LESSON PLAN

NAME OF FACULTY: SH. Vipul Sharma

DISCIPLINE: MECHANICAL ENGINEERING

SEMESTER: III

SUBJECT: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

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**. Electricity Application and Advantage	**Pracical-1** Connection of a three phase motor and starter with fuses and reversing of direction of rotation
	2	Difference between ac and dc,	
	3	various applications of electricity,	
2nd	4	advantages of electrical energy over other types of energy	**Pracical-2** Connection of a single-phase induction motor with supply and reversing of its direction of rotation
	5	**Unit-2-**Basic Electrical Quantities ,Definition of voltage,	
	6	Definition of current, power and energy with their units,	
3rd	7	name of instruments used for measuring above quantities,	**Pracical-3** Troubleshooting in domestic wiring system, including distribution board
	8	connection of these instruments in an electric circuit	
	9	**Unit-3-** AC Fundamentals	
4th	10	Electromagnetic induction-Faraday's Laws,	**Pracical-4** Connection and reading of an electric energy meter
	11	Lenz's Law ,Fleming's rules,	
	12	Principles of A.C. Circuits; Alternating emf	
5th	13	**SESSIONAL TEST -I**.	**Pracical-5** Use of ammeter, voltmeter, wattmeter, and multi-meter
	14	**Unit-3-** Definition of cycle, frequency, amplitude and time period, Instantaneous, average, r.m.s	
	15	maximum value of sinusoidal wave; form factor and Peak Factor,Concept of phase and phase difference	
6th	16	Concept of resistance, inductance and	**Pracical-6**

		capacitance in simple A.C. Circuit. Power factor and improvement of power factor by use of capacitors	Measurement of power and power factor in a given single phase ac circuit
	17	Concept of three phase system; star and delta connections; voltage and current relationship (no derivation)	
	18	**Unit-4-** Transformers, Working principle and construction of single phase transformer	
7th	**19**	transformer ratio, emf equation, losses and efficiency	**Pracical-7** Study of different types of fuses, MCBs and ELCBs
	20	CVT, auto transformer (brief idea), applications	
	21	**Unit-5-** Distribution System, Difference between high and low voltage distribution system	
8th	**22**	identification of three-phase wires, neutral wire and earth wire in a low voltage distribution system	**Pracical-8** Study of zener diode as a constant voltage source and to draw its V-I characteristics
	23	Identification of voltages between phases and between one phase and neutral.	
	24	Difference between three-phase and single-phase supply	
9th	**25**	**SESSIONAL TEST –II**	**Pracical-9** Study of earthing practices
	26	**Unit-6-** Electric Motor , Description and applications of single-phase and three-phase motors	
	27	Connection and starting of three-phase induction motors by star-delta starter. Changing direction of rotation of a given 3 phase induction motor	
10th	**28**	Motors used for driving pumps, compressors, centrifuge, dyers etc	**Pracical-10** To draw V-I characteristics of a (i) NPN transistor (ii) Thyristor (SCR)
	29	Totally enclosed submersible and flame proof motors	
	30	**Unit-7-** Domestic Installation, Distinction between light-fan circuit and single phase power circuit, sub-circuits	
11th	**31**	Various accessories and parts of domestic electrical installation, Identification of wiring systems. Common safety measures and earthing	**Pracical-11** Study of construction and working of a (i) stepper motor and (ii) servo motor
	32	**Unit-8-** Electrical Safety, Electrical shock and precautions against shock treatment of electric shock,	
	33	concept of fuses and their classification, selection and application concept of earthing and various types of earthing, applications of MCBs and ELCBs	
12th	**34**	**Unit-9-** Basic Electronics, Basic idea of semiconductors – P and N type; diodes,	Repeat of Practical 1 to 4
	35	zener diodes and their applications, transistor – PNP and NPN, their characteristics and uses.	
	36	Characteristics and applications of a thyristor, characteristics and applications of stepper motors and servo motors in process control.	

