

LESSON PLAN

FACULTY NAME: **SH. RAVINDER KUMAR**

DISCIPLINE: **MECHANICAL ENGINEERING**

SEMESTER: **Vth**

SUBJECT: **CNC MACHINES AND AUTOMATION**

LESSON PLAN DURATION: **15 WEEKS**

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

WEEK	THEORY		PRACTICAL
	Day/Lecture	Topic(Including Assignment/Test)	Topic
1	1	Unit1: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	Adaptive control systems, Selection of parts to be machined on CNC machines	
	6	Problems with conventional NC	
3	7	PLC Control and its purpose.	Practical 3(a): Study the constructional details and working of: - Automatic tool changer and tool setter - Multiple pallets
	8	Classification Of NC Systems According to Feedback, motion, positioning. ASSIGNMENT-1	
	9	Unit-2: Part Programming Part programming and basic procedure of part programming,	
4	10	Rules for Axis identification, NC words, Blocks, part-programming formats,	Practical 3(b): Study the constructional details and working of: - Swarf removal - Safety devices
	11	Simple programming for rational components (Point to point, Straight line)	
	12	Simple programming for rational components (Curved surface)	
5	13	Tool offset, cutter radius compensation, and Wear compensation.	Repeat Practical 1to3
	14	Comparative study of Fanuc Controller and Sinumerik codes.	

	15	Advanced structures: Advantages of using advanced structures	
6	16	Part programming using canned cycles, subroutines and do loops, mirror image.	Repeat Practical 1to3
	17	ASSIGNMENT-2 1st SESSIONAL TEST	
	18	Unit 3- System Devices: Control System, Feedback control classification (open loop, closed loop),	
7	19	Construction and Tooling: Need of Special mechanical design features for CNC, specification Chart of CNC machines	Practical 4(a): Develop a part programme for following lathe operations and make the job on CNC lathe. -Plain turning and facing operation
	20	Types of slide ways, balls, rollers,	
	21	Motor-servo/stepper, recirculating ball screw And nut assembly	
8	22	Swarf removal, safety and guarding devices	Practical 4(b): Develop a part programme for following lathe operations and make the job on CNC lathe. -Taper turning
	23	Various cutting tools for CNC machines, Overview of tool holder	
	24	Different pallet systems and automatic tool changer-ATC system, tool change cycle	
9	25	Types of tool magazines, specialized work done in CNC tool room. ASSIGNMENT-3	Practical 5(a): Develop a part programme for the following milling operations and make the job on CNC milling -Plain milling
	26	Unit4-System devices: Control System, Transducers and Sensors	
	27	Characteristics of sensors, Tachometer, LVDT	
10	28	Opto- interrupters, potentiometers for linear and angular position	Practical 5(b): Develop a part programme for the following milling operations and make the job on CNC milling -Slot milling
	29	Encoder, Actuators, axis drives.	
	30	2ND SESSIONAL TEST	
11	31	Problems in CNC Machines Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines	Practical 6: Develop a part program by using canned cycle on CNC lathe for turning, facing
	32	Diagnostic study of common problems and remedies	

	33	Use of on-line fault finding diagnosis tools in CNC machines, methods of using discussion forums ASSIGNMENT-4	
12	34	Unit5-AutomationSystem: Automation, suitability of production system to automation	Practical 7: Preparation of work Instruction for machine operator
	35	Types, automatic assembly, manufacture of printed circuit boards(PCB)	
	36	Manufacture of integrated Circuits, Overview of FMS	
13	37	AGV-types, ASRS	Practical 8: Preparation of preventive maintenance schedule for CNC machine.
	38	Group technology, CAD/CAM and CIM, Automated Identification system	
	39	Automated inspection: Off-line, On-line, Contact, Non-contact	
14	40	Coordinate Measuring machines; Machine vision	Repeat Practical 4to8
	41	Concept of AI and its applications in manufacturing, Robotics, nomenclature of joints, motion ASSIGNMENT-5	
	42	3RD SESSIONAL TEST	
15	43	Revision	Repeat Practical 4to8
	44	Revision	
	45	Revision	

