG / PG	Status	Core ☐		Elective ■	
Faculty Proposing the course	Dr. Jayabal K	Type	New ■		Modification ☐	
Recommendation from the DAC - Yes		Date of DAC	01 – 06 – 2021			
External Expert(s)	Prof. Arockiarajan IIT Madras, Prof. Rajagopal IIT Hyderabad					
Pre-requisite	Engineering mechanics, Mechanics of Materials	Submitted for approval	46th Senate			
Learning Objectives	To understand the fundamentals of finite element methods for solving boundary value problems in solid mechanics and heat transfer.					
Learning Outcomes	At the end of the course, a student will be able to: 1. Apply finite element method to elasticity problems to analyze displacements, strains and stresses under various boundary conditions. 2. Analyze heat transfer in structural elements in 1D and 2D cases. 3. Write finite element codes to study simple boundary value problems.					
Contents of the course *(With approximate break-up of hours for L/T/P)*	Mathematical Modeling of field problems – Discrete and continuous models – Weighted Residual Methods – Variational Formulations – Basic concepts of the Finite Element Method. (L8+T2) One-dimensional equations: Discretization, development of bar and beam elements, application to truss and frames, and heat transfer problems. (L12+T4) Two-dimensional Equations: discretization concepts, choice of elements, shape functions, element stiffness matrix and assembly. Application to plane stress, plane strain and axisymmetric, and heat transfer problems. (L14+T5) Isoparametric element formulation, Numerical integration, Matrix solution techniques, Computer implementation, Introduction to Dynamic problems. (L8+T3)					
Text Book	1. J Fish and T Belytschko, A first course in finite elements, Wiley, First edition, 2007. 2. T R Chandrupatla and A D Belegundu, Introduction to Finite Elements in Engineering, Pearson Education India; 4th edition, 2015					
Reference Books	1. J N Reddy, Introduction to Finite Element Method, McGraw Hill Education (India), 4th edition, 2020. 2. P Seshu, Textbook of Finite Element Analysis, Prentice Hall India, 2003. 3. R D Cook, D S Malkus, M E Plesha and R J Witt, Concepts and Applications of Finite Elements Analysis, Wiley, 4th edition, 2007					