13th	**37**	**SESSIONAL TEST –III**	Repeat of Practical 5 to 8
	38	**Revised Sessional Test -1**	
	39	**Revised Sessional Test -2**	
14th	**40**	**Revised Sessional Test -3**	Repeat of Practical 9 to 11
	41	Seminar	
	42	Seminar	
15th	**43**	Any Other Quary	Repeat of Practical

LESSON PLAN

NAME OF FACULTY: Kapil Yadav

DISCIPLINE: MECHANICAL ENGINEERING

SEMESTER: III

SUBJECT: WORKSHOP TECHNOLOGY-II

LESSON PLAN DURATION: 15 WEEKS

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

WEEK	THEORY	
	LECTURE NOS	TOPIC
1st	1	**Unit-1-** Welding Process **1.1**- Principle of welding, Classification of welding processes, Advantages and limitations of welding, Industrial applications of welding
	2	Welding positions and techniques, symbols. Safety precautions in welding. **1.2**- Gas Welding, Principle of operation, Types of gas welding flames and their applications
	3	Gas welding equipment - Gas welding torch, Oxygen cylinder, acetylene cylinder, cutting torch, Blow pipe, Pressure regulators,
2nd	4	Filler rods and fluxes and personal safety equipment for welding. **1.3**- Arc Welding, Principle of operation, Arc welding machines and equipment. A.C. and D.C. arc welding, Effect of polarity, current regulation and voltage regulation, Electrodes
	5	Classification, B.I.S. specification and selection, Flux for arc welding. Requirements of pre heating, post heating of electrodes and work piece. Welding defects and their testing methods. **1.4-** Other Welding Processes
	6	Resistance welding: Principle, advantages, limitations working and applications of spot welding, seam welding, projection welding and percussion welding,
3rd	7	Atomic hydrogen welding, Shielded metal arc welding, submerged arc welding, Welding distortion,
	8	welding defects, methods of controlling welding defects and inspection of welded joints
	9	**1.5** Modern Welding Methods, Methods, Principle of operation,
4th	10	Modern Welding advantages, disadvantages and applications ,Tungsten inert gas (TIG) welding
	11	Metal inert gas (MIG) welding, Thermit welding,Electro slag welding, Electron beam welding,
	12	Ultrasonic welding, Laser beam welding, Robotic welding
5th	13	**SESSIONAL TEST -I**.
	14	**Unit-2-** Foundry Techniques ,2.1- Pattern Making, Types of pattern, Pattern material, Pattern allowances, Pattern codes as

		per B.I.S., Introduction to cores 2.2.. Moulding and Casting
	15	2.2.1. Moulding Sand, Properties of moulding sand, their impact and control of properties viz. permeability, refractoriness, adhesiveness
6th	**16**	cohesiveness, strength, flow ability, collapsibility, Various types of moulding sand, Testing of moulding sand. Safety precautions in foundry.
	17	2.2.2. Mould Making-Types of moulds, Step involved in making a mould, Molding boxes, hand tools used for mould making,
	18	Molding processes: Bench molding, floor molding, pit molding and machine molding, Molding machines squeeze machine, jolt squeeze machine and sand slinger.
7th	**19**	2.2.3 Casting Processes- Charging a furnace, melting and pouring both ferrous and non ferrous metals, cleaning of castings,
	20	Principle, working and applications of Die casting: hot chamber and cold chamber, Centrifugal casting
	21	2.2.4. Gating and Risering System --Elements of gating system, Pouring basin, sprue, runner, gates,
8th	**22**	Types of risers, location of risers, Directional solidification
	23	2.2.5 Melting Furnaces --Construction and working of Pit furnace, Cupola furnace, Crucible furnace – tilting type, Electric furnace
	24	2.2.6 Casting Defects Different types of casting defects, Testing of defects: radiography, magnetic particle inspection and ultrasonic inspection
9th	**25**	**SESSIONAL TEST –II**
	26	**Unit-3-** Metal Forming Processes-**3.1**Press Working - Types of presses, type of dies, selection of press die, die material.
	27	Press Operations-Shearing, piercing, trimming, punching, notching, shaving, gearing, embossing, stamping
10th	**28**	3.2 Forging - Open die forging, closed die forging, Press forging, upset forging,
	29	swaging, up setters, roll forging, Cold and hot forging 3.3 Rolling - Elementary theory of rolling
	30	Types of rolling mills, Thread rolling, roll passes, Rolling defects and remedies
11th	**31**	3.4 Extrusion and Drawing - Type of extrusion- Hot and Cold, Direct and indirect.
	32	Pipe drawing, tube drawing, wire drawing
	33	**Unit-4** Plastic Processing
12th	**34**	4.1 Industrial use of plastics, and applications- Advantages and limitations of ,use of plastics.
	35	4.2 Injection moulding-principle, working of injection moulding machine.
	36	4.3 Compression moulding-principle, and working of compression moudling machine.

