

GOVT. CO-ED POLYTECHNIC JAGDALPUR
ADAWAL, DIST - BASTAR (C.G.) 494001
DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN SESSION-(NOV-DEC) 2024

NAME OF FACULTY : TEJESHVARYA

SUBJECT : BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

SUBJECT CODE : 2037371(025)

SEMESTER : DIPLOMA (3rd)SEM

TEXT BOOKS ELECTRICAL TECHNOLOGY :THERAJA B.L.& THAREJA A.K.

ELECTRICAL MACHINES : BHATTACHARYA S. K.

REF. BOOKS BASIC ELECTRICAL ENGINEERING : MITTAL V.N.

PRINCIPLES OF ELECTRONICS : MEHTA V.K.

LECT. NO.	UNIT	TOPIC TO BE COVERED	DATE OF LECTURE TAKEN	REMARKS	
		UNIT - 1 DC& AC CIRCUITS		12	
1	1	DC circuits concept of charge	1		
2		potential difference and current	1		
3		kirchhoff's current and voltage law	1		
4		series and parallel circuits	1		
5		AC fundamentals phase difference	1		
6		power factor unity, lag and lead	1		
7		RMS value , average value and form factor	1		
8		AC circuits RLC circuits		1	
9		impedance, admittance			
10		power and phasor representation	1		
11		polyphase circuits basic concepts of three phase	1		
12		phase sequence line, phase values of voltages	1		
13		current and voltage relationship in three phase AC circuits			
14		star and delta configuration	1		
UNIT-2 TRANSFORMER AND ELECTRICAL MACHINES		15			
15	2	Transformer construction	1		
16		working principle, transformation ratio	1		
17		EMF equation	1		
18		DC machines-construction	1		
19		DC generator -types	1		
20		working principle EMF equation	1		
21		DC motors - types, working principle	1		
22		EMF equation, back EMF, torque	1		
23		Three phase and single phase induction motor construction	1		
24		working principle, slip, torque-speed characteristics	1		
25		single phase induction motor operating principle and classification	1		
26		Three phase synchronous machine-construction,	1		
27		rotor construction-salient and non salient	1		
28		working principle of synchronous generator , applications	1		
29	working principle of synchronous motor, applications	1			
UNIT-3 DIODE AND ITS APPLICATIONS		8			
30	3	introduction of PN junction diode	1		
31		equivalent circuits of PN junction diode	1		
32		V-I characteristics of diode, forward and reverse biased	1		
33		diode current equation	1		
34		need of rectification, half wave rectifier	1		
35		full wave rectifiers	1		
36		zener diode , equivalent circuit of zener diode	1		
37		zener diode as a voltage regulator	1		

LECT	TOPIC TO BE COVERED	TAKEN	REMARKS
	UNIT-4 BJT, FET AND MOSFET	10	
38	Introduction of BJT,types of BJT	1	
39	construction and operation of NPN and PNP transistor	1	
40	need of transistor biasing	1	
41	input and output characteristics of CB,CE,CC configuration	1	
42	transistors as an amplifier	1	
43	transistor as a switch		
44	introduction of FET	1	
45	classification of FET		
46	types of JFET	1	
47	construction and operation of N-channel JFET		
48	construction and operation of P-channel JFET	1	
49	construction and operation of depletion type MOSFET	1	
50	construction and operation of enhancement type MOSFET	1	
	UNIT-5 TEST AND MEASURING INSTRUMENTS	12	
51	analog multimeter	1	
52	digital multimeter	1	
53	working of mutimeter	1	
54	function generator construction	1	
55	function generator working	1	
56	block diagram of CRO	1	
57	constructional features of CRT	1	
58	Principle of operation,	1	
59	working of various blocks of CRO	1	
60	features of dual trace oscilloscopes	1	
61	fundamentals of LED display technique	1	
62	fundamentals of LCD display techniques	1	
TOTAL SCHEDULED CLASSES: 57		Signature of Faculty	HOD Signature
TOTAL CLASSES TAKEN:			



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LESSION PLAN

Name of the faculty :- Mr. AMAR XALXO

Semester :- 3rd

Subject Name- Strength of material 2037372(037)

Lesson Plan Duration (L+P+T) :- 60Hrs (From Sept. To Dec. 2024)

