Lesson Plan

Name of the faculty: Sh. Sandeep Dhandhi Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 5th Mechanical A & B

Subject: CNC Machines and

Automation **Lesson Plan Duration:**

15 weeks

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 03, Practicals-02

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1st	1st	Introduction to NC, CNC & DNC	1st	Study of constructional detail of CNC lathe
	2nd	Their advantages, disadvantages and applications.		
	3rd	Basic components of CNC machines.	2nd	Study of constructional detail of CNC lathe
2nd	1st	Machine Control Unit. Input devices	1st	Study of constructional detail of CNC milling machine
	2nd	selection of components to be machined on CNC machines.		
	3rd	Axis identification.	2nd	Study of constructional detail of CNC milling machine
3rd	1st	Design features, specification of CNC machines.	1st	Study the constructional details and working of Automatic tool changer and Multiple pallets
	2nd	Use of slideways, balls, rollers and coatings, motor and leadscrew, swarf removal, safety and guarding devices.		
	3rd	various cutting tools for CNC machines.	2nd	Study the constructional details and working of Automatic tool changer and Multiple pallets
4th	1st	Concept of CNC tool holder.	1st	Develop a part programme for following lathe operations and make the job on CNC lathe. - Plain turning and facing operation - Taper turning operation - Circular interpolation
	2nd	different pallet systems and automatic tool changer system.		

	3rd	Management of a tool room.	2nd	Develop a part programme for following lathe operations and make the job on CNC lathe. - Plain turning and facing operation - Taper turning operation - Circular interpolation
5th	1st	Control system	1st	Develop a part programme for the following milling operation and make the job on CNC milling - Plain milling - Slot milling - Contouring - Pocket milling
	2nd	Open loop and Closed Loop system		
	3rd	concept of Actuators	2nd	Develop a part programme for the following milling operation and make the job on CNC milling - Plain milling - Slot milling -

				Contouring - Pocket milling
6th	1st	Transducers and Sensors	1st	Preparation of work instructions for machine operator
	2nd	Tachometer		
	3rd	LVDT	2nd	Preparation of work instructions for machine operator
7th	1st	opto- interrupters		Preparation of preventive maintenance schedule for CNC machine.
	2nd	potentiometers of linear		
	3rd	angular position		Preparation of preventive maintenance schedule for CNC machine.
8th	1st	encoder	1st	Demonstration through industrial visit for awareness of actual working of FMS in production.
	2nd	decoder		
	3rd	axis drives	2nd	Demonstration through industrial visit for awareness of actual working of FMS in production.
9th	1st	Introduction to part programming		
	2nd	basic concepts of part programming		
	3rd	NC words		
10th	1st	part programming formats		
	2nd	simple programming for rational components		
	3rd	part programming using conned cycles		
11th	1st	subroutines and do loops, tool off sets		
	2nd	cutter radius compensation and tool wear compensation.		
	3rd	Common problems in CNC machines related to mechanical		
12th	1st	Electrical and pneumatic, electronic components.		
	2nd	Study of common problem and remedies.		
	3rd	Use of on- time fault finding diagnosis tools in CNC machines.		
13th	1st	Concept of automation		
	2nd	emerging trends in automation		
	3rd	automatic assembly		
14th	1st	Overview of FMS		
	2nd	Group technology		
	3rd	CAD/ CAM and CIM.		
15th	1st	Introduction to robot technology		
	2nd	basic robot motion		

| | 3rd | Its applications. | | |

Lesson Plan

Name of the faculty: Sh. Vikas Goel Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 5th Mechanical A & B

