

LESSON PLAN

NAME OF FACULTY: F U REHMAN

DISCIPLINE: MECHANICAL ENGINEERING - G.P. RAJPUR SADHAURA

SEMESTER: III

SUBJECT: STRENGTH OF MATERIAL

LESSON PLAN DURATION: 16 WEEKS

WORK LOAD (LECTURE/PRACTICAL) PER WEEK: 3 LECTURES/4 PRACTICALS

WEEK	LECTURE NO.	THEORY	PRACTICALS
I	1	UNIT -1 STRESS AND STRAINS 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 Aluminum.
	2	1.3. Linear strain, Lateral strain, 1.4. Shear strain, Volumetric strain. Concept of Elasticity, Elastic limit and limit of proportionality 1.5 Hook's Law and Elastic Constants	
	3	1.6 Stress-strain curve for ductile and brittle materials 1.7 Nominal stress 1.8 Yield point, plastic stage	
II	4	1.9 Ultimate stress and breaking stress 1.10 Percentage elongations 1.11 Proof stress and working stress 1.12 Factor of safety	
	5	1.13 Poisson's Ratio 1.14 Thermal stress and strain	2. Bending tests on a steel bar or a wooden beam.
	6	1.15 Longitudinal and circumferential stresses in seamless thin walled Cylindrical shells. 1.6 Introduction to Principal stresses	

III	7	UNIT – 2 RESILIENCE 2.1 Strain Energy, Resilience, proof resilience and modulus of resilience	
	8	2.2 Strain energy due to direct stresses and Shear Stress	3. Impact test on metals a) Izod test b) Charpy test
	9	2.3 Stresses due to gradual, sudden and falling load.	
		SESSIONAL TEST - I	
IV	10	UNIT -3 MOMENT OF INERTIA 3.1. Concept of moment of inertia and second moment of area 3.2 Radius of gyration	
	11	3.3 Theorem of perpendicular axis and parallel axis (with derivation)	4. Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity.
	12	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	
		3.5 Section modulus	
V	13	UNIT- 4 BENDING MOMENT AND SHEARING FORCES 4.1 Concept of various types of beams and form of loading 4.2 Concept of end supports-Roller, hinged and fixed	
	14	4.3 Concept of bending moment and shearing force	5. To plot a graph between load and extension and to determine the stiffness of a helical spring.
	15	4 B.M. and S.F. Diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and U.D.L	

VI	16	UNIT – 5 BENDING STRESSES 5.1 Concept of Bending stresses 5.2. Theory of simple bending, Derivation of Bending Equation	
	17	5.3. Use of the equation 5.4. Concept of moment of resistance 5.5. Bending stress diagram	6. Hardness test on different metals.
	18	5.6 Section modulus for rectangular, circular and symmetrical I section. 5.7. Calculation of maximum bending stress in beams of rectangular, circular, and T section.	
		SESSIONAL TEST - II	
VII	19	UNIT -6 COLOUMNS 6.1. Concept of column, modes of failure 6.2. Types of columns, modes of failure of columns	
	20	6.3. Buckling load, crushing load 6.4. Slenderness ratio	Revision
	21	6.5. Effective length 6.6 End restraints	
VIII	22	6.7 Factors effecting strength of a column	
	23	6.8 Strength of column by Euler Formula without derivation	Revision
	24	6.9. Rankine Gourdan formula (without derivation)	
IX	25	UNIT -7 TORSION 7.1. Concept of torsion, difference between torque and torsion.	
	26	7.2. Derivation of Torsion Equation, use of torsion equation for circular shaft, solid and hollow.	Revision
	27	7.3. Comparison between solid and hollow shaft with regard to their strength and weight	
X	28	7.4. Power transmitted by shaft 7.5 Concept of mean and maximum torque	
	29	UNIT -8 SPRINGS 8.1. Closed coil helical springs subjected to axial load and calculation of:	Revision
	30	Stress deformation - Stiffness and angle	

		of twist and strain energy	
XI	31	Strain energy and proof resilience	
	32	8.2. Determination of number of plates of laminated spring (semi elliptical type only)	Revision
	33	Revision	
XII	34	Revision	
	35	Revision	Revision
	36	Revision	
XIII	37	Revision	
	38	Revision	Revision
	39	Revision	
XIV	40	Revision	
	41	Revision	Revision
	42	Revision	
XV	43	Revision	
	44	Revision	Revision
	45	Revision	
XVI	46	SESSIONAL TEST - III	
	47	Revision	Revision
	48	Revision	Revision

