LESSON PLAN

NAME OF FACULTY: SH. M. S. Pawar

DISCIPLINE: MECHANICAL ENGINEERING

SEMESTER: V

SUBJECT: THEORY OF MACHINES

LESSON PLAN DURATION: 15 WEEKS

WORK LOAD (LECTURE/PRACTICAL) PER WEEK: (3 Lectures & 2 Practicals)

WEEK	THEORY		PRACTICALS
	LECTURE NOS.	TOPIC	TOPIC
1st	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	
2nd	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 belts 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.	
3rd	7	**Unit-2** 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	Simple Numerical	
	12	Different types of chains and their terminology	
5th	13	**SESSIONAL TEST -I**	Repeat Practical 1 to 4
	14	Gear Drive - Simple, compound, reverted and epicyclic gear trains	

	15	Simple numerical	

6th	16	UNIT 3: Flywheel, Principle and applications of flywheel	Repeat Practical 1 to 4
	17	Turning - moment diagram of flywheel for different engines	
	18	Fluctuation of speed and fluctuation of energy - Concept only	
7th	19	Coefficient of fluctuation of speed and coefficient of fluctuation of energy.	Repeat Practical 1 to 4
	20	Simple numerical on above topics	
	21	**Unit-4-** Governor Function of a governor, comparison of flywheel and governor	
8th	22	Simple description and working of Watt, Porter	Practical-5: To construct cam profile for uniform velocity, SHM and uniform acceleration and retardation on drawing sheet.
	23	Hartnel governor (simple numerical based on watt and porter governor)	
	24	Terminology used in governors: Height, equilibrium speed, Hunting, isochronisms, stability, sensitiveness of a governor	
9th	25	**SESSIONAL TEST -II**	Practical-**6**.: To perform the experiment of Balancing of rotating parts and find the unbalanced couple and forces.
	26	**Unit-5-** 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	S.H.M. and uniform acceleration and deceleration.	Repeat Practical 5 to 6
	29	S.H.M. and uniform acceleration and deceleration	
	30	**Unit-6-** Balancing, need of balancing, concept of static and dynamic balancing	
11th	31	Introduction to balancing of rotating masses in the same plane	Repeat Practical 5 to 6
	32	Balancing of rotating masses in the different Plane	
	33	Simple Numerical	
12th	34	Simple Numerical	Repeat Practical 1 to 6
	35	UNIT7: Vibrations, Causes of vibrations in machines, their harmful effects and remedies.	

	36	Types-longitudinal, transverse and torsional vibrations. Damping of vibrations	
13th	**37**	**SESSIONAL TEST –III**	----
	38	**Revised Sessional Test -1**	
	39	**Revised Sessional Test -2**	
14th	**40**	**Revised Sessional Test -3**	----
	41	Seminar	
	42	Seminar	
15th	**43**	Any Other Query	Repeat Practical

LESSON PLAN

NAME OF FACULTY: SH. Vineet Sharma & Kapil Yadav

DISCIPLINE: MECHANICAL ENGINEERING

SEMESTER: V

SUBJECT: REFRIGERATION AND AIR CONDITIONING

LESSON PLAN DURATION: 15 WEEKS

WORK LOAD (LECTURE/PRACTICAL) PER WEEK: (4 lectures, 2 Practical)

WEEK	THEORY		PRACTICALS
	LECTURE NOS	TOPIC	TOPIC
1st	1	**Unit-1 – REFRIGERATION,** Fundamentals of Refrigeration	Practical-1 Identify various tools of refrigeration kit and practice in cutting, bending, flaring, swaging and brazing of tubes
	2	Introduction to refrigeration, and air conditioning	
	3	meaning of refrigerating effect, units of refrigeration, COP, methods of refrigeration	
2nd	4	Introduction to air refrigerator working on reversed carnot cycle.	Practical-2 Study of thermostatic switch, LP/HP cut out overload protector filters, strainers and filter driers.
	5	**Unit-2** Vapour Compression System	
	6	Introduction, principle, function, parts and necessity of vapour compression system,	
3rd	7	T- ϕ and p– H charts, dry, wet and superheated compression.	Practical-3 Identify various parts of a refrigerator and window air conditioner.
	8	Effect of sub cooling, super heating,	
	9	mass flow rate, entropy, enthalpy	
4th	10	work done, Refrigerating effect and COP.	Practical-4 To find COP of Refrigeration system
	11	actual vapour compression system	
	12	Refrigerants, Functions,	
5th	13	**SESSIONAL TEST -I**	Repeat Practical 1 to 4
	14	**Unit-3** Refrigerants, Functions, classification of refrigerants, properties of R - 717	
	15	R – 22, R–134 (a) and CO_2	
6th	16	Properties of ideal refrigerant, selection of refrigerant	Repeat Practical 1 to 4
	17	**Unit-4**- Vapour Absorption System	
	18	Introduction, principle and working of simple absorption system and domestic electrolux refrigeration systems	
7th	19	Solar power refrigeration system, advantages and disadvantages of	Repeat Practical 1 to 4