Subject: REFRIGERATION AND AIR CONDITIONING

Lesson Plan Duration: 15 weeks

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 04, Practicals- 02

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1st	1st	Introduction to refrigeration, and air conditioning	1st	Identify various tools of refrigeration kit and practice in cutting, bending, flaring, swaging and brazing of tubes.
	2nd	meaning of refrigerating effect, units of refrigeration		
	3rd	COP, methods of refrigeration	2nd	Identify various tools of refrigeration kit and practice in cutting, bending, flaring, swaging and brazing of tubes.
	4th	Introduction to air refrigerator		
2nd	1st	working on reversed carnot cycle.	1st	Study of thermostatic switch, LP/HP cut out overload protector filters, strainers and filter driers
	2nd	Introduction of vapour compression system		
	3rd	Principle of vapour compression system	2nd	Study of thermostatic switch, LP/HP cut out overload protector filters, strainers and filter driers
	4th	function of vapour compression system		
3rd	1st	parts of vapour compression system,	1st	Identify various parts of a refrigerator and window air conditioner.
	2nd	necessity of vapour compression system,		
	3rd	φT- Chart	2nd	Identify various parts of a refrigerator and window air conditioner.
	4th	p– H chart.		
4th	1st	dry, wet and superheated compression.	1st	To find COP of Refrigeration system
	2nd	Effect of sub cooling		
	3rd	super heating	2nd	To find COP of Refrigeration system
	4th	mass flow rate		
5th	1st	entropy, enthalpy	1st	To detect trouble/faults in a refrigerator/window type air conditioner
	2nd	work done		
	3rd	Refrigerating effect	2nd	To detect trouble/faults in a refrigerator/window type air conditioner
	4th	COP		
6th	1st	actual vapour compression system	1st	Charging of a refrigerator/window type air

	2nd	Functions of refrigerants		conditioner.
	3rd	classification of refrigerants	2nd	Charging of a refrigerator/window type air conditioner.
	4th	properties of R - 717		
7th	1st	properties of R - 22	1st	Study of cut section of single cylinder compressor
	2nd	Properties of R–134 (a) and CO2		
	3rd	Properties of ideal refrigerant	2nd	Study of cut section of single cylinder compressor
	4th	selection of refrigerant		
8th	1st	Introduction of simple absorption system	1st	Visit to an ice plant, cold storage plant, central air conditioning plant
	2nd	Introduction of domestic electrolux refrigeration systems		
	3rd	Principle of simple absorption system	2nd	Visit to an ice plant, cold storage plant, central air conditioning plant
	4th	Principle of domestic electrolux refrigeration systems		
9th	1st	Working of simple absorption system		
	2nd	Working of domestic electrolux refrigeration systems		
	3rd	Solar power refrigeration system		
	4th	advantages of solar power refrigeration system over vapour compression system.		
10th	1st	disadvantages of solar power refrigeration system over vapour compression system.		
	2nd	Refrigeration Equipment		
	3rd	Compressor		
	4th	Function of compressors		
11th	1st	Various types of compressors.		
	2nd	Condenser - Function		
	3rd	various types of condensers		
	4th	Evaporator - Function, types of evaporators		
12th	1st	Expansion Valve - Function, various types such as capillary tube, thermostatic expansion valve		
	2nd	low side and high side float valves, application of various expansion valves		
	3rd	Safety Devices-Thermostat		
	4th	Safety Devices- overload protector LP		
13th	1st	Safety Devices-HP cut out switch		
	2nd	Definition of Psychrometry		
	3rd	importance of Psychrometry		
	4th	specific humidity, relative humidity		
14th	1st	degree of saturation		

	2nd	DBT, WBT, DPT		
	3rd	sensible heat, latent heat.		
	4th	Total enthalpy of air		
15th	1st	Psychrometry chart and various processes of psychrometry		
	2nd	Study of window air-conditioning		
	3rd	split type air conditioning		
	4th	concept of central air- condition, automobile air-conditioning		

Lesson Plan

Name of the faculty: Sh. Kuldeep Singh Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 5th Mechanical A &

B **Subject:** THEORY OF

MACHINES

Lesson Plan Duration: 15 weeks

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 04

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1st	1st	Simple Mechanisms	1st	
	2nd	Introduction to link		
	3rd	kinematic pair	2nd	
	4th	lower and higher pair		
2nd	1st	Kinematic chain	1st	
	2nd	mechanism		
	3rd	Inversions	2nd	
	4th	Different types of mechanisms (with examples)		
3rd	1st	Introduction to Belt	1st	
	2nd	Introduction to Rope drives		
	3rd	Types of belt drives	2nd	
	4th	types of pulleys		
4th	1st	Concept of velocity ratio	1st	
	2nd	slip and creep		
	3rd	crowning of pulleys (simple numericals)	2nd	
	4th	condition for maximum horse power (simple numericals)		
5th	1st	Different types of chains and	1st	
	2nd	their terminology		
	3rd	Gear terminology	2nd	
	4th	types of gears		
6th	1st	applications of gears	1st	
	2nd	simple gear train.		
	3rd	compound gear train	2nd	
	4th	power transmitted by simple spur gear		
7th	1st	Principle of flywheel	1st	
	2nd	applications of flywheel		