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 Quary

LESSON PLAN

NAME OF FACULTY: SH. Anil Kumar Yadav

DISCIPLINE: MECHANICAL ENGINEERING –

SEMESTER: III

SUBJECT: MECHANICAL ENGINEERING DRAWING

LESSON PLAN DURATION: 15 WEEKS

WORK LOAD (LECTURE/PRACTICAL) PER WEEK: (06 Practical)

WEEK	PRACTICALS	
	LECTURE NOS	**TOPIC**
1st	**1**	Unit-1- **Limit, fits and tolerance,** Need of limit, fits and tolerance, Maximum limit of size, minimum limit of size, tolerance, allowance, deviation, upper deviation, lower deviation,
	2	fundamental deviation, clearance, maximum clearance, minimum clearance. Fits – clearance fit, interference fit and transition fit. Hole basis system, shaft basis system, tolerance grades, calculating values of clearance, interference, hole tolerance, shaft tolerance with given basic size for common assemblies like H_7/g6, H_7/m6, H_8/p6. Basic terminology and symbols of geometrical dimensioning and tolerances.
	3	**Unit-2-** Drawing of the following with complete dimensions, tolerances, bill of material and surface finish representation
2nd	**4**	2.1 Universal coupling and Oldham coupling (Assembly)
	5	**2.2** Bearings
	6	2.2.1 Bushed Bearing (Assembly Drawing), 2.2.2 Ball Bearing and Roller Bearing (Assembled Drawing)
3rd	**7**	**2.2.3** Plummer Block (Detail and Assembly Drawing)
	8	2.2.4 Foot step Bearing (Assembled Drawing)
	9	**2.3** Pulleys
4th	**10**	**2.3.1** Pulleys, Function of pulley, Types and materials of Pulley.
	11	2.3.2 Free hand Sketch of Various types of pulleys.
	12	2.3.3 Fast and loose pulley (Assembly Drawing)
5th	**13**	**SESSIONAL TEST -I**.
	14	**Unit-2 - 2.4** Pipe Joints,
	15	2.4.1- Types of pipe Joints,
6th	**16**	Symbol and line layout of pipe lines
	17	2.4.2 Expansion pipe joint (Assembly drawing)
	18	2.4.3 Flanged pipe and right angled bend joint (Assembly Drawing)

7th	19	**2.5-** Lathe Tool Holder (Assembly Drawing
	20	**2.6-** Reading and interpretation of mechanical components and assembly drawings
	21	**2.7-** Sketching practice of bearings and bracket
8th	22	**Unit-3** Drilling Jig (Assembly Drawing)
	23	**Unit4-**Machine vices (Assembly Drawing)
	24	
9th	25	**SESSIONAL TEST –II**
	26	**Unit-5-** I.C. Engine Parts
	27	Piston Connecting rod (Assembly Drawing)
10th	28	Crankshaft and flywheel (Assembly Drawing)
	29	**Unit-6-** Boiler Parts
	30	Steam Stop Valve (Assembly Drawing)
11th	31	Blow off cock. (Assembly Drawing)
	32	**Unit-7-** Mechanical Screw Jack (Assembled Drawing)
	33	**Unit-8-** Gears
12th	34	Gear, Types of gears,
	35	Nomenclature of gears and conventional representation
	36	Draw the actual profile of involute teeth of spur gear by different methods
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 Quary