S.No.	No. Of Periods	Topic Name	Practicals
	(Approx.Hrs: L+P+T =06)	Unit-1.0 Direct Stresses and Strains in components	
1	1	Different types of Structures and Loads. Direct Stress, linear Strain, Hook's Law Calculation of Direct Stress and Linear Strain,	LE1.1 Perform Tension Test on mild steel/ Aluminium on Universal Testing machine as per IS432 (I)
2	1	Stress- Strain curve of Mild Steel, Modulus of Elasticity, Yield, Breaking and Ultimate Stress and factor of Safety. Lateral Strain and Poisson's ratio.	LE1.2 Perform Compression test on cast iron on Universal Testing Machine as per IS 14858.
3	1	Temperature Stresses and Strain with and without yielding.	LE1.3 Perform direct Shear Test on mild steel using Universal Testing Machine as per IS 5242.
4	1	Shear Stress Shear Strain and Shear Modulus. Bulk Modulus and Volumetric Strain.	LE1.4 Calculate Impact Value of Mild Steel using IZOD Impact Test Apparatus.
5	2	Differentiate Sudden, Gradual and Impact Load, Strain Energy and Proof Resilience for Sudden, Gradual and Impact Load with numerical problems.	
	(Approx. Hrs: L+P+T =07)	Unit-2 Shear Force and Bending Moments in Beam type components	
1	1	Statically Determinate Beams like Cantilever, Simply Supported and Over Hang Beam.	LE2.1 Estimate Maximum Bending moment And shear force for simply supported and cantilever beam under point load and UDL using Combined Shear Force and Bending Moment apparatus.
2	1	Relation between Shear Force and Bending Moment.	
3	2	Sagging and Hogging Bending Moment and its importance. Point of Contra flexure and its importance.	
4	2	S.F and B.M Diagram for Cantilever, Simply Supported and Over Hang Beam.	
5	1	Components like shaft, axle and spindle compression system subjected to Point Load and/ or Uniformly Distributed Load (UDL).	
	(Approx. Hrs: L+P+T =10)	Unit-3 Bending stresses and shear stresses in beam type components	

1	2	Bending Theory Equation Bending stress , Sectional Modulus	LE3.1 Measure flexural rigidity (EI) for a given beam using 'Slope and Deflection' apparatus and compare it with theoretical value.
2	3	Neutral Axis, application of Bending theory to Statically determinate beams elements like shaft, axle, spindle , pulley arm having rectangular or circular section to find out stresses.	
3	2	Structural components subjected to Axial Eccentric Loads.	
4	3	Shear stress-Average and Maximum shear stress for rectangular, circular section.	
	(Approx. Hrs: L+P+T =12)	Unit-4 Deflection of beam type components	
1	2	Slope and Deflection.	LE4.1 Investigate the effect of beam length and width on deflection of beam and compare it with theoretical value using 'Slope and Deflection' apparatus.
2	5	Deflection Formulae for Cantilever Beam subjected to Point Load at free end and with full UDL.	
3	5	Formulae for Simply supported Beam subjected to Point Load at Mid Span and with full UDL.	
	(Approx. Hrs: L+P+T =10)	Unit-5.0 Springs	
1	2	Definition, types and use of springs.	LE5.1 Measure Stiffness and deflection of given spring and modulus of rigidity the spring wire using 'Extension and compression of Spring' apparatus.
2	4	Spring classification based on size, shape and load- leaf spring, helical and spiral spring.	
3	4	Stiffness, deflection and maximum stress in helical open and closed coil springs and leaf springs.	
	(Approx. Hrs: L+P+T =15)	Unit-6.0 Principal Stresses and Strains	
1	2	Multi load situations and need of estimating principal stresses.	LE6.1 Measure principal stresses and strains in a beam made of aluminum and loaded as a cantilever, and compare them with theoretical values using 'Principal stress and strain. Apparatus.
2	4	Definition of principal plane and principal stresses. Expression for normal and tangential stress, maximum shear stress.	
3	2	Stresses on inclined planes.	
4	3	Position of principal planes and planes of maximum shear	