	3rd	Turning - moment diagram of flywheel for different engines	2nd	
	4th	Turning - moment diagram of flywheel for different engines		
8th	1st	Fluctuation of speed	1st	
	2nd	fluctuation of energy		
	3rd	Coefficient of fluctuation of speed	2nd	
	4th	coefficient of fluctuation of energy		
9th	1st	Simple numerical problems on fluctuation of speed		
	2nd	Simple numerical problems on fluctuation of energy		
	3rd	Principal of governor		
	4th	Simple description		
10th	1st	working of Watt		

	2nd	Porter and Hartnel governor (simple numericals based on watt governor)		
	3rd	Hunting		
	4th	isochronism		
11th	1st	stability		
	2nd	sensitiveness of a governor		
	3rd	Revision		
	4th	Concept of balancing		
12th	1st	Introduction to balancing of rotating masses		
	2nd	simple numericals on balancing.		
	3rd	Simple problems related to several masses rotating in different planes		
	4th	Simple problems related to several masses rotating in different planes		
13th	1st	Revision		
	2nd	Concept of vibrations		
	3rd	Types of vibrations.		
	4th	longitudinal		
14th	1st	transverse		
	2nd	torsional vibrations		
	3rd	Simple numerical on vibrations.		
	4th	Damping of vibrations		
15th	1st	Causes of vibrations in machines		
	2nd	harmful effects on vibrations		
	3rd	remedies		

Lesson

Plan

Name of the faculty: Sh. Narender Sharma W/S.

Discipline: Mechanical

Semester: 5th Mechanical A & B

Subject: WORKSHOP TECHNOLOGY - III

Lesson Plan Duration: 15 weeks

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 03

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1st	1st	Specification and working principle of milling machine		
	2nd	Classification, brief description and applications of milling machine		
	3rd	Main parts of column and knee type milling machine		
2nd	1st	Milling machine accessories and attachment – Arbors, adaptors, collets, vices,		
	2nd	circular table, indexing head and tail stock, vertical milling attachment		
	3rd	Milling methods - up milling and down milling		
3rd	1st	Identification of different milling cutters and work mandrels		
	2nd	Work holding devices		
	3rd	Milling operations – face milling, angular milling, form milling		
4th	1st	straddle milling and gang milling		
	2nd	Cutting parameters		
	3rd	Indexing on dividing heads, plain and universal dividing heads.		
5th	1st	Indexing methods: direct, Plain or simple, compound, differential and angular indexing, numerical problems on indexing.		
	2nd	Purpose of grinding		
	3rd	Various elements of grinding wheel – Abrasive		
6th	1st	Grade, structure, Bond		

	2nd	Common wheel shapes and types of wheel – built up wheels, mounted wheels and diamond wheels		
	3rd	Specification of grinding wheels as per BIS.		
7th	1st	Truing, dressing		
	2nd	balancing and mounting of wheel		
	3rd	Grinding methods – Surface grinding, cylindrical grinding		
8th	1st	centreless grinding		
	2nd	Grinding machine – Cylindrical grinder		
	3rd	surface grinder, internal grinder		
9th	1st	centreless grinder, tool and cutter grinder		
	2nd	Selection of grinding wheel		

	3rd	Gear Manufacturing and Finishing Processes		
10th	1st	Gear hobbing , Gear shaping		
	2nd	Mechanical Process - Ultrasonic machining (USM): Introduction, principle, process		
	3rd	advantages and limitations, applications of USM		
11th	1st	Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental principle, process, applications		
	2nd	Electro chemical Grinding (ECG) – Fundamental principle, process, application		
	3rd	Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit, Principle, metal removing rate, dielectric fluid, applications		
12th	1st	Laser beam machining (LBM) – Introduction, machining process and applications		
	2nd	Electro beam machining (EBM)- Introduction, principle, process and applications		
	3rd	Metal spraying – Wire process, powder process, applications		
13th	1st	Powder coating		
	2nd	Purpose of finishing surfaces. Surface roughness-Definition and units		
	3rd	Honing Process, its applications		
14th	1st	Description of hones		
	2nd	Brief idea of honing machines.		
	3rd	Lapping process, its applications		
15th	1st	Description of lapping compounds and tools. Brief idea of lapping machines		
	2nd	Super finishing process, its applications.		
	3rd	Polishing Buffing		

Lesson Plan

Name of the faculty: Sh. Aakash Suran Lecturer & Sh. Mohit Kadyan Lecturer in Mechanical Engg.