LESSON PLAN

Name of the Faculty : SH. Vipul Sharma / Akash Mishra

Discipline : Mechanical Engineering

Semester : 3rd

Subject : STRENGTH OF MATERIAL

Work load per week : Lecture – 03, Practical – 02

WEEK	THEORY		PRACTICAL	
	Day Lecture	Topic(Including Assignment/Test)	Day Practical	Practical Topic
1	1	**Unit – 1** 1.1. Basic concept of load, stress and strain 1.2. Tensile, compressive and shear stresses	1	Tensile test on bars of Mild steel and Aluminium.
	2	1.3. Linear strain, Lateral strain, Shear strain, Volumetric strain. 1.4 Concept of Elasticity, Elastic limit and limit of proportionality		
	3	1.5 Hook's Law and Elastic Constants 1.6. Stress-strain curve for ductile and brittle materials	2	Tensile test on bars of Mild steel.
2	4	1.7 Nominal stress 1.8 Yield point, plastic stage	3	Tensile test on bars of Aluminium.
	5	1.9 Ultimate stress and breaking stress 1.10 Percentage elongation		
	6	1.11 Proof stress and working stress 1.12. Factor of safety	4	Tensile test on bars of Aluminium.
3	7	1.13 Poisson's Ratio 1.14 Thermal stress and strain	5	Bending tests on a steel bar.
	8	1.15 Longitudinal and circumferential stresses in seamless thin walled cylindrical shells. 1.16 Introduction to Principal stresses. **Assignment No.-1.**	6	Bending tests on a steel bar.
	9	**Unit – 2** 2.1 Strain Energy, Resilience, proof resilience and modulus of resilience		
4	10	2.2 Strain energy due to direct stresses and Shear Stress	7	Bending tests on a wooden beam.
	11	2.3 Stresses due to gradual, sudden and falling load.		
	12	**Unit – 3** 3.1. Concept of moment of inertia and second moment of area	8	Bending tests on a wooden beam.
5	13	3.2 Radius of gyration	9	Viva

	14	3.3 Theorem of perpendicular axis and parallel axis (with derivation)		
	15	**1st Class Test.**	10	Viva
6	16	3.4 Second moment of area of common geometrical sections : Rectangle, Triangle, Circle (without derivation); Second moment of area for L,T and I section	11	Viva
	17	3.5 Section modulus.	12	Viva
	18	**Unit – 4** 4.1 Concept of various types of beams		
7	19	4.1 Concept of various form of loading	13	Viva
	20	4.2 Concept of end supports-Roller,		
	21	4.2 Concept of hinged and fixed	14	Viva
8	22	4.3 Concept of bending moment and shearing force & **Assignment No.-2.**	15	Viva
	23	**1st Sessional Test.**		
	24	4.4 B.M. and S.F. Diagram for cantilever and simply supported beams with overhang subjected to concentrated and U.D.L.	16	Viva
9	25	4.4 B.M. and S.F. Diagram for cantilever and simply supported beams without overhang subjected to concentrated and U.D.L.	17	Impact test on metals a) Izod test
	26	**Unit – 5** 5.1 Concept of Bending stresses 5.2. Theory of simple bending, Derivation of Bending Equation	18	Impact test on metals a) Izod test
	27	**2nd Class Test**		
10	28	5.3. Use of the equation $\frac{M}{I}=\frac{\sigma}{y}=\frac{E}{R}$	19	Impact test on metals b) Charpy test
	29	5.4. Concept of moment of resistance 5.5. Bending stress diagram		
	30	5.6 Section modulus for rectangular, circular and symmetrical I section.	20	Impact test on metals b) Charpy test
11	31	5.7. Calculation of maximum bending stress in beams of rectangular, circular, and T section.	21	Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity.
	32	**Unit – 6** 6.1. Concept of column, modes of failure 6.2. Types of columns, modes of failure of columns		
	33	6.3. Buckling load, crushing load 6.4. Slenderness ratio 6.5. Effective length 6.6 End restraints 6.7 Factors effecting strength of a column	22	Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity.

12	34	6.8 Strength of column by Euler Formula without derivation	23	Viva
	35	6.9. Rankine Gourdan formula (without derivation) **Assignment No.-3.**	24	Viva
	36	**2nd Sessional Test**		
13	37	**Unit – 7** 7.1. Concept of torsion, difference between torque and torsion.	25	To plot a graph between load and extension and to determine the stiffness of a helical spring.
	38	**3rd Class Test**		
	39	7.2. Derivation of Torsion Equation, use of torsion equation for circular shaft, (solid and hollow)	26	To plot a graph between load and extension and to determine the stiffness of a helical spring.
14	40	7.3. Comparison between solid and hollow shaft with regard to their strength and weight.	27	Hardness test on different metals.
	41	7.4. Power transmitted by shaft 7.5 Concept of mean and maximum torque.		
	42	**Unit – 8** 8.1. Closed coil helical springs subjected to axial load and calculation of: - Stress deformation	28	Hardness test on different metals.
15	43	- Stiffness and angle of twist and strain energy - Strain energy and proof resilience.	29	Viva
	44	8.2. Determination of number of plates of laminated spring (semi elliptical type only) **& Assignment No.-4.**	30	Viva
	45	3rd Sessional test		

