

<b>COURSE TITLE</b>	<b>CNC PROGRAMMER</b>
<b>COURSE CODE</b>	<b>01ME1705</b>
<b>COURSE CREDITS</b>	<b>1</b>

**Objective:**

- 1 This course aims to provide students with the essential knowledge and skills to effectively operate and program CNC machines.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Follow safety procedures relevant to operations in a modern machine shop.
- 2 Use precision measuring instruments such as micrometers, calipers, and height gauges for accurate part inspection.
- 3 Select and utilize appropriate cutting tools and tool materials for specific machining tasks.
- 4 Develop manual CNC programs for lathes and milling machines using G and M codes.
- 5 Set up and operate CNC lathes and milling machines to produce components as per specifications.
- 6 Generate part geometry and tool paths using CAD/CAM software.

**Pre-requisite of course:** Zeal to learn, attention to detail, and interest in machining and precision tools.

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
0	0	2	0	0	0	50	50

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
<b>Total Hours</b>		

**Suggested List of Experiments:**

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Compare and analyze the advantages and limitations of CNC and conventional machine tools in specific contexts.</b> Compare and analyze the advantages and limitations of CNC and conventional machine tools in specific contexts.	2
2	<b>Analyze the specifications and functional features of a CNC lathe to determine its suitability for various turning operations.</b> Analyze the specifications and functional features of a CNC lathe to determine its suitability for various turning operations.	2

**Suggested List of Experiments:**

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
3	<b>Analyze how a CNC Vertical Machining Centre (VMC) features such as spindle speed, tool magazine, and travel range affect machining accuracy.</b> Analyze how a CNC Vertical Machining Centre (VMC) features such as spindle speed, tool magazine, and travel range affect machining accuracy.	2
4	<b>Analyze the impact of varying machining parameters on tool life, surface roughness, and cycle time.</b> Analyze the impact of varying machining parameters on tool life, surface roughness, and cycle time.	2
5	<b>Develop CNC part programs using both absolute and incremental coordinate systems.</b> Develop CNC part programs using both absolute and incremental coordinate systems.	2
6	<b>Hands-on work and tool setting in CNC lathe.</b> Hands-on work and tool setting in CNC lathe.	2
7	<b>Hands-on work and tool setting in CNC VMC.</b> Hands-on work and tool setting in CNC VMC.	2
8	<b>Manual part programming for step turning, facing, and grooving in CNC lathe.</b> Manual part programming for step turning, facing, and grooving in CNC lathe.	2
9	<b>Manual programming using macros, subroutines, and canned cycles.</b> Manual programming using macros, subroutines, and canned cycles.	2
10	<b>CNC part programming with simulation.</b> CNC part programming with simulation.	2
11	<b>Software-assisted part programming for a milling job in VMC.</b> Software-assisted part programming for a milling job in VMC.	2
12	<b>Software-assisted part programming for a turning job in CNC lathe.</b> Software-assisted part programming for a turning job in CNC lathe.	2
13	<b>Tool path optimization using CAM software.</b> Tool path optimization using CAM software.	2
14	<b>Hands-on machining practice on CNC lathe.</b> Hands-on machining practice on CNC lathe.	2
15	<b>Hands-on machining practice on VMC.</b> Hands-on machining practice on VMC.	2
<b>Total Hours</b>		<b>30</b>

**Textbook :**

- 1 CAD/CAM Computer-Aided Design and Manufacturing , M. Groover, E. Zimmers, Pearson, 2014
- 2 CNC Programming Handbook, Peter Smid, Industrial Press Inc, U. S., 2007

**References:**

- 1 Computer Numerical Control: Machining and Turning Centers, Computer Numerical Control: Machining and Turning Centers, Robert Quesada, Pearson, 2004
- 2 Programming of CNC Machines, Programming of CNC Machines, Ken Evans, Industrial Press, 2016
- 3 Machine Tool Design and Numerical Control , Machine Tool Design and Numerical Control , N. K. Mehta, McGrawHill, 2017
- 4 CNC Machining Handbook, CNC Machining Handbook, Alan Overby, McGrawHill, 2010
- 5 CNC Programming: FANUC CONTROL, CNC Programming: FANUC CONTROL, S. K. Sinha, Galgotia Publications, 2011

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	40.00	25.00	5.00	30.00

**Instructional Method:**

- 1 Problem based teaching learning and Hands-on practice sessions.

**Supplementary Resources:**

- 1 <https://cnclink.com>
- 2 <https://www.helmancnc.com>
- 3 <https://gcodetutor.com>