

## Lesson Plan

Name of the Faculty : Sh. Deepak Malhotra

Discipline : Mechanical Engineering

Semester : 5<sup>th</sup>

Subject : CNC Machines and Automation

Lesson Plan duration : 17 weeks (01.10.2021 to 28.01.2022)

Work load per week : Lecture – 03, Practical – 04

Week	Theory		EXECUTION	
	Lecture Day	Topic (Including assessment/test)	Date	Sign.
1 <sup>st</sup>	1 <sup>st</sup>	Introduction about the subject & brief overview.		
	2 <sup>nd</sup>	<b>1. Introduction:</b> Introduction to NC, Components of NC, binary Coding		
	3 <sup>rd</sup>	Machine Control Unit, input devices		
2 <sup>nd</sup>	4 <sup>th</sup>	Advantages, disadvantages of NC over Conventional machine, CNC & DNC		
	5 <sup>th</sup>	Their type, Advantages & disadvantages and Applications		
	6 <sup>th</sup>	Selection of components to be machined on CNC machines		
3 <sup>rd</sup>	7 <sup>th</sup>	Problems with conventional NC, Axis identification		
	8 <sup>th</sup>	New development in NC, PLC Control and its purpose.		
	9 <sup>th</sup>	<b>2. Construction and Tooling:</b> Design features, special mechanical design features, specification Chart of CNC machines		
4 <sup>th</sup>	10 <sup>th</sup>	Type of slide ways, balls, roller,		
	11 <sup>th</sup>	motor-servo/stepper and Axis drive, Lead screw, recirculating ball screw & nut assembly		
	12 <sup>th</sup>	Swarf removal, safety and guarding devices.		

5 <sup>th</sup>	13 <sup>th</sup>	Various cutting tools for CNC machines		
	14 <sup>th</sup>	Overview of CNC tool holder		
	15 <sup>th</sup>	different pallet systems and automatic tool changer system		
6 <sup>th</sup>	16 <sup>th</sup>	Tool change cycle, management of a tool room.		
	17 <sup>th</sup>	<b>3. System Devices:</b> Control System; Feedback control classification(Open Loop and Closed Loop System)		
	18 <sup>th</sup>	Concept of Actuators, Transducers and Sensors		
7 <sup>th</sup>	19 <sup>th</sup>	<b>1<sup>st</sup> sessional test (Tentative)</b>		
	20 <sup>th</sup>	<b>Assessment</b>		
	21 <sup>st</sup>	Tachometer, LVDT,		
8 <sup>th</sup>	22 <sup>nd</sup>	Opto-interrupters, potentiometers for linear and angular Position		
	23 <sup>rd</sup>	Encoder and decoder and axis drives, other classification of CNC feedback, motion, positioning.		
	24 <sup>th</sup>	<b>4. Part Programming:</b> Introduction to Part programming		
9 <sup>th</sup>	25 <sup>th</sup>	Basic concepts of part programming, NC words, Blocks		
	26 <sup>th</sup>	Part programming formats, simple programming for rational components(PTP, Straight Line, Curved Surface)		
	27 <sup>th</sup>	Tool offset, cutter radius compensation, Wear compensation,		
10 <sup>th</sup>	28 <sup>th</sup>	Advanced Structure: Advantages of using advanced structure, part programming using canned cycles,		
	29 <sup>th</sup>	subroutines and do loops and mirror image		
	30 <sup>th</sup>	<b>5. Problems in CNC Machines:</b> Common problems in mechanical components of NC machines,		
11 <sup>th</sup>	31 <sup>st</sup>	Common problems in electrical components of NC machines,		
	32 <sup>nd</sup>	Common problems in pneumatic components of NC machines,		
	33 <sup>rd</sup>	Common problems in electronic and PC components of NC machines.		