5	4	Graphical solution using Mohr's circle of Stresses.	
	(Approx. Hrs: L+P+T =10)	Unit-7.0 Buckling stresses in Columns and Struts type components	
1	2	Column and Strut , Short and Long Column.	LE7.1 Measure the buckling load of three different slenderness ratio long columns of same lengths using 'Behaviour of column and struts' apparatus.
2	3	End Condition of Column, Effective Length of Column. and Modes of Failure in column.	
3	2	Radius of Gyration , Slenderness Ratio. Euler's Crippling Load and its application.	
4	3	Rankin's load /Buckling Load and its application in screw of screw jack.	
	(Approx. Hrs: L+P+T =10)	Unit-8.0 Torsion of Shaft	
1	3	Torsion, Angle of Twist, Polar Moment of Inertia, Torsional Rigidity.	LE8.1 Perform the torsion test on MS wire/ Rod using 'Torsion of Bar' apparatus. LE8.2 Determine modulus of rigidity by conducting Torsion Test on MS (Part I) as per IS 1717
2	2	Formula of Torsional Stress.	
3	5	Formula for Power Transmitted/Consumed for shaft, spindle and axle of solid and hollow sections subjected to Torsion.	



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Name of the faculty :- Mr. AMAR XALXO

Semester :- 3rd

Subject :- Thermal Engineering (2037373(037))

Lesson Plan Duration (CL+LI+SL) :- 80 Hrs (Nov- Dec. 2024)

S. No.	No. Of Periods	Topic Name	Practical
	(Approx. Hrs: CI+ LI =20)	Unit-1.0 Basics Concepts of thermodynamics	
1	3	Basic Concepts -Definition and importance of Thermodynamics ,Thermodynamic systems, Thermodynamic properties ,Work, heat and energy, Thermodynamic equilibrium, Quasi-static process, work done during Quasi-static process, Zeroth law of Thermodynamics	LE1.1 Determine the rise in temperature of air due to external work using an air compressor test rig. LE1.2 Determine the coefficient of performance of heat pump.
2	2	First law of thermodynamics –First law of thermodynamics and its applications, Steady flow energy equation and its applications to boiler, engine, turbine, compressor and nozzle	
3	3	Thermodynamic processes and representation on P-V and T-S diagram, Simple Numerical problem on first law of thermodynamics	
4	2	Concept of heat pump Refrigerating effect, Units of refrigeration, COP, Reversed Carnot cycle and its representation on PV and TS diagram	
5	7	Second Law of Thermodynamics -Limitations of First law of thermodynamics, Second law of thermodynamics: Kelvin Planck's and Clausius statements, Heat reservoir, Heat source and Heat sink, Concept of heat engine, heat pump and refrigerator, Carnot cycle Thermal Efficiency, Coefficient of performance, Parameters affecting thermal efficiency, Means of increasing efficiency, Thermodynamically reversible and irreversible processes. Factors that makes a process irreversible.	
6	3	Entropy- Clausius inequality, concept of Entropy, Principle of increase of entropy, T-S and H-S diagrams computation of change in entropy	
	(CL-15,LI-5)		



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	(Approx. Hrs: CI+ LI =14)	Unit-2.0 Air Standard Cycles and internal combustion engines	
1	5	2.1 Air standard cycles-definition and its purpose, Otto, Diesel cycles, their representation on PV & TS diagrams, Derivation of air standard efficiency and their comparison and limitation	LE2.2 Determine the BP of four strokes Petrol engines using brake dynamometer. LE2.3 Perform load test on 2 stroke petrol engine.
2	5	Internal Combustion engines Introduction and classification of IC engine, I.C. engine components and their function, Working of two-stroke and four stroke cycle engines and their comparison,	
3	4	Indicator diagram, calculation of IP, BP, FP, Thermal Efficiency, Mechanical efficiency and relative efficiency, Pollution from IC engines and emission norms	
	(CL-10,LI-4)		
	(Approx. Hrs: CI+ LI =10)	Unit-3.0 Pure substances	
1	3	3.1 Pure substance, phase, phase changes, steam as a two phase system, bsteam formation and its representation on the enthalpy plane	LE3.1 Determine the dryness fraction of given sample of steam using separating and throttling calorimeter LE3.2 Plot the steam properties on h-s diagram (Mollier diagram) for a given sample of steam.
2	3	Representation of wet, dry and saturated and superheated steam on P-V, T-S and H-S planes, Dryness fraction of steam	
3	2	Simple calculations on quality of steam using Steam table	
4	2	Safety precautions in handling steam.	
	(CL-7,LI-3)		
	(Approx. Hrs: CI+ LI =11)	Unit-4.0 Ideal Gases and Ideal Gas Processes	
1	5	Avogadro's law, Derivation of characteristic gas equation using Boyle's and Charle's law, characteristic gas constant and universal gas constant. , simple numerical problems based on above	LE4.1 Determine the characteristic Gas constant of commonly used gases from given data.
2	6	Ideal gas processes – Isobaric, Isochoric, Isothermal, Isentropic, Polytropic, Throttling and their representation on P-V and T-S diagrams, determination of work, heat, internal	



