

LESSON PLAN (SEPTEMBER-2022)

Name of faculty	BHARAT BHUSHAN
Discipline	Mechanical Engineering
Semester	5TH Semester
Subject	CNC MACHINES AND AUTOMATION
Lesson Plan Duration	15 weeks
Work load (Lecture/ Practical) per week (in hours)	3 Hours Lecture & 4 Hours Practical

WEEK	THEORY		PRACTICAL	
	Day Lecture	Topic (Including Assignment/Test)	Day Practical	Practical Topic
1	1	Unit- 1 Introduction. Introduction to NC, Basic Components of NC, binary coding,	1	Study the constructional details of CNC lathe.
	2	MCU, , input devices, advantages /disadvantages of NC machines over conventional machines,		
	3	CNC & DNC, their types,	2	
	4	their advantages, disadvantages and applications,		
2	5	selection of parts to be machined on CNC machines,	3	Study the constructional details of CNC milling machine.
	6	Problems with conventional NC,	4	Study the constructional details of CNC milling machine.
	7	Rules for Axis identification, New developments in NC,		
	8	PLC Control and its purpose.		
3	9	Unit- 2 Construction and Tooling. Design features, special mechanical design features, specification Chart of CNC machines,	5	Study the constructional details and working of: Automatic tool changer and tool setter, Multiple pallets, Swarf removal & Safety devices.
	10	types of slideways, balls, rollers, motor- servo/stepper,		
	11	axis drive and leadscrew, recirculating ball screw,	6	Study the constructional details and working of: Automatic tool changer and tool setter, Multiple pallets, Swarf removal & Safety devices.
	12	nut assembly, & Assignment No.-1.		
4	13	swarf removal, safety and guarding devices,	7	Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center.(for finish pass only) Calculating coordinate points for a cylindrical job by considering sign convention for lathe -Plain turning, facing operations and Taper turning operations .
	14	Various cutting tools for CNC machines, overview of tool holder,		

	15	different pallet systems,	8	Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center.(for finish pass only) Calculating coordinate points for a cylindrical job by considering sign convention for lathe -Plain turning, facing operations and Taper turning operations .
	16	automatic tool changer system,		
5	17	tool change cycle, management of a tool room.	9	Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center.(for finish pass only) Calculating coordinate points for a cylindrical job by considering sign convention for lathe -Operation along contour using circular interpolation.
	18	Unit-3 System Devices- Control System ,	10	Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center.(for finish pass only) Calculating coordinate points for a cylindrical job by considering sign convention for lathe -Operation along contour using circular interpolation.
	19	1st Class Test.		
	20	Feedback control classification(open loop, closed loop),		
6	21	Actuators, Transducers and Sensors, characteristics of sensors,	11	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)- Plain milling. Calculate coordinate points for a zig zag job by considering sign convention for milling.
	22	Tachometer, LVDT, opto-interrupters, potentiometers for linear,		
	23	angular position, encoder and decoder,	12	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)- Plain milling. Calculate coordinate points for a zig zag job by considering sign convention for milling.
	24	axis drives, other classifications of CNC machines-Feedback, motion, positioning.		
7	25	Unit-4 Part Programming - Part programming and basic procedure of part programming,	13	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)- Slot milling.Calculate coordinate points for a zig zag job by considering sign convention for milling.

