LESSON PLAN

FACULTY NAME: **SH. VIKAS**

DISCIPLINE: **MECHANICAL ENGINEERING**

SEMESTER: **Vth**

SUBJECT: **CNC MACHINES AND AUTOMATION**

LESSON PLAN DURATION: **15 WEEKS**

WORK LOAD (LECTURE/PRACTICAL)/WEEK**: (3L, 4P)**

WEEK	THEORY		PRACTICAL
	Day Lecture	**Topic(Including Assignment/Test)**	**Topic**
1	1	**Unit 1-Introduction:** Introduction to NC, Basic Components of NC	**Practical 1:** Study the constructional details of CNC lathe.
	2	Binary coding, MCU, input devices	
	3	Advantages /disadvantages of NC machines over conventional machines	
2	4	CNC & DNC, their types, their advantages, disadvantages and applications	**Practical 2:** Study the constructional details of CNC milling machine.
	5	Selection of parts to be machined on CNC machines	
	6	Problems with conventional NC	
3	7	Rules for Axis identification, New developments in NC	**Practical 3(a):** Study the constructional details and working of: - Automatic tool changer and tool setter - Multiple pallets
	8	PLC Control and its purpose.	
	9	**Unit 2- Construction and Tooling:** Design features, special mechanical design features	
4	10	Specification Chart of CNC machines, types of slideways, balls, rollers,	**Practical 3(b):** Study the constructional details and working of: - Swarf removal - Safety devices
	11	motor- servo/stepper , axis drive and leadscrew, recirculating ball screw and nut assembly	
	12	swarf removal, Safety and guarding devices	
5	13	Various cutting tools for CNC machines, overview of tool holder	Repeat Practical 1 to 3
	14	different pallet systems and automatic tool changer system,	
	15	tool change cycle, management of a tool room. **ASSIGNMENT- 1**	
6	16	Revision for 1ST SESSIONAL TEST	Repeat Practical 1 to 3
	17	**1ST SESSIONAL TEST**	
	18	**Unit 3- System Devices:** Control System , Feedback control classification(open loop, closed loop),	

7	19	Actuators, Transducers and Sensors, characteristics of sensors,	**Practical 4(a):** Develop a part programme for following lathe operations and makethe job on CNC lathe. - Plain turning and facing operation
	20	Tachometer, LVDT, optointerrupters, potentiometers for linear and angular position	
	21	encoder and decoder, axis drives,	
8	22	other classifications of CNC machines-Feedback,	**Practical 4(b):** Develop a part programme for following lathe operations and make the job on CNC lathe. -Taper turning
	23	motion , positioning	
	24	**Unit-4 Part Programming** Part programming and basic procedure of part programming,	
9	25	NC words, Blocks, part programming formats,	**Practical 5(a):** Develop a part programme for the following milling operations and make the job on CNC milling -Plain milling
	26	simple programming for rational components (Point to point, Straight line)	
	27	simple programming for rational components (Curved surface)	
10	28	Tool offset cutter radius compensation and wear compensation.	**Practical 5(b):** Develop a part programme for the following milling operations and make the job on CNC milling - Slot milling
	29	Advanced structures: Advantages of using advanced structures **ASSIGNMENT- 2**	
	30	**2ND SESSIONAL TEST**	
11	31	part programming using canned cycles, subroutines and do loops, mirror images	**Practical 6:** Develop a part program by using canned cycle on CNC lathe for turning , facing
	32	**Unit-5 Problems in CNC Machines** Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines,	
	33	diagnostic study of common problems and remedies,	
12	34	use of on-line fault finding diagnosis tools in CNC machines	**Practical 7:** Preparation of work instruction for machine operator
	35	methods of using discussion forums, environmental problems.	
	36	**Unit-6 Automation and NC system:** Automation, suitability of production system to automation	
13	37	types, emerging trends in automation, automatic assembly	**Practical 8:** Preparation of preventive maintenance schedule for CNC machine.
	38	manufacture of printed circuit boards, manufacture of integrated Circuits,	
	39	Overview of FMS, AGV, ASRS, Group technology	
14	40	CAD/CAM and CIM, Automated Identification system	Repeat Practical 4 to 8
	41	Concept of AI, Robotics, nomenclature of joints, motion. **ASSIGNMENT - 3**	
	42	**3RD SESSIONAL TEST**	
15	43	Revision	Repeat Practical 4 to 8
	44	Revision	
	45	Revision	