LESSON PLAN

Name of Faculty : JAGDEEP JASHET
 Discipline : Mechanical Engineering- G P RAJPUR
 Semester : III Semester
 Subject : THERMODYNAMICS - I
 Lesson Plan Duration: : 16 Weeks
 Work Load (Lecture/Practical) : 3Hrs. Lecture & 3 Practical

Week	Day	Topic(Including Assignment/Test)	Practical
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
	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	Determination of temperature by pyrometer
	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	Determination of temperature by Infrared thermometer
	8	Simple numerical problems on gas equation	
	9	Thermodynamic Processes Types of thermodynamic processes	
4	10	Isochoric, isobaric, isothermal	Demonstration of mountings and accessories of a boiler.
	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	I CLASS TEST	
	15	I SESSIONAL TEST	
6	16	Laws of Thermodynamics Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations	Study of working of high pressure mboiler
	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 boilers (Through industrial visit)
	20	Perpetual motion Machine of first kind, second kind	
	21	Carnot engine,	
8	22	Introduction of third law of thermodynamics	Study of boilers (Through industrial visit)
	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	II CLASS TEST	
	30	II 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.	Determination of Dryness fraction of steam using calorimeter.
	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	Demonstrate the working of air compressor.
	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	III CLASS TEST	VIVA
	44	Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor	
	45	III SESSIONAL TEST	
16	46	REVISION	VIVA
	47	REVISION	
	48	REVISION	

LESSON

PLAN

NAME OF FACULTY: JAGDEEP JASHET

DISCIPLINE : MECHANICAL ENGINEERING - G.P.

RAJPUR

SEMESTER : III

SUBJECT : W.T - I

DURATION : 16

WEEKS

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

WEEK	THEORY	
	LECTURE NOS.	TOPIC
1	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,
2	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,
3	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,
	10	Modern Welding advantages, disadvantages and applications

4		, 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
5	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
6	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.
7	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 Riser System, Elements of gating system, Pouring basin, sprue, runner, gates,
8	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
9	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
10	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
11	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
12	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 moulding machine.
13	37	SESSIONAL TEST –III
	38	Revised Sessional Test -1
	39	Revised Sessional Test -2
14	40	Revised Sessional Test -3
	41	Seminar
	42	Seminar
15	43	Any Other Query
	44	Revision
	45	Revision
16	46	Revision
	47	Revision
	48	Revision

LESSON

PLAN

NAME OF FACULTY: JAGDEEP JASHET

DISCIPLINE: MECHANICAL ENGINEERING - G.P. RAJPUR SADHAURA

SEMESTER: III

SUBJECT: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

LESSON PLAN DURATION: 16 WEEKS

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

Week	Theory	
	Lecture day	Topic
1	1	INTRODUCTION: About BEEE subject
	2	Difference between ac and dc, various applications of electricity, advantages of electrical energy over other types of energy
	3	2. Basic Electrical Quantities (04 Hours) Definition of voltage, current, power and energy with their units, name of instrument used for measuring above quantities,
2	4	Connection of these instruments in an electric circuit
	5	Electromagnetic induction-Faraday's Laws, Lenz's Law; Fleming's rules, Principles of A.C. Circuits;
	6	Alternating emf, Definition of cycle, frequency, amplitude and time period. Instantaneous, average, r.m.s and maximum value of sinusoidal wave; form factor and Peak Factor.
3	7	Concept of phase and phase difference. Concept of resistance, inductance and capacitance in simple A.C. circuit
	8	Power factor and improvement of power factor by use of capacitors. Concept of three phase system; star and delta connections; voltage and current relationship (no derivation)
	9	Working principle and construction of single phase transformer,
4	10	Transformer ratio, e.m.f. equation, losses and efficiency,
	11	Cooling of transformers, isolation transformer,
	12	CVT, auto transformer (brief idea), applications.
5	13	Difference between high and low voltage distribution system,
	14	Identification of three phase wires, neutral wire and earth wire in a low voltage distribution system.

