INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

COMPUTER AIDED MANUFACTURING LABORATORY							

V Semester: AE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AAED24	Core	-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		
Prerequisite: Aerospace Materials and Production Laboratory								

I. COURSE OVERVIEW:

Computer-aided manufacturing (CAM) is a technique that uses computer software and hardware to optimize and automate processes in manufacturing. This laboratory course provides learners with real skills and experience with computer-aided tools in manufacturing processes. The course includes topics such as computer numerical control (CNC) equipment, component identification, safety measures, setting up of home locations, offsets, part programming using G Codes, program execution, dimensional accuracy, and surface finish. It will combine theoretical understanding with hands-on applications in a modern learning environment.

II. COURSES OBJECTIVES:

The students will try to learn

I. The fundamental principles of computer-aided manufacturing and the integration of computer technology into manufacturing processes.
II. The workflow from design to production using CAM tools, and become proficient in utilizing industry-standard CAM for manufacturing operations.
III. Real-world involvement with Computer Numerical Control (CNC) machines through programming and operating CNC milling and turning machines.
IV. The optimization strategies to perform efficient machining to improve production time and enhance tool life.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1 Outline various computer numeric control systems for suitability and application on CNC machines.
CO2 Recognize various standard machine tools and numeric codes for manufacturing machine parts by turning machines.
CO3 Develop a numeric code for manufacturing machine components by milling machine.
CO4 Make use of G and M codes for drilling operation on machine components using milling machine.
CO5 Investigate tapping, slotting and cylindrical grinding by using CNC for manufacturing aircraft components.
CO6 Utilize laser cutting and electric discharge machine for cutting and drilling of airfoil profile.

Week-I: INTRODUCTION TO COMPUTER NUMERICAL CONTROL
Numerical control, functions of a machine tool, concept of numerical control, historical development, definition, advantages of CNC machine tools, features of CNC, Machine Control Module (MCM) for CNC, classification of CNC Machine tools.

Week-2: INTRODUCTION TO FANUC SYSTEM
Introduction to FANUC, historical development, FANUC control components, FANUC- Lathe and Mill, control panel.

Week-3: CNC FACING
To perform facing operation using CNC turning machine.

Week-4: CNC PLAIN TURNING
To perform plain turning operation using CNC turning machine.

Week-5: CNC STEP TURNING
To perform step turning operation using CNC turning machine.

Week-6: GROOVING AND THREADING
To perform grooving and threading operation using CNC turning machine.

Week-7: DRILLING AND BORING
To perform drilling and boring operation on CNC turning machine.

Week-8: CNC MILLING PLAIN AND STEP MILLING
To perform plain and step milling operation using CNC milling machine.

Week-9: DRILLING OPERATION
To perform drilling operation using CNC milling machine.

Week-10: PROFILE AND HELICAL MILLING
To perform profile and helical milling operation using CNC milling machine.

Week-11: TAPPING AND SLOTTING
To perform tapping and slotting operation using CNC milling machine.

Week-12: CNC CYLINDRICAL GRINDING
To perform cylindrical grinding operation using CNC cylindrical grinding machine.

Week-13: LASER CUTTING
To perform aero profile cutting using Laser cutting machine.

Week-14: RAPID DRILLING
To perform rapid drilling using Electrical discharge machine.

V. TEXT BOOKS:
1. Peter Smid, CNC Control Setup for Milling and Turning: Mastering CNC Control Systems, Industrial Press Inc., 2010.
2. Stephen F. Krar, et al. Computer Numerical Control Simplified, Industrial Press Inc., 2001.

VI. REFERENCE BOOKS:
1. C. Elanchezhian, et al. Computer Aided Manufacturing, Firewall Media, 2007.
2. Chang, Tien-Chien, et al. Computer-aided manufacturing. United Kingdom, Pearson Prentice Hall, 2006.

VII. ELECTRONICS RESOURCES:
1. https://onlinecourses.swayam2.ac.in/nou22_me04/preview
2. https://onlinecourses.nptel.ac.in/noc22_me10/preview
3. https://faculty.etsu.edu/hemphill/entc3710/nc-prog/index.html

VIII. MATERIALS ONLINE
1. Course template
2. Lab Manual