

**MOHAMMED SATHAK A J COLLEGE OF ENGINEERING**

Siruseri IT park, OMR, Chennai - 603103

**LESSON PLAN****Department of Mechanical Engineering**

Name of the Subject	<b>Manufacturing Technology II</b>	Name of the handling Faculty	<b>Mr.D SAKTHIVEL</b>
Subject Code	<b>ME8451</b>	Year / Sem	<b>II/IV</b>
Acad Year	<b>2021-2022</b>	Batch	<b>2020-2024</b>

**Course Objective**

To understand the concept and basic mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching

To understand the basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming

**Course Outcome**

CO1: Explain the mechanism of material removal processes

CO2: Describe the constructional and operational features of Centre lathe and other special purpose lathes.

CO3: Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines and explain the type of grinding

CO4: Explain the types of super finishing processes apart from gear manufacturing processes.

CO5: Summarize numerical control of machine tools and write a part program.

**Lesson Plan**

Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL /	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I THEORY OF METAL CUTTING							
1	Mechanics of chip formation, single point cutting tool, forces in machining	T2	2	BB	L2	CO1	PO1 & PO10
2	Types of chip, cutting tools	T2	1	BB / NPTEL	L2	CO1	PO1 & PO10
3	Nomenclature, orthogonal metal cutting,	T2	2	BB / NPTEL	L2	CO1	PO1 & PO10
4	Thermal aspects, cutting tool materials, tool wear	T2	2	Chalk & Talk	L1	CO1	PO1 & PO10
5	Tool life, surface finish, cutting fluids and Machinability.	T2	2	Chalk & Talk	L2	CO1	PO1, PO2 & PO10

**Suggested Activity:** Assignment given

**Evaluation method:** Evaluation of Assignment

**UNIT II TURNING MACHINES**

6	Centre lathe, constructional features, specification, operations	T2	2	BB	L1	CO2	PO1 & PO10
7	Taper turning methods, thread cutting methods, special attachments,	T2	1	BB / NPTEL	L2	CO2	PO1 & PO10
8	Machining time and power estimation	T2	2	BB / NPTEL	L2	CO2	PO1, PO2 & PO10
9	Capstan and turret lathes- tool layout	T2	2	BB	L2	CO2	PO1 & PO10

10	Automatic lathes: semi automatic, single spindle : Swiss type, automatic screw type & multi spindle:	T2	2	BB	L1	CO2	PO1 &PO10
<b>Suggested Activity:</b> Assignment given							
<b>Evaluation method:</b> Evaluation of Assignment							
<b>UNIT III SHAPER, MILLING AND GEAR CUTTING MACHINES</b>							
11	Shaper & Types of operations. Drilling ,reaming, boring, Tapping.	T2	2	BB / NPTEL	L1	CO3	PO1&P1 0
12	Milling operations & Types of milling cutter. Gear cutting	T2	1	BB / NPTEL	L1	CO3	PO1&P1 0
13	Forming and generation principle and construction of gear milling	T2	2	BB	L1	CO3	PO1,PO2 _P10
14	Hobbing and gear shaping processes	T2	2	BB	L2	CO3	PO1,PO2 _P10
15	Finishing of gears.	T2	2	BB	L2	CO3	PO1,PO2 _P10
<b>Suggested Activity:</b> Assignment given							
<b>Evaluation method:</b> Evaluation of Assignment							
<b>UNIT IV ABRASIVE PROCESS AND BROACHING</b>							
16	Abrasive processes: grinding wheel	T2	2	BB	L1	CO3	PO1&P1 0
17	specifications and selection, types of grinding process, cylindrical grinding, surface grinding,	T2	1	BB	L1	CO3	PO1&P1 0
18	Typical applications & concepts of surface integrity,	T2	2	BB / NPTEL	L2	CO4	PO1&P1 0
19	Broaching machines: broach construction	T2	2	BB / NPTEL	L1	CO4	PO1&P1 0
20	Push, pull, surface and continuous broaching machines	T2	2	BB	L1	CO4	PO1&P1 0
<b>Suggested Activity:</b> Assignment given							
<b>Evaluation method:</b> Evaluation of Assignment							
<b>UNIT V CNC MACHINING</b>							
21	Numerical Control (NC) machine tools	T2	2	BB / NPTEL	L2	CO5	PO1&P1 0
22	CNC types, constructional details, special features, machining centre,	T2	1	BB / NPTEL	L2	CO5	PO1&P1 0
23	Part programming fundamentals CNC	T2	2	BB / NPTEL	L3	CO5	PO3,PO5 _P10
24	Manual part programming	T2	2	BB / NPTEL	L3	CO5	PO3,PO5 _P10
25	Micromachining & wafer machining	T2	2	BB / NPTEL	L2	CO5	PO1&P1 0
<b>Suggested Activity:</b> Assignment given							
<b>Evaluation method:</b> Evaluation of Assignment							
<b>Content Beyond the Syllabus Planned</b>							
1	Introduction to Unconventional Techniques in Manufacturing						
2	Introduction to additive manufacturing						
<b>Text Books</b>							
1	Hajra Choudhury, "Elements of Workshop Technology", Vol.II., Media Promoters						
2	Rao. P.N “Manufacturing Technology - Metal Cutting and Machine Tools”, Tata McGraw-Hill, New Delhi, 2003.						
<b>Reference Books</b>							

