

## COMPUTER AIDED MANUFACTURING LABORATORY

<b>VI Semester: AE</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AAE110	Core	L	T	P	C	CIA	SEE	Total
		-	-	3	2	30	70	100
<b>Contact Classes: Nil</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: 36</b>			<b>Total Classes: 36</b>	
<p><b>COURSE OBJECTIVES:</b></p> <ol style="list-style-type: none"> <li>I. Gain knowledge about software equipment, tools and machines associated with computer aided manufacturing.</li> <li>II. Execute simple operations using computer numerical control codes.</li> <li>III. Identify parameters and tools suitable for manufacturing a component on computer numerical control machines.</li> <li>IV. Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.</li> </ol> <p><b>COURSE OUTCOMES (COs):</b></p> <ol style="list-style-type: none"> <li>CO 1 Understand the features and specifications of CNC machines.</li> <li>CO 2 Develop the process planning sheets and tool layouts.</li> <li>CO 3 Understand the CAM software and its programming</li> <li>CO 4 Use the CAM software and prepare CNC part programs.</li> <li>CO 5 Execute the part program and machine the component as per the production drawing.</li> </ol> <p><b>COURSE LEARNING OUTCOMES (CLOs):</b></p> <ol style="list-style-type: none"> <li>1. Remember procedures for CNC machine start-up.</li> <li>2. Understand CNC machining and uses, and applications of CNC program.</li> <li>3. Describe the capabilities and limitations of computer numerical control (CNC)/computer assisted manufacturing (CAM) equipment.</li> <li>4. Understand the Cartesian coordinate system as used in a CNC machine program.</li> <li>5. Understand the differences in absolute and incremental dimensioning as related to programming of a CNC machine.</li> <li>6. Understand the purpose or function of the preparatory commands for a CNC machine (G-codes) and miscellaneous commands used with a CNC machine (M-codes).</li> <li>7. Remember the purpose of other alphabetical commands used in programming operations of a CNC machine.</li> <li>8. Knowledge about selecting tool for CNC operations and use CNC mill, CNC lathe, and CNC machine centers to project specifications.</li> <li>9. Remember different types of tooling required for CNC mills, CNC lathes, and CNC machine centers.</li> <li>10. Select tooling required for specific job on CNC mill, CNC machine centers, and CNC lathe.</li> <li>11. Write a program for a given operation to be executed for the required machining operation.</li> <li>12. Execute programs for CNC mill, CNC lathe, and CNC machine center according to project specifications.</li> <li>13. Understand differences between CNC and VMC.</li> <li>14. Knowledge about selecting tool for VMC operations and use VMC machine.</li> <li>15. Understand different operations that are to be executed to get a final product which include drilling and reaming operations.</li> </ol>								

16. Understand importance of feed and rate of cut and how to control each parameter in CNC based on the project specifications.

### LIST OF EXPERIMENTS

<b>Week-1</b>	<b>SIMULATION OF SIMPLE STEP TURNING AND FACING USING CNC MACHINE</b>
To write the manual part program as per given dimensions for step turning and facing operations and simulate	
<b>Week-2</b>	<b>MACHINING OF SIMPLE STEP TURNING AND FACING USING CNC MACHINE</b>
To execute step turning and facing operations using the codes on CNC lathe	
<b>Week-3</b>	<b>SIMULATION OF TAPPER TURNING AND CHAMFERING USING CNC MACHINE</b>
To write the manual part program as per given dimensions for taper turning and chamfering operations and simulate	
<b>Week-4</b>	<b>MACHINING OF TAPPER TURNING AND CHAMFERING USING CNC MACHINE</b>
To execute taper turning and chamfering operations using the codes on CNC lathe	
<b>Week-5</b>	<b>SIMULATION OF SIMPLE TURNING, CHAMFERING AND FILLET USING CNC MACHINE</b>
To write the manual part program to the given dimensions for simple turning, chamfering and fillet operations and simulate	
<b>Week-6</b>	<b>MACHINING OF SIMPLE TURNING, CHAMFERING AND FILLET USING CNC MACHINE</b>
To execute simple turning, chamfering and fillet operations using the codes on CNC lathe	
<b>Week-7</b>	<b>SIMULATION OF SIMPLE TURNING AND THREADING CYCLE USING CNC MACHINE</b>
To write the manual part program to the given dimensions for simple turning and threading operations and simulate	
<b>Week-8</b>	<b>MACHINING OF SIMPLE TURNING AND THREADING CYCLE USING CNC MACHINE</b>
To execute simple turning and threading operations using the codes on CNC lathe	
<b>Week-9</b>	<b>SIMULATION OF CONTOUR MILLING USING VMC MACHINE</b>
To write the manual part program to the given dimensions for contour milling operations and simulate	
<b>Week-10</b>	<b>MACHINING OF CONTOUR MILLING USING VMC MACHINE</b>
To execute contour milling operations using the codes on CNC lathe	
<b>Week-11</b>	<b>SIMULATION OF DRILLING AND REAMING USING CNC MACHINE</b>
To write the manual part program to the given dimensions and execute contour milling operations in CNC	
<b>Week-12</b>	<b>MACHINING OF DRILLING AND REAMING USING CNC MACHINE</b>
To execute drilling and reaming operations using the codes on CNC	

**Text Books:**

- 1 Computer Aided Manufacturing by T.K.Kundra., Tata McGraw-Hill Education, 13th Softcover Reprint 2008.
- 2 Lalit Narayan, “Computer Aided Design and Manufacturing ”, Prentice-HallIndia Learning Private Limited (2008)..

**Web Reference:**

1. <https://wings.buffalo.edu/eng/mae/courses/460-564/Course-Notes/cnc-classnotes.pdf>
2. [https://www.engr.uvic.ca/~mech410/CAM\\_references/CNC\\_Computer\\_Numerical\\_Control\\_Programmig\\_Basics.pdf](https://www.engr.uvic.ca/~mech410/CAM_references/CNC_Computer_Numerical_Control_Programmig_Basics.pdf)
3. <https://www.cnccookbook.com/CCCNCGCodeCourse.htm>