	26	NC words, Blocks, part programming formats,	14	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)- Slot milling.Calculate coordinate points for a zig zag job by considering sign convention for milling.
	27	simple programming for rational components		
	28	(Point to point, Straight line, curved surface),		
8	29	tool off sets, cutter radius compensation,	15	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)-Contouring. Calculate coordinate points for a zig zag job by considering sign convention for milling.
	30	wear compensation. Assignment No.- 2.	16	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)-Contouring. Calculate coordinate points for a zig zag job by considering sign convention for milling.
	31	Advanced structures: Advantages of using advanced structures,		
	32	1st Sessional Test		
9	33	part programming using canned cycles,	17	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)- Pocket milling.Calculate coordinate points for a zig zag job by considering sign convention for milling.
	34	subroutines and do loops,		
	35	mirror image.	18	Develop a part programme for the following milling operations and make the job on CNC milling (for finish pass only)-Pocket milling.Calculate coordinate points for a zig zag job by considering sign convention for milling.
	36	2nd Class Test		
10	37	Unit -5 Problems in CNC Machines - Common problems in mechanical, electrical,	19	Develop a part program by using canned cycle on CNC lathe for turning , facing.
	38	pneumatic, electronic,	20	Develop a part program by using canned cycle on CNC lathe for turning , facing.
	39	PC components of NC machines,		
	40	diagnostic study of common problems and remedies,		
11	41	use of on-line fault finding diagnosis tools in CNC machines,	21	Preparation of work instruction for machine operator.
	42	methods of using discussion forums,	22	Preparation of work instruction for machine operator.
	43	environmental problems.		

	44	Unit-6 Automation and NC system - Automation,		
12	45	suitability of production system to automation ,	23	Preparation of preventive maintenance schedule for CNC machine.
	46	types, emerging trends in automation, & Assignment No.-3.	24	Preparation of preventive maintenance schedule for CNC machine.
	47	2nd Sessional Test		
	48	automatic assembly,		
13	49	manufacture of printed circuit boards,	25	Demonstration through industrial visit for awareness of actual working of FMS in production.
	50	manufacture of integrated Circuits,		
	51	3rd Class Test	26	Demonstration through industrial visit for awareness of actual working of FMS in production.
	52	Overview of FMS, AGV,		
14	53	ASRS, Group technology,	27	Use of software for turning operations on CNC turning center.
	54	CAD/CAM and CIM,	28	Use of software for turning operations on CNC turning center.
	55	Automated Identification system ,		
	56	concept of AI,		
15	57	Robotics,	29	Use of software for milling operations on machine centres.
	58	nomenclature of joints, motion.	30	Use of software for milling operations on machine centres.
	59	Assignment No.-4.		
	60	3rd Sessional Test.		

LESSON PLAN (SEPTEMBER-2022)

Name of faculty	ISHU MONGA
Discipline	Mechanical Engineering
Semester	5 th Semester
Subject	THEORY OF MACHINES
Lesson Plan Duration	15 weeks
Work load (Lecture/ Practical) per week (in hours)	3 Hrs. Lecture & 2 Hrs. Practical

WEEK	THEORY	
	Day Lecture	Topic(Including Assignment/Test)
1	1	Simple Mechanisms - Introduction to link,
	2	kinematic pair,
	3	lower and higher pair, Kinematic chain,
2	4	mechanism,
	5	Inversions.
	6	Different types of mechanisms (with examples) Assignment Unit – 1
3	7	Power Transmission - Introduction to Belt
	8	Rope drives
	9	Types of belt drives types of pulleys
4	10	Concept of velocity ratio, slip and creep;
	11	crowning of pulleys (simple numericals)
	12	Flat and V belt drive:, Ratio of driving tensions
5	13	power transmitted, centrifugal tension, condition for maximum horse power (simple numericals)
	14	Class test
	15	Different types of chains and their terminology Gear terminology,
6	16	types of gears and their applications;
	17	simple and compound gear trains;
	18	power transmitted by simple spur gear & Assignment Unit - 2 1 st sessional test
7	19	Flywheel - Principle of flywheel
	20	applications of flywheel
	21	Turning - moment diagram of flywheel for different engines
8	22	Fluctuation of speed
	23	fluctuation of energy
	24	Coefficient of fluctuation of speed, Simple numerical problems on fluctuation of speed
9	25	Class test
	26	Simple numerical problems on fluctuation of energy & Assignment Unit - 3
	27	Governor - Principal of governor Simple description of Watt governor,