1	Richerd R Kibbe, John E. Neely, Roland O. Merges and Warren J.White “Machine Tool Practices”, Prentice Hall of India, 1998													
2	HMT, "Production Technology", Tata McGraw Hill, 1998													
3	Geofrey Boothroyd, "Fundamentals of Metal Machining and Machine Tools", Mc Graw Hill, 1984													
4	Roy. A.Lindberg, “Process and Materials of Manufacture,” Fourth Edition, PHI/Pearson Education 2006													
Website / URL References														
1	<a href="https://nptel.ac.in/courses/112/105/112105127/">https://nptel.ac.in/courses/112/105/112105127/</a>													
Blooms Level														
Level 1 (L1) : Remembering		Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing					Higher Order Thinkin g	Projects / Mini Projects				
Level 2 (L2) : Understanding				Level 5 (L5) : Evaluating										
Level 3 (L3) : Applying				Level 6 (L6) : Creating										
Mapping syllabus with Bloom’s Taxonomy LOT and HOT														
Unit No	Unit Name			L1	L2	L3	L4	L5	L6	LOT	HOT	Total		
Unit 1	Theory of Metal Cutting			1	4	0	0	0	0	5	0	5		
Unit 2	Turning Machines			2	3	0	0	0	0	5	0	5		
Unit 3	Shaper, Milling and Gear Cutting Machine			3	2	0	0	0	0	5	0	5		
Unit 4	Abrasive Process and Broaching			4	1	0	0	0	0	5	0	5		
Unit 5	CNC Machining			0	3	2	0	0	0	5	0	5		
Total				10	13	2	0	0	0	25	0	25		
Total Percentage				40	52	8	0	0	0	100	0	100		
CO PO Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1								3			3	2
CO2	3	1								3			3	2
CO3	3	2								3			3	2
CO4	3	2								3			3	2
CO5	3		1		1					3			3	2
Avg	3	1.5	1		1					3			3	2
Justification for CO-PO mapping														
CO1	Highly Mapped with PO1 because subject need basic engineering knowledge to understand the terms and definitions & Highly Mapped with PO10 because with out proper communication skills it is difficult to understand the concept													
CO2	Highly Mapped with PO1 because subject need basic engineering knowledge to understand the terms and definitions, Low level mapping done with PO2 it need basic formula knowledge & Highly Mapped with PO10 because with out proper communication skills it is difficult to understand the concept													
CO3	Highly Mapped with PO1 because subject need basic engineering knowledge to understand the terms and definitions, Moderately mapped with PO2 it needs scientific formula for calculation & Highly Mapped with PO10 because with out proper communication skills it is difficult to understand the concept													

<b>CO4</b>	Highly Mapped with PO1 because subject need basic engineering knowledge to understand the terms and definitions, Moderately mapped with PO2 it needs scientific formula for calculation & Highly Mapped with PO10 because with out proper communication skills it is difficult to understand the concept				
<b>CO5</b>	Highly Mapped with PO1 because subject need basic engineering knowledge to understand the terms and definitions, Low level mapping has been done with PO3 and PO5 for understanding the design and program writing & Highly Mapped with PO10 because with out proper communication skills it is difficult to understand the concept				
<b>3</b>	<b>High level</b>	<b>2</b>	<b>Moderate level</b>	<b>1</b>	Low level
Name & Sign of Faculty Incharge : Mr.D SAKTHIVEL					
Name & Sign of Subject Expert :					
Head of the Department :					

Format No :231