

COMPUTER AIDED MODELLING AND ANALYSIS LABORATORY

VII Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AME115	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil		Total Classes: 60		
<p>COURSE OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> I. Understand the features and specifications of CAD and 3D Modeling tools. II. Develop the part design and drafting methods. III. Use the CAE software and analyse the load conditions. IV. Execute the results of reaction forces and stress and strain diagrams. <p>COURSE OUTCOMES: The students will be able to:</p> <p>CO 1: Understand the features and specifications of CAD and 3D Modeling tools. CO 2: Develop the part design and drafting methods. CO 3: Use the CAE software and analyze the load conditions. CO 4: Execute the results of reaction forces and stress and strain diagrams</p> <p>COURSE LEARNING OUTCOMES (CLOs):</p> <ol style="list-style-type: none"> 1. Understand the concept of Modeling and Analysis software. 2. Know the various types of CAD tools and apply it to design and model various products 3. Understand modern tools to formulate the problem, and able to create geometry. 4. Understand Fundamentals of CNC programming, Part programming and interpolation technique Understand Fundamentals of discretize, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different loading conditions. 5. Performance of relative mechanisms in simulation module. 6. Generation of part programming through assembly module. 7. Generation of CAM-CNC programming and execution. Generation of deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams. 8. Understand various Work piece setting methods and tool setting methods 9. Practice on structural and thermal real time problems 10. Understand CNC programming and execution on milling and turning machines Design, manufacture and analyze a Mechanical system using modern engineering software tools and measurement systems. 11. Utilize self-education to develop lifelong learning to appraise and adapt global and societal contexts to propose Engineering solutions. 12. Perform Practice session at industry 								

Week - 1	INTRODUCTION TO CATIA
Familiarization and practicing of drawing and modifying commands, template creation, lettering, object snapping and sectioning.	
Week - 2	DRAFTING OF SIMPLE 2D DRAWINGS
Prepare the 2D drawings using draw and modify commands for simple geometric assemblies, sectional views for part drawing and assemblies.	
Week - 3	SOLID MODELING
Preparing the 2D and 3D models (wire frame, surface and solid models) by using B-REP, CSG. Introduction of Boolean operations. Generation of 2D, 3D models, through protrusion, revolve, sweep.	
Week - 4	CREATING ORTHOGRAPHIC VIEWS FROM SOLID MODELS
Development of orthographic views for assembly drawings and preparation of bill of materials(IC engine components, Machine tool accessories, Jigs and Fixtures).	
Week - 5	INTRODUCTION TO ANSYS
Determination of deflection and stresses in bar.	
Week - 6	TRUSSES AND BEAMS
Determination of deflection and stresses in 2D and 3D trusses and beams.	
Week - 7	SHELL STRUCTURES
Determination of stresses in 3D and shell structures (one example in each case).	
Week - 8	HARMONIC ANALYSIS
Estimation of natural frequencies and mode shapes, harmonic responses of 2D beams.	
Week - 9	HEAT TRANSFER ANALYSIS
Steady state heat transfer analysis of plane and axi-symmetric components	
Week - 10	CONVENTIONAL REPRESENTATION OF MATERIALS
Conventional representation of parts screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits, methods of indicating notes on drawings.	
Week - 11	LIMITS FITS AND TOLERANCES
Limits, Fits and Tolerances: Types of fits, exercises involving selection, interpretation of fits and estimation of limits from tables.	

Week - 12	FORM AND POSITIONAL TOLERANCES
Introduction and indication of form and position tolerances on drawings, types of run out, total run out and their indication.	
Week - 13	SURFACE ROUGHNESS AND ITS INTRODUCTION
Definition, types of surface roughness indication surface roughness obtainable from various manufacturing processes, recommended surface roughness on mechanical components. Heat treatment and surface treatment symbols used on drawings.	
Week - 14	DETAILED AND PART DRAWINGS
Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors.	
Week - 15	DETAILED AND PART DRAWINGS
Part drawings using computer aided drafting by CAD software.	
Text Books:	
<ol style="list-style-type: none"> 1. K.L. Narayana, P. Kannaiah, —Production Drawing], New Age publishers, 3rd Edition, 2009 2. Goutham Pohit, Goutham Ghosh, —Machine Drawing with Auto CAD, Pearson, 1st Edition, 2004. 	
Reference Books:	
<ol style="list-style-type: none"> 1. James D. Meadows, —Geometric Dimensioning and Tolerancing], CRC Press, 1st Edition, 1995 	