12 <sup>th</sup>	34 <sup>th</sup>	<b>2<sup>nd</sup> sessional test (Tentative)</b>		
	35 <sup>th</sup>	<b>Assessment</b>		
	36 <sup>th</sup>	Study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines,		
13 <sup>th</sup>	37 <sup>th</sup>	Method of using discussion forums, Environmental problems		
	38 <sup>th</sup>	<b>6. Automation and NC system:</b> Concept of automation		
	39 <sup>th</sup>	Suitability of production system to automation, and their types		
14 <sup>th</sup>	40 <sup>th</sup>	Emerging trends in automation Automatic assembly, Manufacturing of PCB, manufacturing of IC,		
	41 <sup>st</sup>	Overview of FMS, AGV		
	42 <sup>nd</sup>	ASRS, Group Technology, CAD/Cam& CIM		
15 <sup>th</sup>	43 <sup>rd</sup>	Automated Identification system, Concept of AI		
	44 <sup>th</sup>	Robotics, nomenclature of joints, motion		
	45 <sup>th</sup>	Revision		
16 <sup>th</sup>	46 <sup>th</sup>	<b>3<sup>rd</sup> sessional test (Tentative)</b>		
	47 <sup>th</sup>	<b>Assessment</b>		
	48 <sup>th</sup>	Revision		
17 <sup>th</sup>	49 <sup>th</sup>	Revision		
	50 <sup>th</sup>	Revision		
	51 <sup>st</sup>	Revision		

## Lesson Plan

Name of the Faculty : Sh. Deepak Malhotra

Discipline : Mechanical Engineering

Semester : 5<sup>th</sup>

Subject : CNC Machines and Automation

Lesson Plan duration : 17 weeks (15.09.2022 to 16.01.2023)

Work load per week : Lecture – 03, Practical – 04

Week			EXECUTION		
	Practical Day	Topic	G1	G2	Sign.
1 <sup>st</sup>	1 <sup>st</sup> 2 <sup>nd</sup>	Introduction about the Lab & brief discussion over the Lab practical's to be conducted.			
2 <sup>nd</sup>	1 <sup>st</sup> 2 <sup>nd</sup>	1. Study of constructional detail of CNC lathe			
3 <sup>rd</sup>	1 <sup>st</sup> 2 <sup>nd</sup>	2. Study of constructional detail of CNC milling machine.			
4 <sup>th</sup>	1 <sup>st</sup> 2 <sup>nd</sup>	3. Study the constructional details and working of: -Automatic tool changer and tool setter -Multiple pallets -Swarf Removal -Safety Devices.			
5 <sup>th</sup>	1 <sup>st</sup> 2 <sup>nd</sup>	4. Develop a part programme for following lathe operations and make the job on CNC lathe& CNC turning Center. 1. Plain turning and facing operation 2. Taper turning operation 3. Operation along contour using Circular interpolation			
6 <sup>th</sup>	1 <sup>st</sup> 2 <sup>nd</sup>	5. Develop a part programme for the following milling operation and make the job on CNC milling 1. Plain milling 2. Slot milling			

7 <sup>th</sup>	1 <sup>st</sup>	Checking of Practical file/			
	2 <sup>nd</sup>	<b>1st sessional test (Tentative)</b>			
8 <sup>th</sup>	1 <sup>st</sup>	5. Develop a part programme for the following milling operation and make the job on CNC milling 3. Contouring 4. Pocket milling Calculate coordinate points for a zigzag job by consideration sign conventions for milling.			
	2 <sup>nd</sup>				
9 <sup>th</sup>	1 <sup>st</sup>	6. Develop a part program by using Canned cycle on CNC lathe turning, Facing			
	2 <sup>nd</sup>				
10 <sup>th</sup>	1 <sup>st</sup>	6. Develop a part program by using Canned cycle on CNC lathe turning, Facing			
	2 <sup>nd</sup>				
11 <sup>th</sup>	1 <sup>st</sup>	7. Preparation of work instructions for machine operator			
	2 <sup>nd</sup>				
12 <sup>th</sup>	1 <sup>st</sup>	Checking of Practical file/			
	2 <sup>nd</sup>	<b>2nd sessional test (Tentative)</b>			
13 <sup>th</sup>	1 <sup>st</sup>	8. Preparation of preventive maintenance schedule for CNC machine.			
	2 <sup>nd</sup>				
14 <sup>th</sup>	1 <sup>st</sup>	9. Demonstration through industrial visit for awareness of actual working of FMS in production.			
	2 <sup>nd</sup>				
15 <sup>th</sup>	1 <sup>st</sup>	10. Use of software for turning operation on CNC turning center.			
	2 <sup>nd</sup>				
16 <sup>th</sup>	1 <sup>st</sup>	Checking of Practical file/			
	2 <sup>nd</sup>	<b>3rd sessional test (Tentative)</b>			
17 <sup>th</sup>	1 <sup>st</sup>	Checking of Practical file/Evaluation			
	2 <sup>nd</sup>				