COURSE TITLE	**COMPUTER AIDED MANUFACTURING LAB**
COURSE CODE	**01CA1203**
COURSE CREDITS	**2**

Objective:

1 The course is prepared to provide the detailed understanding of CNC programming, tool path simulation and manufacturing of components on CNC machines.

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

1 Apply 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 Prepare CNC part programs using G and M codes for turning and milling operations on lathes and VMC machines.

4 Set up, operate, and evaluate CNC lathes and milling machines to produce components conforming to given dimensional and surface specifications.

5 Apply CAD/CAM software to generate part geometry, simulate tool paths, and optimise machining strategies.

6 Analyse CNC programs using simulator tools to diagnose, troubleshoot, and rectify programming errors effectively.

Pre-requisite of course: Manufacturing processes – 1, Production Technology

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	4	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**CNC machines hardware, controllers, sensors and their axis designations.** CNC machines hardware, controllers, sensors and their axis designations.	2
2	**Work offset on CNC Lathe and VMC machine.** Work offset on CNC Lathe and VMC machine.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	**Manual part programming for CNC lathe for multipass turning and facing without canned cycles.** Manual part programming for CNC lathe for multipass turning and facing without canned cycles.	2
4	**Manual part programming for CNC lathe for grooving, drilling and undercutting.** Manual part programming for CNC lathe for grooving, drilling and undercutting.	2
5	**Manual part programming for CNC lathe using Macros.** Manual part programming for CNC lathe using Macros.	2
6	**Manual part programming for CNC lathe using subroutines.** Manual part programming for CNC lathe using subroutines.	2
7	**Part programming for CNC lathe using Canned Cycles.** Part programming for CNC lathe using Canned Cycles.	2
8	**Manual part programming for profile milling with cutter radius compensation.** Manual part programming for profile milling with cutter radius compensation.	2
9	**Software based programming using Mill Planner operations.** Software based programming using Mill Planner operations.	2
10	**Software based programming using Mill Contour operations.** Software based programming using Mill Contour operations.	2
11	**Tool path optimization using Software based programming.** Tool path optimization using Software based programming.	2
12	**Cutting and Engraving operation using Laser.** Cutting and Engraving operation using Laser.	2
Total Hours		**24**

Textbook :

1 Numerical Control and Computer Aided Manufacturing , T.K. Kundra, P.N.Rao, N.K. Tewari , Tata McGraw Hill Publishing Company Ltd. , 2015

2 Computer aided design and manufacturing , Dr Sadhu Singh , Khanna Publisher , 2022

References:

1 CNC Machining and Programming: An Introduction , CNC Machining and Programming: An Introduction , David Gibbs and Thomas Crandall , Industrial Press Inc.,U.S. , 2003

2 Computer Aided Design and Manufacturing , Computer Aided Design and Manufacturing , M Groover , Pearson, 2018

3 Computer Aided Manufacturing , Computer Aided Manufacturing , E Zimmers , Pearson, 2018

4 Computer aided design and Manufacturing , Computer aided design and Manufacturing , Lalit Narayan , PHI, 2022

5 CNC Programming , CNC Programming , S K Sinha , Galgotia Publications Pvt Ltd , 2021

References:

6 CNC Fundamentals and Programming , CNC Fundamentals and Programming , Agarwal, Charotar Publishing House Pvt. Ltd. , 2014

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**
10.00	20.00	20.00	20.00	20.00	10.00

Instructional Method:

1 Presentation, Demonstration, Simulation, Practical

Supplementary Resources:

1 https://nptel.ac.in/courses/112102102