		solar power refrigeration system over vapour compression system	
	20	**Unit-5-**Refrigeration Equipment, Compressor - Function, various types of compressors	
	21	Condenser - Function, various types of condensers, Evaporator - Function, types of evaporators	
8th	**22**	Expansion Valve - Function, various types such as capillary tube, thermostatic	Practical-5 To detect trouble / faults in a refrigerator/window type air conditioner
	23	expansion valve, low side and high side float valves, application of various expansion valves	
	24	Safety Devices-Thermostat, overload protector LP, HP cut out switch	
9th	**25**	**SESSIONAL TEST -II**	Practical-**6** Charging of a refrigerator/window type air conditioner.
	26	**Unit-6-** Psychrometry Definition, importance,	
	27	specific humidity, relative humidity,	
10th	**28**	degree of saturation DBT	Practical-7 Study of cut section of single cylinder compressor
	29	WBT, DPT,	
	30	sensible heat, latent heat	
11th	**31**	Total enthalpy of air. Psychrometry chart and various processes of psychrometry	Practical-8 Visit to an ice plant, cold storage plant, central air conditioning plant
	32	**Unit-7-**Air-Conditioner	
	33	Study of window air-conditioning,	
12th	**34**	split type air conditioning,	Repeat Practical 5 to 8
	35	concept of central air-condition,	
	36	automobile air-conditioning	
13th	**37**	**SESSIONAL TEST -III**	Repeat Practical 5 to 8
	38	**Revised Sessional Test -1**	
	39	**Revised Sessional Test -2**	
14th	**40**	**Revised Sessional Test -3**	Repeat Practical 5 to 8
	41	Seminar	
	42	Seminar	
15th	**43**	Any Other Query	Repeat Practical

LESSON PLAN

NAME OF FACULTY: SH. Shivam Gupta

DISCIPLINE: MECHANICAL ENGINEERING

SEMESTER: V

SUBJECT: CNC MACHINES AND AUTOMATION

LESSON PLAN DURATION: 15 WEEKS

WORK LOAD (LECTURE/PRACTICAL) PER WEEK: (3 lectures, 2 Practical)

WEEK	THEORY		PRACTICALS
	LECTURE NOS	TOPIC	TOPIC
1st	1	**Unit-1-** Introduction, Introduction to NC, CNC & DNC,	Practical-1 Study of constructional detail of CNC lathe.
	2	Advantages, disadvantages and its Applications.	
	3	Basic components of CNC machines, Machine Control Unit,	
2nd	4	Input devices, selection of components to be machined on CNC machines,	Practical-2 Study of constructional detail of CNC milling machine.
	5	Axis identification	
	6	**Unit-2-** Construction and Tooling	
3rd	7	Design features, specification of CNC machines,	Practical-3 Study the constructional details and working of Automatic tool changer and Multiple pallets
	8	use of slide ways, balls, rollers	
	9	coatings, motor and lead screw, swarf removal,	
4th	10	safety and guarding devices, various cutting tools for CNC machines,	Practical-4 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.
	11	Concept of CNC tool holder, different pallet systems	
	12	Automatic tool changer system, management of a tool room.	
5th	13	**SESSIONAL TEST –I**	Repeat Practical 1 to 4
	14	**Unit-3-** System Devices- Control System; Open Loop and Closed Loop System,	
	15	Concept of Actuators, Transducers and Sensors, Tachometer, LVDT,	
6th	16	Interrupters, potentiometers for linear and angular position	Repeat Practical 1 to 4
	17	Encoder and decoder and axis drives	
	18	**Unit-4-**Part Programming, Introduction to Part programming, Basic concepts of part programming,	