LESSON PLAN	
Name of Faculty	: **Sh. Sanjeev Yadav / Akash Mishra**
Discipline	: **Mechanical Engineering**
Semester	: **3rd Semester**
Subject	: **THERMODYNAMICS -I**
Lesson Plan Duration:	: **15 Weeks**
Work Load (Lecture/Practical) per week(in hours)	: **3Hrs. Lecture & 3 Practical**

Week	Theory		Practical	
	Lecture Day	**Topic(Including Assignment/Test)**	**Practical Day**	**Topic**
1	1	Fundamental Concepts Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic		Determination of temperature by thermocouple pyrometer Infrared thermometer
	2	properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes		
	3	Zeroth law of thermodynamics		
2	4	definition of properties like pressure, volume, temperature, enthalpy and internal energy		Practical conduct
	5	Laws of Perfect Gases Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law		
	6	Universal gas constant, Characteristic gas constants and its derivation.		
3	7	Specific heat at constant pressure, specific heat at constant volume of a gas, derivation of an expression for specific heats with characteristics		Demonstration of mountings and accessories of a boiler.
	8	simple numerical problems on gas equation		
	9	Thermodynamic Processes Types of thermodynamic processes		

4	10	isochoric, isobaric, isothermal		Practical conduct
	11	adiabatic, isentropic, polytropic		
	12	throttling processes, equations representing the processes		
5	13	Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above process.		Study the working of Lancashire boiler and Nestler boiler.
	14	1st Class test		
	15	1st sessional test		
6	16	Laws of Thermodynamics Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations		Practical conduct
	17	Application of first law of thermodynamics to Non-flow systems – Constant volume, Constant pressure, Adiabatic and polytropic processes		
	18	Steady flow energy equation, Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators.		
7	19	Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement, Classius statement, equivalency of statements		Study of working of high pressure boiler
	20	Perpetual motion Machine of first kind, second kind		
	21	Carnot engine,		
8	22	Introduction of third law of thermodynamics		Practical conduct

	23	concept of irreversibility and concept of entropy.		
	24	Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas, P – V – T surface of an ideal gas		
9	25	triple point, real gases, Vander-Wall's equation		Study of boilers (Through industrial visit)
	26	Formation of steam and related terms, thermodynamic properties of steam, steam tables		
	27	sensible heat, latent heat, internal energy of steam, entropy of water, entropy of steam, T- S diagrams, Mollier diagram (H – S Chart)		
10	28	Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes, determination of quality of steam (dryness fraction)		VIVA
	29	2nd class test		
	30	2nd sessional test		
11	31	Uses of steam, classification of boilers, function of various boiler mounting and accessories		Determination of Dryness fraction of steam using calorimeter.
	32	comparison of fire tube and water tube boilers		
	33	Construction and working of Lancashire boiler, Nestler boiler, Babcock & Wilcox Boiler		
12	34	Introduction to modern boilers.		Practical conduct
	35	Meaning of air standard cycle – its use, condition of reversibility of a cycle		
	36	Description of Carnot cycle, Otto cycle		

13	37	Diesel cycle, simple problems on efficiency for different cycles.		Demonstrate the working of air compressor.
	38	Comparison of Otto, Diesel cycles for same compression ratio, same peak pressure developed and same heat input		
	39	Reasons for highest efficiency of Carnot cycle and all other cycles working between same temperature limits		
14	40	Functions of air compressor – uses of compressed air, type of air compressors		Practical conduct
	41	Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done		
	42	Multistage compressors – advantages over single stage compressors, use of air cooler, condition of minimum work in two stage compressor (without proof) simple problems Multistage compressors		
15	43	3rd class test		VIVA
	44	Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor		
	45	**3rd sessional test**		