Lesson Plan				
Name of the Teacher with Designation		:	Sh. Pradeep Malhotra	
Discipline		:	Mech. Engg.	
Semester		:	5th Semester	
Subject		:	Industrial Engineering	
Lesson Plan Duration		:	15 weeks	
Work Load (Lecture / Practical) per week (In hours) : Lectures : 03 , Practicals : Nil				
Week	Theory		Practical	
	Lecture Day	Topic (Including Assignment / Test)	Practical Day	Topic
1 st	1 st	Chapter-1 Productivity Introduction to productivity, factors affecting productivity Measurement of productivity	1 st	Not Applicable
	2 nd	Causes of low productivity		
	3 rd	Methods to improve productivity		
2 nd	4 th	Chapter-2 Work Study Definition and scope of work study	2 nd	
	5 th	Inter-relation between method study and work measurement		
	6 th	Inter-relation between method study and work measurement		
3 rd	7 th	Inter-relation between method study and work measurement	3 rd	
	8 th	Human aspects of work study		
	9 th	Role of work study in improving productivity.		
4 th	10 th	Chapter-3 Method Study	4 th	
	11 th	Method Study Objectives and procedure for Method analysis		
	12 th	Information collection and recording techniques.		
5 th	13 th	Information collection and recording techniques.	5 th	
	14 th	Information collection and recording techniques.		
	15 th	Information collection and recording techniques. Assisnment No. 1 Productivity, causes of low Productivity, Method to improve Productivity, Human Aspect of work study, Role of Work study to improve productivity, Information and Recording Techniques		
6 th	16 th	Sessional Test No. 1	6 th	
	17 th	Chapter-4 Motion Analysis Motion Analysis , Principles of Motion analysis		
	18 th	Motion Analysis , Principles of Motion analysis		
7 th	19 th	Therbligs and SIMO charts	7 th	
	20 th	Therbligs and SIMO charts		
	21 st	Normal work area and design of work places. Ergonomics		
8 th	22 nd	Chapter-5 Work Measurement Work Measurement Objectives , Work measurement techniques	8 th	
	23 rd	Stop watch time study		
	24 th	Principle, equipment used and procedure		
9 th	25 th	Systems of performance rating	9 th	
	26 th	Calculation of basic times; various allowances		
	27 th	Calculation of standard time, work sampling		
10 th	28 th	Standard data and its usage	10 th	
	29 th	Chapter-6 Wages and incentives Schemes		
	30 th	Wage payment plans and incentives		
11 th	31 st	Wage payment plans and incentives	11 th	
	32 nd	Various incentive plans, incentives for indirect labour Assisnment No. 2 Motion Analysis and its Principles, Therbligs and SIMO Chart, Work Measurement techniques, Stop watch Study Procedure, Standard data and Its usage, Wages plans , Various incentives for indirect labour.		
	33 rd	Sessional Test No. 2		
12 th	34 th	Chapter-7 Production Planning and Control Production Planning and Control Introduction, objectives and components (functions) of P.P.C	12 th	
	35 th	Advantages of production planning and Production Control, stages of P.P.C , Process planning, routing, scheduling, dispatching and follow up		
	36 th	Routing purpose, route sheets, scheduling – purpose		
13 th	37 th	Machine loading chart, Gantt chart, dispatching – purpose and procedure	13 th	
	38 th	Follow up – purpose and procedure. CPM/PERT technique,		
	39 th	Drawing of simple networks and critical time calculation , Production Control in job order		
14 th	40 th	Batch type and continuous type of productions. , Difference between these controls	14 th	
	41 st	Chapter-8 Stores Management Different Layout and structures of stores		
	42 nd	Inventory control, calculation of EOQ		
15 th	43 rd	Bin cards and various forms required in stores for documentation. Purchase procedures	15 th	
	44 th	Estimation of cost for machining processes, Numerical problems Assisnment No. 3 PPC Objectives and its different stages, Machine loading chart and Gantt chart , PERT and CPM Techniques and difference between these two, Different Layout and structures of stores, , Inventory control, calculation of EOQ		
	45 th	Sessional Test No. 3		

Lesson Plan
Refrigeration and Air-Conditioning
Sem-5th, Branch: Mechanical Engg.

