



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

## COURSE CONTENT

COMPUTER AIDED ENGINEERING LABORATORY								
V Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AMED29	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes:45			Total Classes:45			
Prerequisite: Machine Drawing								

### I. COURSE OVERVIEW:

Computer aided engineering laboratory is a course primary important to mechanical engineering students. The aim is to impart the overview of computer applications or design and manufacturing the discrete engine components, assemblies and final product to meet the global competition. The course covers the life cycle of a product describes the product model generation, analysis structural, thermal, dynamic behaviors. This course also deals with creation of synthetic curves and surfaces. It imposes the knowledge of latest manufacturing techniques using CNC/DNC Machines centers with different CNC programming methods, Manufacturing processes, Group Technologies.

### II. COURSES OBJECTIVES:

The students will try to learn

- I. The 2D drawings of machine components and modify commands for simple geometric assemblies.
- II. The 2D Sectinal views for part drawing and assemblies, and generation of 2D, 3D models through different features.
- III. The Simulation software used for anylse stresses in various beams and truss.
- IV. The fundamentals of CNC turning and milling, Part programming and interpolation techniques using CAM software.

### III. COURSE OUTCOMES:

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

- CO 1 Develop the ability to create and analyze 2D and 3D models for engineering components and systems.
- CO 2 Analyze and interpret simulation results to make informed engineering decisions.
- CO 3 Conduct static and dynamic stress analysis on mechanical components to ensure safety and reliability.
- CO 4 Apply optimization techniques to enhance product performance and efficiency using CAE tools.
- CO 5 Develop practical experience in using industry-standard software for engineering simulations.
- CO 6 Solve real-world engineering problems using computational techniques and validate results through theoretical or experimental approaches.

### IV. COURSE CONTENT:

#### WEEK -1: INTRODUCTION TO CAD SOFTWARE

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

Prepare 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 SIMULATION SOFTWARE**

Study the basic commands used in Simulation Software (Eg. Ansys, Hyperworks, etc.) and related simulation methodologies.

#### **WEEK -6: SIMPLE BEAM**

Determine the deflection and stresses in bar.

#### **WEEK -7: TRUSSES**

Simulate and analysis of a truss.

#### **WEEK -8: CANTILEVER BEAM-1**

Simulate and analysis of a cantilever beam with load.

#### **WEEK -9: CANTILEVER BEAM-2**

Simulate and analysis of a cantilever beam with UDL.

#### **WEEK -10: INTRODUCTION TO CAM**

Study the fundamentals of CNC milling, familiarization of machine control panel, Part programming and interpolation techniques using CAM software.

#### **WEEK -11: CNC MILLING**

Study the machining practice on CNC milling.

#### **WEEK -12: CNC TURNING**

Study the machining practice on CNC turning.

#### **WEEK -13: CNC DRILLING**

Study the machining practice on CNC Drilling.

#### **WEEK – 14: CNC FACING**

Study the machining practice on CNC Facing

#### **V. TEXT BOOKS:**

1. Ibrahim Zeid, “Mastering CAD/CAM”, McGraw-Hill, 2<sup>st</sup> Edition, 2009.
2. Groover M. P, Zimmers. E. W., “CAD/CAM: Computer Aided Design Manufacturing”, Pearson Education India, 1<sup>st</sup> Edition, 2016.

#### **VI. REFERENCE BOOKS:**

1. Yoram Koren, “Computer Control of Manufacturing Systems”, McGraw-Hill, 1<sup>st</sup> Edition, 1983.
2. K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, “Computer Aided Design Manufacturing”, PHI, 1<sup>st</sup> Edition, 2018.

#### **VII. ELECTRONICS RESOURCES:**

1. <https://archive.nptel.ac.in/courses/112/106/112106270/>
2. [https://akanksha.iare.ac.in/index?route=course/details&course\\_id=509](https://akanksha.iare.ac.in/index?route=course/details&course_id=509)

#### **VIII. MATERIALS ONLINE:**

1. Course Content
2. Lab manual