	15	Identification of voltages between phases and between one phase and neutral.
6	16	Difference between three-phase and single-phase supply
	17	Description and applications of single-phase
	18	Description and applications of three-phase motors.
7	19	Connection and starting of three-phase induction motors by star-delta starter.
	20	Changing direction of rotation of a given 3 phase induction motor.
	21	Motors used for driving pumps, compressors, centrifuge, dyers etc.
8	22	Totally enclosed submersible and flame proof motors
	23	Distinction between light-fan circuit and single phase power circuit,
	24	Sub-circuits, various accessories
9	25	And parts of domestic electrical installation.
	26	Identification of wiring systems.
	27	Common safety measures and earthing.
10	28	Electrical shock and precautions against shock
	29	Treatment of electric shock, concept of fuses
	30	Classification of fuses, selection and application,
11	31	Concept of earthing
	32	Various types of earthing,
	33	Applications of MCBs and ELCBs
12	34	Basic idea of semiconductors – P and N type; diodes
	35	Zener diodes and their applications,
	36	Transistor – PNP and NPN, their characteristics and uses.
13	37	Characteristics and applications of a thyristor,
	38	Characteristics and applications of stepper motors
	39	And servo motors in process control
14	40	Revision
	41	Revision

	42	Class test
15	43	3 rd Sessional Test
	44	Revision
	45	Revision
16	46	Revision
	47	Revision

LESSON PLAN

NAME OF FACULTY: F U REHMAN/SHEKHAR

CHAUHAN/JAGDEEP JASHET

DISCIPLINE: MECHANICAL ENGINEERING - G.P. RAJPUR

SADHAURA SEMESTER: III

SUBJECT: MECHANICAL ENGG.

DRAWING

LESSON PLAN DURATION: 16 WEEKS

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

WEEK	PRACTICAL S	
	LECTURE NO.	TOPIC
1	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 H7/g6, H7/m6, H8/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
	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)
2	7	2.2.3 Plummer Block (Detail and Assembly Drawing)
	8	2.2.4 Foot step Bearing (Assembled Drawing)
	9	2.3 Pulleys
	10	2.3.1 Pulleys, Function of pulley, Types and material of Pulley.
	11	2.3.2 Free hand Sketch of Various types of pulleys.
	12	2.3.3 Fast and loose pulley (Assembly Drawing)

3	13	SESSIONAL TEST - I
	14	Unit-2 - 2.4 Pipe Joints,
	15	2.4.1- Types of pipe Joints,
	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)
4	19	2.5- Lathe Tool Holder (Assembly Drawing)
	20	2.6- Reading and interpretation of mechanical components
	21	Assembly drawings of mechanical components.
	22	2.7- Sketching practice of bearings and bracket
	23	Unit - 3 Drilling Jig (Assembly Drawing)
	24	Unit4 - Machine vices (Assembly Drawing)
5	25	SESSIONAL TEST - II
	26	Unit-5- I.C. Engine Parts
	27	Piston Connecting rod (Assembly Drawing)
	28	Crankshaft and flywheel (Assembly Drawing)
	29	Unit-6- Boiler Parts
	30	Steam Stop Valve (Assembly Drawing)
6	31	Blow off cock. (Assembly Drawing)
	32	Unit-7- Mechanical Screw Jack
	33	(Assembled Drawing) screw jack
	34	Unit-8- Gears
	35	Gear, Types of gears,
	36	Nomenclature of gears and conventional representation
7	37	Draw the actual profile of involute teeth of spur gear by different methods
	38	SESSIONAL TEST – III
	39	Revised Sessional Test -1
	40	Revised Sessional Test -2
	41	Revised Sessional Test -3
	42	Seminar
8	43	Seminar
	44	Any Other Query
	45	Revision