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

COURSE CONTENT

COMPUTER AIDED MANUFACTURING LABORATORY								
IV Semester: AE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
AAEE17	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	0	2	1	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		
Prerequisite: Aerospace Materials and Processing Techniques								

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. COURSE 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. Toolpath optimization strategies to perform efficient machining to improve production time and enhance tool life.

III. COURSE OUTLINE

After successful completion 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.

IV. COURSE CONTENT

EXERCISE -1: GETTING STARTED EXERCISES
Computer Numeric Control, advantages and applications

EXERCISE -2: INTRODUCTION TO FANUC SYSTEMS
Introduction to FANUC

EXERCISE -3: EXERCISES ON FACING OPERATION
CNC facing operation on lathe, CNC facing operation on mill

EXERCISE -4: EXERCISES ON PLAIN TURNING
Plain turning operation on a cylindrical block

EXERCISE -5: EXERCISES ON STEP TURNING
Perform a step turning operation on a cylindrical block, perform a step turning operation

EXERCISE -6: EXERCISES ON GROOVING AND THREADING
Grooving operation, perform a step turning operation

EXERCISE -7: EXERCISES ON DRILLING AND BORING
Drilling operation, boring operation

EXERCISE -8: EXERCISES ON MILLING: PLAIN AND STEP MILLING
Plain milling, Step milling, End milling

EXERCISE -9: EXERCISES ON DRILLING OPERATION ON VMC
Drilling operation

EXERCISE -10: EXERCISES ON PROFILE AND HELICAL MILLING
Profile Milling Helical Milling

EXERCISE -11: EXERCISES ON TAPPING AND SLOTTING
Tapping operation, slotting operation

EXERCISE -12: EXERCISES ON CNC CYLINDRICAL GRINDING
cylindrical grinding operation

EXERCISE -13: EXERCISE ON LASER CUTTING
Create airfoil profile cutting using Laser cutting machine

EXERCISE-14: EXERCISE ON RAPID DRILLING
Rapid drilling on a Mils steel plate

V. TEXTBOOKS

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. Chang, Tien-Chien, et al. Computer-aided manufacturing. United Kingdom, Pearson Prentice Hall, 2006.

VII. ELECTRONIC REFERENCES
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.htm

VIII. MATERIALS ONLINE

1. Course Outline Description
2. Lab Manual