10	28	working of Watt governor,
	29	Simple description of Porter governor
	30	working of Porter governor Simple description of Hartnel governor
11	31	working of Hartnel governor
	32	Simple numericals based on watt governor
	33	Hunting of a governor isochronism of a governor
12	34	Stability of a governor
	35	sensitiveness of a governor & Assignment Unit – 4
	36	Definition and function of cam, different types of cams and followers with simple line diagram
13	37	Terminology of cam profile
	38	Displacement diagram for uniform velocity, S.H.M and uniform acceleration and deceleration & Assignment Unit – 5
	39	Balancing - Concept of balancing 2 nd Sessional test
14	40	Introduction to balancing of rotating masses (simple numericals)
	41	Class test
	42	Simple problems related to several masses rotating in different planes
15	43	Simple problems related to several masses rotating in different planes
	44	Simple problem related to several masses rotating in different planes & Assignment Unit -6
	45	Vibrations - Concept of vibrations , vibrations types – longitudinal vibration , torsional vibration , (simple numericals) Damping of vibrations , Causes of vibrations in machines, vibrations harmful effects
		vibrations remedies & Assignment Unit -7 3 rd Sessional test

Week	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	Viva-Voce
3	To study various kinds of belts drives and gear trains with the help of working models.

4	Viva-Voce
5	To find the moment of inertia of a flywheel.
6	Viva-Voce
7	To Study the different types of centrifugal governors & to plot graph between R.P.M & Displacement.
8	Viva-Voce
9	To construct cam profile for uniform velocity, SHM and uniform acceleration and retardation on drawing sheet.
10	Viva-Voce
11	To perform the experiment of Balancing of rotating parts and find the unbalanced couple and forces.
12	Viva-Voce
13	Revision of experiment
14	Revision of experiment
15	Revision of experiment

LESSON PLAN

Name of faculty	SUNIL KUMAR
Discipline	Mechanical Engineering
Semester	5th Semester
Subject	Machine Design
Lesson Plan Duration	15 weeks
Work load (Lecture/ Practical) per week (in hours)	4 Hours Lecture

WEEK	THEORY	
	Day Lecture	Topic(Including Assignment/Test)
1	1	Design – Definition, Type of design, necessity of design
	2	Comparison of designed and undersigned work
	3	Design procedure
2	4	Characteristics of a good designer
	5	Design terminology: stress, strain, factor of safety, factors affecting factor of safety
	6	stress concentration, methods to reduce stress concentration, fatigue, endurance limit.
3	7	General design consideration
	8	Codes and Standards (BIS standards)
	9	Engineering materials and their mechanical properties
4	10	Properties of engineering materials: elasticity, plasticity, malleability, ductility
	11	toughness, hardness and resilience. Fatigue, creep, tenacity and strength etc.
	12	Selection of materials, criteria of material selection
5	13	Class test
	14	Design Failure , Various design failures-maximum stress theory, maximum strain theory
	15	Classification of loads
6	16	Design under tensile, compressive and torsional loads.
	17	Type of shaft, shaft materials, Type of loading on shaft, standard sizes of shaft available
	18	Shaft subjected to torsion only, determination of shaft diameter (hollow and solid shaft) on the basis of :Strength criterion, Rigidity criterion -
7	19	Determination of shaft diameter (hollow and solid shaft) subjected to combined torsion and bending .
	20	Design of Key Types of key, materials of key, functions of key
	21	Failure of key (by Shearing and Crushing).
8	22	1st Sessional test
	23	Design of key (Determination of key dimension) Effect of keyway on shaft strength. (Figures and problems).
	24	Design of Joints Types of joints - Temporary and permanent joints, utility of various joints
9	25	Temporary Joint: Knuckle Joints – Different parts of the joint, material used for the joint, type of knuckle Joint, design of the knuckle joint. (Figures and problems).

