

CAD/CAM LABORATORY

VII Semester: ME																				
Course Code	Category	Hours / Week			Credits	Maximum Marks														
AMEB28	Core	L	T	P	C	CIA	SEE	Total												
		-	-	3	1.5	30	70	100												
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36															
<p>I. COURSE OVERVIEW: In this laboratory the students learn the fundamentals of numerical control (NC) technology, pro- gramming of computer numerical control (CNC) machines in NC codes and APT language and with CAD/CAM systems. Students also gain experience in NC postprocessors and distributed numerical control, operation of CNC lathe and milling machines, and programming and machining complex engineering parts.</p> <p>II. OBJECTIVES: The course should enable the students to:</p> <ul style="list-style-type: none"> I Understand the features and specifications of CNC and 3D printing machines. II Develop the process planning sheets and tool layouts. III Use the CAM software and prepare CNC part programs. <p>III. COURSE OUTCOMES: After successful completion of the course, students should be able to:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">CO 1 Understand the concept of numerical control and advantages ofCNC machine tools.</td> <td style="width: 20%; text-align: right;">Apply</td> </tr> <tr> <td>CO 2 Understand Basic fundamentals of CNC milling and familiarization of machine control panel.</td> <td style="text-align: right;">Apply</td> </tr> <tr> <td>CO 3 Demonstrate fundamentals of CNC programming, Part programming and interpolation techniques</td> <td style="text-align: right;">Understand</td> </tr> <tr> <td>CO 4 Generate part programming through CAM software.</td> <td style="text-align: right;">Apply</td> </tr> <tr> <td>CO 5 Understand various Work piece setting methods and tool settingmethods.</td> <td style="text-align: right;">Apply</td> </tr> <tr> <td>CO 6 Understand CNC programming and execution on milling and turning machines.</td> <td style="text-align: right;">Understand</td> </tr> </table>									CO 1 Understand the concept of numerical control and advantages ofCNC machine tools.	Apply	CO 2 Understand Basic fundamentals of CNC milling and familiarization of machine control panel.	Apply	CO 3 Demonstrate fundamentals of CNC programming, Part programming and interpolation techniques	Understand	CO 4 Generate part programming through CAM software.	Apply	CO 5 Understand various Work piece setting methods and tool settingmethods.	Apply	CO 6 Understand CNC programming and execution on milling and turning machines.	Understand
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LIST OF EXPERIMENTS																				
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 & 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	INTRODUCTION TO COMPUTER NUMERICAL CONTROL
Numerical control, functions of a machine tool, concept of numerical control, historical development, definition, advantages of CNC machine tools. Evolution of CNC, advantages of CNC, limitations of CNC, features of CNC, machine control MODULE (MCU) for CNC, classification of CNC machine tools; CNC machining centers: classification, features of CNC machining centers.	
Week-11	CNC TURNING
Fundamentals of CNC programming, Part programming and interpolation techniques, Work piece setting methods, tool setting methods	
Week-12	CNC MILLING
Fundamentals of CNC programming, Part programming and interpolation techniques, Machining practice on CNC milling.	
Week-13	CAM SOFTWARE
Generation of part programming through the CAM software package, CAM-CNC programming and execution on milling and turning machines.	
Reference Books:	
<ol style="list-style-type: none"> 1. K.L. Narayana, P. Kanniah, "Production Drawing", New Age publishers, 3rd Edition, 2009. 2. GouthamPohit, GouthamGhosh, "Machine Drawing with Auto CAD", Pearson, 1st Edition, 2004. 3. James D. Meadows, "Geometric dimensioning and tolerancing", CRC Press, 1st Edition, 1995. 	
Web Reference:	
1. https://mech.iitm.ac.in/Production%20Drawing.pdf	