7th	**19**	NC words, part	Repeat Practical 1 to 4

		programming formats, simple programming for rational components, part programming using conned cycles,	
	20	subroutines and do loops, tool off sets, cutter radius compensation and tool wear compensation	
	21	**Unit-5** -Problems in CNC Machines, Common problems in CNC machines related to mechanical,	
8th	**22**	electrical and pneumatic, electronic components.	Practical-5 Develop a part programme for the following milling operation and make the job on CNC milling - Plain milling - Slot milling - Contouring - Pocket milling
	23	Study of common problems and remedies,	
	24	use of on-time fault finding diagnosis tools in CNC machines	
9th	**25**	**SESSIONAL TEST -II**	Practical-6- Preparation of work instructions for machine operator
	26	**Unit-6-** Automation and NC system	
	27	Concept of automation,	
10th	**28**	emerging trends in automation,	Practical-6- Preparation of preventive maintenance schedule for CNC machine.
	29	Automatic assembly.	
	30	Overview of FMS, Group technology,	
11th	**31**	CAD/CAM	Practical-7 Demonstration through industrial visit for awareness of actual working of FMS in production
	32	CIM	
	33	**Unit-7-** Robot Technology	
12th	**34**	Introduction to robot technology,	Repeat Practical 5 to 8
	35	basic robot motion	
	36	and its applications	
13th	**37**	**SESSIONAL TEST -III**	Repeat Practical 5 to 8
	38	**Revised Sessional Test -1**	
	39	**Revised Sessional Test -2**	
14th	**40**	**Revised Sessional Test -3**	Repeat Practical 5 to 8
	41	Seminar	
	42	Seminar	
15th	**43**	Any Other Quary	Repeat Practical

Lesson Plan

Name of the faculty: Sh. Kapil Yadav

Discipline: Mechanical

Semester: 5th Mechanical A & B

Subject: Plant Maintenance and Material Handling

Lesson Plan Duration: 15 weeks

Work Load (Lecture/ Practical) per week (in hours): Theory – 03

Week	Theory		Practicals	
	Lecture day	Topic (including assignment / test)		
1st	1st	Necessity and advantages of testing, repair and maintenance, common instruments required for testing		
	2nd	significance of B-T curve in life span of machine tool, Acceptance test for machine tools		
	3rd	Revision		
2nd	1st	Economic aspects, manpower planning and materials management		
	2nd	Fits and tolerances – common fits and tolerances used for various machine parts		
	3rd	Revision		
3rd	1st	Location, layout of machines in Plant Layout, Principles of Plant layout		
	2nd	types of plant layout and positioning of machines, grouping of machines.		
	3rd	Foundation – types of foundation, various considerations for machine foundations, foundation plan, types of foundation bolts		
4th	1st	erection and leveling, grouting Vibration, damping, vibration isolation – methods of isolation, anti vibration mounts		
	2nd	Testing equipment – dial gauge, mandrel, spirit level, straight edge, auto collimator Recalibration of measuring instruments like vernier calliper		
	3rd	Testing methods – geometrical/alignment test, performance test, testing under load, run test, vibrations, noise		
5th	1st	Definition, advantages, limitations, functions and types of maintenance organisation. Types of maintenance viz. emergency, preventive, breakdown/corrective, predictive		
	2nd	Introduction to computerized maintenance record like facility register, maintenance request		
	3rd	ISO standards for maintenance documentation Introduction to machine history card – purpose and advantages		
6th	1st	Preparation of scheduled yearly plan for preventive maintenance,		

		difference of work content of servicing, repairs and overhauling. MTBF and MTTR. Maintainability		
	2nd	Spare parts- Need of frequently needed spare parts inventory, Make provision of spares for parts not available in market		
	3rd	Common parts which are prone to failure, reasons of failure		
7th	1st	Repair schedule Parts that commonly need repair such as belts		
	2nd	couplings, nuts, and bolts repairing the engines, compressors and boilers.		
	3rd	couplings, nuts, and bolts repairing the engines, compressors and boilers.		
8th	1st	couplings, nuts, and bolts repairing the engines, compressors and boilers.		
	2nd	Revision		
	3rd	Lubrication methods and periodical lubrication chart for various machines (daily, weekly, monthly)		
9th	1st	Handling and storage of lubricants		
	2nd	Lubricants conditioning and disposal		
	3rd	Lubricant and their grades needed gears and bearings		
10th	1st	Lubricant and their grades needed for chains		
	2nd	Purpose and procedure of changing oil periodically (like gear box oil)		
	3rd	Purpose and procedure of changing oil periodically (like gear box oil)		
11th	1st	Revision		
	2nd	Basic principles of material handling,		
	3rd	Basic types of material handling equipments and its characteristic		
12th	1st	Uses and limitations, forklift trucks		
	2nd	Selection of material handling equipment		
	3rd	Unit load: pallet sizing and loading		
13th	1st	Conveyor models		
	2nd	Revision		
	3rd	AGV Systems		
14th	1st	Automated Storage		
	2nd	Retrieval System (ASRS)		
	3rd	Carousels		
15th	1st	Revision		
	2nd	Revision		
	3rd	Revision		