	26	Cotter Joint – Different parts of the spigot and socket joints, Design of spigot and socket joint.
	27	Class test
10	28	Welded Joint - Welding symbols. Type of welded joint, strength of parallel and transverse fillet welds.
	29	Strength of combined parallel and transverse weld.
	30	Riveted Joints. : Rivet materials, Rivet heads,
11	31	leak proofing of riveted joint – caulking and fullering.
	32	Different modes of rivet joint failure.
	33	Design of riveted joint – Lap and butt, single and multi riveted joint.
12	34	Design of Flange Coupling
	35	Numerical
	36	2nd Sessional test
13	37	Necessity of a coupling, advantages of a coupling, types of couplings, design of muff coupling, design of flange coupling. (both protected type and unprotected type).
	38	Class test
	39	Design of Screwed Joints ,Introduction, Advantages and Disadvantages of screw joints, location of screw joints.
14	40	Important terms used in screw threads, designation of screw threads
	41	Initial stresses due to screw up forces, stresses due to combined forces
	42	Design of power screws (Press, screw jack, screw clamp)
15	43	Use of design data book during the examination is allowed.
	44	The paper setter should normally provide all the relevant data for the machine design in the question paper.
	45	3rd Sessional test

LESSON PLAN (SEPTEMBER-2022)

Name of Faculty	: BHARAT BHUSHAN
Discipline	: Mechanical Engineering
Semester	: 5th Semester
Subject	: Refrigeration and air conditioning
Lesson Plan Duration:	: 15 Weeks
Work Load (Lecture/Practical) per week(in hours)	: 3 Hrs. Lecture & 2 Hrs. Practical

Week	Theory		Practical	
	Day	Topic(Including Assignment/Test)	Day	Topic
1	1	1. Fundamentals of Refrigeration ,Introduction to refrigeration, and air conditioning, meaning of refrigerating effect	1	Introduction to R&AC Lab
	2	units of refrigeration, COP, difference between COP and efficiency	2	
	3	methods of refrigeration, Natural system and artificial system.		
2	4	Introduction of Vapour Compression System	3	Identify various tools of refrigeration kit
	5	Principle, function, parts and necessity of vapour compression system	4	
	6	T- S and p– H charts of vapour compression cycle of refrigeration		
3	7	dry, wet and superheated compression.	5	Practice in cutting, bending, flaring, swaging and brazing of tubes.
	8	Neumericals and problems discussions		
	9	Effect of sub cooling,	6	Practice in cutting, bending, flaring, swaging and brazing of tubes.
4	10	Effect of super heating, Numerical problems	7	Study of thermostatic switch, LP/HP cut out overload protector filters, strainers and filter driers.

	11	actual vapour compression system	8	Study of thermostatic switch, LP/HP cut out overload protector filters, strainers and filter driers.
	12	Introduction to air refrigeration system		
5	13	advantage and disadvantage of air refrigeration over vapour compression system.	9	Viva-Voce
	14	Ist class test		
	15	Sessional Test of Unit 1 & 2	10	Viva-Voce
6	16	Functions and classifications of refrigerants	11	Identify various parts of a refrigerator and window air conditioner
	17	Properties of R - 717, R – 22, R–134 (a), CO ₂ , R – 12, R – 502etc.		
	18	Properties of ideal refrigerants, selection of refrigerants.	12	Identify various parts of a refrigerator and window air conditioner
7	19	Principle and working of simple vapour absorption system and domestic electrolux refrigeration systems.	13	To find COP of Refrigeration system
	20	Solar power refrigeration system,		
	21	advantages and disadvantages of solar power refrigeration system over vapour compression system.,	14	To find COP of Refrigeration system
8	22	Refrigeration Equipment ,Compressors- Function, various types of compressors	15	To measure air flow using anemometer
	23	Condensers - Function, various types of condensers		
	24	Evaporators- Function, types of evaporators	16	To measure air flow using anemometer
9	25	Expansion Valves - Function	17	Charging of a refrigerator/ air conditioner
	26	various types such as capillary tube, thermostatic expansion valve,		

