

**MARTHANDAM COLLEGE OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**CAD/CAM LAB**

Major Equipments Available in the Lab

Sl. No	Name of the Equipments	Specification	Quantity
1	Computer work station	i3, 18.5" TFT Monitor, 2Gb RAM	30
2	Computer Server	-	1
3	Computer nodes or systems (High end CPU with atleast 1 GB main memory) networked to the server	-	
4	Laser jet Printer	Width: 347mm Height: 194mm Weight: 4.7 kg Depth: 224 mm Printer type: laser Output type: monochrome printer Format: A4 Processor speed: 266 mHz Power consumption operational: 335 w Power consumption standby: 3w	1
5	CNC Lathe	Capacity: 100mm Maximum turning diameter:32mm Maximum turning length:120mm Bed: slant bed 45deg No. of axis: 2 Swing over bed:150mm Swing over crosslide: 50mm Distance between centers from spindle face: 210mm Number of stations: 8 nos Tool cross section: 12×12 mm Boring bar size: 16mm Control system: PC based 2 axis continuous path	1
6	CNC milling machine	X axis: 225mm Y axis: 150mm Z axis: 115mm Distance between table top and spindle nose: 70-185 Spindle motor capacity: 0.5 HP Tool storage capacity: 6 Pcs Max tool length: 40mm Max tool diameter: 16mm Control system: PC based 3 axis continuous path	1
7	Any High end integrated modeling	-	30

	and manufacturing CAD / CAM software		
8	CAM Software for machining centre and turning centre (CNC Programming and tool path simulation for FANUC / Sinumeric and Heidenhain controller)		30
9	Licensed operating system	-	30
10	Support for CAPP	-	
11	Multi body dynamic software suitable for Mechanism simulation and analysis	-	30
12	C/MAT Lab		
<b>SOFTWARE</b>			
1	Solidworks		
2	Ansys		
3	Stadpro		
4	Free cad		

### **COURSES OFFERED**

Sl.No	Odd Sem (Course code & Name)	Class	Even Sem (Course code & Name)	Class
1	ME3381-Computer Aided Machine Drawing Laboratory	II MECH	ME3681 CAD/CAM LAB	III MECH
2	ME8711-Simulation and Analysis Laboratory	IV MECH		

**OBJECTIVES:**

- To acquaint the skills and practical experience in handling 2D drafting and 3D modelling software systems, standard drawing practices using fits and tolerances.
- To prepare assembly drawings both manually and using standard CAD packages.
- To Preparing standard drawing layout for modeled parts, assemblies with BoM.

**OUTCOMES:**

At the end of the course the students would be able to

Prepare standard drawing layout for modelled assemblies with BoM.

Model orthogonal views of machine components.

Prepare standard drawing layout for modelled parts

**LIST OF EXPERIMENTS****PART I****DRAWING STANDARDS & FITS AND TOLERANCES**

Code of practice for Engineering Drawing, BIS specifications – Welding symbols, riveted joints, keys, fasteners – Reference to hand book for the selection of standard components like bolts, nuts, screws, keys etc. - Limits, Fits – Tolerancing of individual dimensions IS919- Specification of Fits – Preparation of production drawings and reading of part and assembly drawings, basic principles of Geometric Dimensioning &Tolerancing.

**PART II****2D DRAFTING**

Drawing, Editing, Dimensioning, Layering, Hatching, Block, Array, Detailing, Detailed Drawing. 1. Bearings – Bush Bearing, 2. Valves – Safety and Non-return Valves. 3. Couplings – Flange, Oldham's, Muff, Gear couplings. 4. Joints – Universal, Knuckle, Gib& Cotter, Strap, Sleeve &Cotter joints. 5. Engine parts – Piston, Connecting Rod, Crosshead (vertical and horizontal), Stuffing box, multi-plate clutch. 6. Machine Components – Screw Jack, Machine Vice, LatheTail Stock, Lathe Chuck, Plummer Block, Vane and Gear pumps.

**OBJECTIVES**

- 1 To gain practical experience in handling 2D drafting and 3D modelling software systems
- 2 Designing 3 Dimensional geometric model of parts, sub-assemblies, assemblies and exporting it to drawing
- 3 Programming G & M Code programming and simulate the CNC program and Generating part programming data through CAM software

**OUTCOMES:**

At the end of the course the students would be able to

**CO1.** Design experience in handling 2D drafting and 3D modelling software systems

**CO2.** Design 3 Dimensional geometric models of parts, sub-assemblies, assemblies and export it to drawing

**CO 3.** Demonstrate manual part programming and simulate the CNC program and Generate part programming using G and M code through CAM software.

**LIST OF EXPERIMENTS****3D GEOMETRIC MODELLING**

1. CAD Introduction Sketch: Solid modeling: Extrude, Revolve, Sweep, Variational sweep and Loft. Surface modeling: Extrude, Sweep, Trim, Mesh of curves and Free form. Feature manipulation: Copy, Edit, Pattern, Suppress, History operations. Assembly: Constraints, Exploded Views, Interference check Drafting: Layouts, Standard & Sectional Views, Detailing & Plotting
2. Creation of 3D assembly model of following machine elements using 3D Modelling software
  1. Flange Coupling
  2. Plummer Block
  3. Screw Jack
  4. Lathe Tailstock
  5. Universal Joint
  6. Machine Vice
  7. Stuffing box
  8. Crosshead
  9. Safety Valves
  10. Non-return valves
  11. Connecting rod
  12. Piston
13. Crankshaft \* Students may also be trained in manual drawing of some of the above components (specify the number – progressive arrangement of 3D)

**MANUAL PART PROGRAMMING**

1. CNC Machining Centre i) Linear Cutting. ii) Circular cutting. iii) Cutter Radius Compensation. iv) Canned Cycle Operations.
2. CNC Turning Centre i) Straight, Taper and Radial Turning. ii) Thread Cutting. iii) Rough and Finish Turning Cycle. iv) Drilling and Tapping Cycle.
3. COMPUTER AIDED PART PROGRAMMING
  - i) Generate CL Data and Post process data using CAM packages for Machining and Turning Centre.
  - ii) Application of CAPP in Machining and Turning

**OBJECTIVES**

To give exposure to software tools needed to analyze engineering problems.

To expose the students to different applications of simulation and analysis tools.

**OUTCOMES**

Upon the completion of this course the students will be able to

**CO1** Simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.

**CO2** a Analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.

**CO3** Calculate the natural frequency and mode shape analysis of 2D components and beams.

**LIST OF EXPERIMENTS****A. SIMULATION**

1. MATLAB basics, Dealing with matrices, Graphing-Functions of one variable and two variables
2. Use of Matlab to solve simple problems in vibration
3. Mechanism Simulation using Multibody Dynamic software

**B. ANALYSIS**

1. Force and Stress analysis using link elements in Trusses, cables etc.
2. Stress and deflection analysis in beams with different support conditions.
3. Stress analysis of flat plates and simple shells.
4. Stress analysis of axi – symmetric components.
5. Thermal stress and heat transfer analysis of plates.
6. Thermal stress analysis of cylindrical shells.
7. Vibration analysis of spring-mass systems.
8. Model analysis of Beams.
9. Harmonic, transient and spectrum analysis of simple systems.