Week	Topic
1	UNIT-I Introduction to Refrigeration Definition of Refrigeration; Introduction to Air-Conditioning Revision of; Heat, Entropy, Enthalpy, Specific Heat, Latent Heat.
2	Refrigerating effect-unit of refrigeration, Types of Refrigeration-Ice, dry ice Steam jet Refrigeration
3	Throttling, Liquid nitrogen refrigeration Basic Air Refrigeration; Difference between Heat Engine, Refrigerator and Heat Pump,
4	Coefficient of performance; Difference between COP and efficiency, Reversed Carnot Cycle(P-V, T-S diagrams & efficiency), Simple Numerical problems based on calculation of efficiency and COP , Refrigeration effect, etc.
5	Refrigeration Systems Vapour compression Refrigeration cycle: Basic Components(compressor, condenser, throttling devices and evaporator), Working of Vapour compression cycle;
6	Representation of the vapour compression cycle on T-S & P-V Diagram; Introduction to Dry Saturated Vapour after Compression Wet Vapour after Compression
7	Superheated Vapour after Compression Effects of super heating and under cooling, its advantages and disadvantages. 1st Sessional Test
8	UNIT-II REFRIGERATION COMPONENT AND DEVICES: Compressor - types of compressors; Hermetically sealed and Semi hermetically sealed compressor; Relative advantages Condensers - Air Cooled, water cooled,
9	Natural and forced cooling system; Advantages and disadvantages of air cooled and water cooled condensers; Evaporators -natural, convection, forced convection types. Refrigerant flow controls devices: Capillary tube; Automatic Expansion valve; Thermo static expansion valve; High side and low side float valve;
10	Solenoid valve; Evaporator pressure regulator, application of various expansion valves. Safety Devices-Thermostat, overload protector, L, HP cutout switch, Strainer and accumulator. UNIT III REFRIGERANTS: Introduction to refrigerants, Functions of refrigerants; Primary and secondary refrigerants, Properties of ideal refrigerants; Classification of refrigerants by group number and commonly used refrigerants in practice; Selection of refrigerant.
11	Properties of R - 717, R – 22, R-134 (a), R744 (CO ₂), R-454B as an alternate to R410A Detection of refrigerants leakage and safety measures; Charging the system with refrigerant. Lubricants used in refrigeration and their properties. 2nd Sessional Test

12	UNIT IV AIR CONDITIONING: Introduction to Air conditioning; Factors affecting Air conditioning, Psychrometry
	Definition and importance of specific humidity, relative humidity, degree of saturation,
	DBT, WBT, DPT, sensible heat, latent heat
13	Total enthalpy of air. Psychrometric process-sensible heating and cooling, Humidifying and dehumidifying;
	Psychrometric process-sensible heating and cooling, Humidifying and dehumidifying
	By-pass factor, room sensible heat factor(Concept only).
14	UNIT V REFRIGERATION AND AIR-CONDITIONING TOOLS: Tools used in refrigeration and Air conditioner installation;
	Installation procedure; Faults in refrigeration and air conditioning system; Servicing procedure.
	LATEST DEVELOPMENT IN REFRIGERATION AND AIR CONDITIONING:- Inverter technology
15	auto-defrosting, blast cooling, star rating;
	Window and Split air conditioning,
	Year-round Air-Conditioning system; Industrial Air conditioning.
16	Dairy refrigeration, Cold Storage,
	Introduction to Solar Refrigeration.
	3 rd Sessional Test