	27	low side and high side float valves, application of various expansion valves		
10	28	Safety Devices-Thermostat, overload protector, LP, HP cut out switch	19	Viva-Voce
	29	2 nd class test		
	30	2nd Sessional test of Units 3,4&5	20	Viva-Voce
11	31	Psychrometry ,Definition, importance	21	To detect faults in a refrigerator/ air conditioner
	32	specific humidity, relative humidity, degree of saturation		
	33	DBT, WBT, DPT	22	To detect faults in a refrigerator/ air conditioner
12	34	sensible heat, latent heat, Total enthalpy of air.	23	Visit to an ice plant or cold storage plant. or central air conditioning plant
	35	Applied Psychrometry and Heat Load Estimation		
	36	Psychrometric chart, various lines	24	To find COP ICE-Plant Refrigeration system
13	37	psychrometric process, by pass factor, room sensible heat factor, effective room sensible heat factor	25	To find COP of ICE-Plant Refrigeration system
	38	grand sensible heat factor, ADP, room DPT.		
	39	Heating and humidification, cooling and dehumidification	26	To find COP of Cold storage Refrigeration system
14	40	window air-conditioning, split type air-conditioning	27	To find COP of Cold storage Refrigeration system
	41	car air-conditioning, central air-conditioning. Latest development in refrigeration and air conditioning	28	Problems Discussions and feed back
	42	3 rd class test		
15	43	Inverter technology, auto-defrosting, blast cooling, star rating.	29	Viva-Voce

LESSON PLAN (SEPTEMBER-2022)		
Name of Faculty		: PARDEEP
Discipline		: Mechanical Engineering
Semester		: 5th Semester
Subject		: Workshop Technology –III
Lesson Plan Duration:		: 15 Weeks
Work Load (Lecture/Practical) per week(in hours)		: 3Hrs. Lecture
Week	Theory	
	Lecture Day	Topic(Including Assignment/Test)
1	1	Specification and working principle of milling machine
	2	Classification, brief description and applications of milling machines
	3	Details of column and knee type milling machine
2	4	Milling machine accessories and attachment – Arbors, adaptors, collets, vices, circular table
	5	indexing head and tail stock, vertical milling attachment, rotary table.
	6	Milling methods - up milling and down milling
3	7	Identification of different milling cutters and work mandrels
	8	Work holding devices , straddle milling and gang milling.
	9	Milling operations – face milling, angular milling, form milling,
4	10	Cutting parameters
	11	Indexing on dividing heads, plain and universal dividing heads
	12	Indexing methods: direct, Plain or simple, compoun differential and angular indexing, numerical problems on indexing d ,
5	13	Purpose of grinding, Various elements of grinding wheel – Abrasive, Grade, structure, Bond
	14	Common wheel shapes and types of wheel – built up wheels, mounted wheels and Specification of grinding wheels as per BIS. diamond wheels
	15	Truing, dressing, balancing and mounting of wheel
6	16	Revision of Unit I & 11

	17	1st class test
	18	1st Sessional test
7	19	Grinding methods – Surface grinding, cylindrical
	20	grinding and centreless grinding
	21	Grinding machine – Cylindrical grinder, surface
8	22	grinder, internal grinder, centreless grinder, tool and cutter grinder
	23	Selection of grinding wheel
	24	Gear hobbing Gear shaping
9	25	Mechanical Process - Ultrasonic machining (USM): Introduction, principle,
	26	process, advantages and limitations, applications
	27	Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental principle, process, applications
10	28	Electro chemical Grinding (ECG) – Fundamental principle, process, application
	29	Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit,
	30	Principle, metal removing rate, dielectric fluid, applications
11	31	Laser beam machining (LBM) – Introduction, machining process and applications
	32	Electron beam machining (EBM)- Introduction, principle, process and applications
	35	Problems discuss of Unit-2 nd
12	33	Problems discuss of Unit-3 rd
	34	Problems discuss of Unit-4 th
	35	2nd class test
13	36	2nd Sessional test
	37	Metal spraying – Wire process, powder process, applications

	38	Powder coating; electroplating and organic coating
	39	Purpose of finishing surfaces.
14	40	Surface roughness-Definition and units, Honing Process, its applications , Description of hones.
	41	Lapping process, its applications , Description of lapping compounds and tools. Brief idea of lapping machines.
	42	Super finishing process, its applications , Polishing , Buffing
15	43	Problems discuss of Unit-5th
	44	3 rd class test
	45	3 rd Sessional test