Discipline: Mechanical

Semester: 5th Mechanical A &

B **Subject:** Machine Design

Lesson Plan Duration: 15 weeks

Work Load (Lecture/ Practical) per week (in hours): Lecturers- 04

Week	Theory		Practical	
	Lecture day	Topic (including assignment / test)	Practical Day	Topic
1st	1st	Design – Definition, Type of design, necessity of design Comparison of designed and undesigned work	1st	
	2nd	Design procedure Characteristics of a good designer		
	3rd	Design terminology: stress, strain, factor of safety, factors affecting factor of safety, stress concentration, methods to reduce stress concentration, fatigue, endurance limit.	2nd	
	4th	General design consideration Codes and Standards (BIS standards)		
2nd	1st	Engineering materials and their mechanical properties : Properties of engineering materials: elasticity, plasticity, malleability, ductility, toughness, hardness and resilience.	1st	
	2nd	Fatigue, creep, tenacity and strength		

		etc. Selection of materials, criteria of material selection		
	3rd	Design Failure Various design failures-maximum stress theory	2nd	
	4th	Various design failures- maximum strain theory		
3rd	1st	Classification of loads	1st	
	2nd	Design under tensile, compressive and torsional loads.		
	3rd	Revision	2nd	
	4th	Doubt Class		
4th	1st	Design of Shaft 3.1 Type of shaft, shaft materials,	1st	
	2nd	Type of loading on shaft, standard sizes of shaft available		
	3rd	3.2 Shaft subjected to torsion only, determination of shaft diameter (hollow and solid shaft) on the basis of : - Strength criterion	2nd	
	4th	3.2 Shaft subjected to torsion only, determination of shaft diameter (hollow and solid shaft) on the basis of : - Rigidity criterion		
5th	1st	1st Sessional	1st	
	2nd	1st Sessional		
	3rd	1st Sessional	2nd	
	4th	Determination of shaft diameter (hollow) subjected to bending		
6th	1st	Determination of shaft diameter (solid shaft) subjected to bending	1st	
	2nd	Determination of shaft diameter (hollow) subjected to combined torsion and bending .		
	3rd	Determination of shaft diameter (solid shaft) subjected to combined torsion and bending .	2nd	
	4th	Design of Key Types of key, materials of key, functions of key		
7th	1st	Failure of key (by Shearing and Crushing).	1st	
	2nd	Design of key (Determination of key dimension)		

	3rd	Effect of keyway on shaft strength. (Figures and problems).	2nd	
	4th	Revision		
8th	1st	Revision	1st	
	2nd	Design of Joints Types of joints - Temporary and permanent joints, utility of various joints		
	3rd	Temporary Joint: Knuckle Joints – Different parts of the joint, material used for the joint,	2nd	
	4th	type of knuckle Joint, design of the knuckle joint. (Figures and problems).		
9th	1st	Cotter Joint – Different parts of the spigot and socket joints, Design of spigot and socket joint.		
	2nd	Permanent Joint: Welded Joint - Welding symbols. Type of welded joint, strength of parallel and transverse fillet welds.		
	3rd	Strength of combined parallel and transverse weld. Riveted Joints. : Rivet materials, Rivet heads, leak proofing of riveted joint – caulking and fullering.		
	4th	Different modes of rivet joint failure. Design of riveted joint – Lap and butt, single and multi riveted joint.		
10th	1st	2nd Sessional		
	2nd	2nd Sessional		
	3rd	2nd Sessional		
	4th	Design of Flange Coupling		
11th	1st	Necessity of a coupling, advantages of a coupling,		
	2nd	types of couplings, design of muff coupling,		
	3rd	design of flange coupling. (both protected type and unprotected type).		
	4th	Revision		
12th	1st	Design of Screwed Joints	1st	
	2nd	Introduction, Advantages and Disadvantages of screw joints,		

	3rd	location of screw joints. Important terms used in screw threads,		
	4th	Designation of screw threads		
13th	1st	Initial stresses due to screw up forces, stresses due to combined forces		
	2nd	Design of power screws (Press, screw jack)		
	3rd	Design of power screws (screw clamp)		
	4th	Doubt Class		
14th	1st	3rd Sessional		
	2nd	3rd Sessional		
	3rd	3rd Sessional		
	4th	Revision		
15th	1st	Remedial Class		
	2nd	Remedial Class		
	3rd	Revision		