LESSON PLAN

NAME OF FACULTY: VISHNU GOYAL

DISCIPLINE: MECHANICAL ENGINEERING

SEMESTER: 5th

SUBJECT: THEORY OF MACHINES

DURATION: 15 weeks

WORK LOAD (Lecture/Practical in hours) per week: 3 Lectures/4 Practicals

WEEK	THEORY		PRACTICALS
	LECTURE	TOPIC	TOPIC
1 st	1	Unit -1: Simple Mechanisms: Kinematics of Machines: - Definition of Kinematics, Dynamics, Statics, Kinetics, Kinematic link.	Practical-1: To study inversion of Four Bar Mechanism, Single Slider Crank Chain Mechanism and Double Slider Crank Chain Mechanism with the help of working models.
	2	Kinematic Pair and its types, constrained motion.	
	3	Constrained motion and its types, Kinematic chain & its types, Mechanism, inversion	
2 nd	4	Machine and structure, Inversions of Kinematic Chain: Inversion of four bar chain, coupled wheels of Locomotive & Pantograph	Practical-2: To study various kinds of belt drives and gear trains with the help of working models
	5	Inversion of Single Slider Crank chain- Rotary I.C. Engines mechanism, Crank and Slotted lever quick return mechanism.	
	6	Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism & Oldham's Coupling.	
3 rd	7	Unit-4: Power Transmission: Introduction to Belt and Rope drives, types of belt drives.	Practical-3: To find the moment of inertia of a flywheel. .
	8	Concept of velocity ratio, slip and creep; crowning of pulleys (simple numerical)	
	9	Flat and V belt drive: Ratio of driving tensions, power transmitted	

4th	10	Centrifugal tension, and condition for maximum horse power	Practical-4: To Study the different types of centrifugal governors & to plot graph between R.P.M & Displacement
	11	Different types of chains and their terminology	
	12	Gear Drive - Simple, compound	
5th	13	Reverted and Epicyclic gear trains	Repeat Practical 1&2
	14	Relative advantages and disadvantages of various drives.	
	15	Simple numerical	
6th	16	ASSIGNMENT - 1	Repeat Practical 3&4
	17	1ST SESSIONAL TEST	
	18	Unit 3: Flywheel Principle and applications of flywheel, Fluctuation of speed and fluctuation of energy - Concept only,	
7th	19	Turning - moment diagram of flywheel for different engines, Coefficient of fluctuation of speed and coefficient of fluctuation of energy.	Practical-5: To construct cam profile for uniform velocity, SHM and uniform acceleration and retardation on drawing sheet.
	20	Simple numerical on above topics	
	21	Governor: Function of a governor, comparison of flywheel and governor	
8th	22	Simple description and working of Watt, Porter governor	Repeat Practical 5
	23	Hartnell governor (simple numerical based on watt and porter governor)	
	24	Terminology used in governors: Height, equilibrium speed,	
9th	25	Hunting, isochronisms, stability, sensitiveness of a governor	Practical 6: To perform the experiment of Balancing of rotating parts and find the unbalanced couple and forces.
	26	Unit-2: Cam Definition and function of cam, Description of different types of cams and followers with simple line diagram	
	27	Terminology of cam profile, Displacement diagram for uniform velocity	

10th	28	Displacement diagram for S.H.M.	Repeat Practical 5&6
	29	Displacement diagram for uniform acceleration and deceleration,	
	30	ASSIGNMENT- 2 2ND SESSIONAL TEST	
11th	31	Unit-5: Balancing: Need of balancing,	Repeat Practical 5&6
	32	Concept of static and dynamic balancing	
	33	Introduction to balancing of rotating masses in the same plane.	
12th	34	Balancing of rotating masses in the different plane.	Repeat Practical 1 to 3
	35	Simple Numericals	
	36	Simple Numericals	
13th	37	Vibrations: Causes of vibrations in machines,	Repeat Practical 4 to 6
	38	Their harmful effects and remedies.	
	39	Types-longitudinal, transverse and torsional vibrations,	
14th	40	Damping of vibrations	
	41	ASSIGNMENT - 3	
	42	3RD SESSIONAL TEST	
15th	43	Revision	
	44	Revision	
	45	Revision	