

Program : Diploma in Mechanical Engineering / Manufacturing Technology	
Course Code : 6029	Course Title: Advanced Machine Tools Lab
Semester : 6	Credits: 1.5
Course Category: Program Elective	
Periods per week: 3 (L:0, T:0, P:3)	Periods per semester: 45

Course Objectives:

- To acquire skill for performing various operations in Computer numerically controlled machines
- To Familiarize with the creation of simple part programmes for machining operations in CNC Lathe and Milling machine
- To Familiarize with the operations performed on Non-conventional machines
- To acquire skills for producing intricate shapes using 3D printing machines and to develop elementary ideas on robotics

Course Prerequisites:

Topic/Description	Course Code	Course Title	Semester
Conventional Machine tools and manufacturing		Machine Shop Practice	5
Conventional Machine tools and manufacturing		Workshop Practice 3 & 4	3 & 4

Course Outcomes:

CO_n	Description	Duration (Hours)	Cognitive Level
CO1	Perform various operations in CNC Machines (lathe/milling)	12	Applying
CO2	Demonstrate simple part programming operations (turning/milling)	11	Applying
CO3	Apply technical skill to operate sophisticated machines in manufacturing industry (Non-conventional machining)	9	Applying

CO4	Perform simple works on 3D printing Machine and develop elementary ideas on robotics and applications.	11	Applying
	Lab Exam	2	Applying

CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2		3			2
CO2	3	2	3	3			2
CO3	3	3		2			
CO4	3	3		3			

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	Perform various operations in CNC Machines (lathe/milling)		
M1.01	Study of CNC Lathe	3	Understanding
M1.02	Simple part programming	9	Applying
<p>Contents: CNC Programming and Machining: Introduction; 1). Study of CNC lathe 2). Study of international standard codes: G-Codes and M-Codes; 3). Format – Dimensioning methods; CNC Turning Machine: (Material: Aluminum/Acrylic/Plastic rod) 1. Using Linear and Circular interpolation - Create a part program and produce component in the Machine. 2. Using Stock removal cycle – Create a part program for multiple turning operations and produce component in the Machine. 3. Using canned cycle - Create a part program for thread cutting, grooving and produce component in the Machine.</p>			
CO2	Demonstrate simple part programming operations (turning/milling)		
M2.01	Study CNC Milling Machines	3	Understanding

M2.02	Simple part programming operations	8	Applying
	Lab Exam – I	1	
<p>Contents: CNC Milling Machine (Material: Aluminium/ Acrylic/ Plastic/Metal)</p> <p>1. Using Linear interpolation and Circular interpolation – Create a part program for grooving and produce component in the Machine.</p> <p>2. Using canned cycle - Create a part program for drilling, tapping, counter sinking and produce component in the Machine.</p> <p>3. Using subprogram - Create a part program for mirroring and produce component in the Machine.</p>			
CO3	Apply technical skill to operate sophisticated machines in manufacturing industry (Non-conventional machining)		
M 3.01	Study of any one non-traditional machining process	1	
M 3.02	Simple operations/machining in any advanced machining like EDM/ECM/USM etc.	4	
M 3.03	Study of any one non-conventional machining process and simple machining operations using it.	4	
CO4	Perform simple works on 3D printing Machine and develop elementary ideas on robotics and applications.		
M4.01	To introduce the basic concepts, parts of robots and types of robots /scope of 3D printing in manufacturing industry	5	Applying
M 4.02	Basic robotic operations/ Procedure of 3D printing	6	Applying
	Lab Exam – II	1	
<p>Contents: Application of robots in machining; - welding; assembly and material handling Application of 3D printing Machine in production of intricate shapes</p>			

Text / Reference

T/R	BookTitle/Author
1	Manufacturing process – Myro N Begman, 5 th edition, Tata McGraw Hill, New Delhi
2	Production Technology – HMT, 18th edition, Tata McGraw Hill, New Delhi
3	Elements of Workshop Technology (Volume I & II) – Hajra Chowdry & Bhattacharaya, Media Promoters, 11th Edition, 2007

4	Industrial Robotics: Technology, Programming and Applications – M.P. Groover, Tata McGraw Hill Co, 2001.
5	Fundamentals of CNC machining-Titans of CNC academy.

Online Resources

Sl.No	Website Link
1	https://www.okuma.com
2	https://www.autodesk.com
3	https://www.robotics.org
4	https://www.emachineshop.com