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		energy, enthalpy change and entropy change.	
	(CL-7,LI-4)		
	(Approx. Hrs: CI+LI = 12)	Unit-5.0 Air Compressors	
1	4	Basics of compression , industrial uses of compressed air	LE5.1 Determine the performance parameters of a Reciprocating Compressor/Centrifugal compressor.
2	6	Classification of compressors, Description of Reciprocating compressor and Centrifugal compressor, Work done in single stage reciprocating compressor, Volumetric, Isothermal and Isentropic efficiencies of reciprocating air compressor	LE 5.2 Determine the capacity of the given reciprocating air compressor..
		Multistage compression and inter cooling and advantages. Safety precautions in handling compressed air.	.
	(Approx. Hrs: CI+LI = 13)	Unit-6.0 Heat Transfer	
1	2	Modes of heat transfer Conduction, convection and radiation. Terms related to heat transfer - thermal conductivity, Heat transfer coefficient , thermal diffusivity , heat flux, thermal resistance	LE6.1 Determine Thermal conductivity of a solid metallic rod/plate. LE6.2 Determine thermal conductivity of a given insulating powder.
2	1	Conduction-Fourier's law of heat conduction, temperature gradient,	
3	2	Determination of heat transfer across a flat plate through conduction, engineering applications/examples.	LE6.3 Determine the value of Stefan- Boltzmann constant for radiation
4	3	Convection- Newton's law of cooling, natural and forced convection, engineering applications/examples. Radiation- Stefan-Boltzmann law of thermal radiation, absorptivity, reflectivity, transmissivity, emissivity, Black body, Grey body, Emissive power, shape factor, engineering applications/examples.	
5	5	Heat Exchangers - Classification, construction and working of shell and tube, shell and coil, pipe in pipe type & plate type heat exchanger and their applications.	
	(CL-9,LI-4)		



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DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

SESSION: NOV - DEC 2024

Name of Faculty: Rakesh Kumar Ray

Subject: Machine Drawing and Computer Aided Drafting

Subject Code: 2037374(037)

Semester: Diploma 3rd Sem

Text Books	Machine Drawing: Bhatt N.D., Panchal V.M.
	Machine Drawing: R. K. Dhawan

Ref. Books	Machine Drawing including Auto Cad: Ajeet Singh
	Engineering Drawing: Bhatt N.D.

TOTAL CLASS SCHEDULED:	60
TOTAL CLASS TAKEN:	65

Faculty Signature (Rakesh Kumar Ray)

HOD Signature

Principal
Govt. Co-Ed Polytechnic
Jagdalpur, Adawal

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT-1 Intersection of Solids		
1	1	Curves of intersection of surfaces of the regular solids	1.10.2024 - 12.10.2024	
2		Prism with prism (Triangular and square)		
3		Cylinder with cylinder		
4		Cylinder with cylinder		
5		Square Prism with Cylinder		
6		Square Prism with Cylinder		
7		Cylinder with Cone		
8		Cylinder with Cone		

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT-2 Development of surfaces		
9	2	Introduction Development of Lateral surfaces of objects.	13.10.2024 - 25.10.2024	
10		Development of Lateral surfaces of cylinder		
11		Development of Lateral surfaces of cylinder		
12		Development of Lateral surfaces of cone		
13		Development of Lateral surfaces of cone		
14		Development of Lateral surfaces of pyramids		
15		Development of Lateral surfaces of pyramids		
16		Development of Lateral surfaces and their applications such as funnel, Chimney, pipe bend		

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT-3 Conventional Representations		
17	3	Introduction Standard convention as per BIS [SP – 46 (1988)]	26.10.2024 - 5.11.2024	
18		Materials- C.I., M.S, Brass, Bronze, Aluminium, wood, Glass, Concrete and Rubber		
19		Ball and Roller Bearings, Pipe joints, cocks, valves.		
20		Internal / external threads, Knurling, Serrated shafts, splined shafts, and keys and key ways		
21		Springs with square and flat ends Gears, sprocket wheel, chain wheels		
22		Countersunk & counter bored holes, Tapers		

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT-4 Limits-fits-tolerance, surface finish and welding symbols in Production drawing		
23	4	Limits, fits and tolerances: Definitions	6.11.2024 - 17.11.2024	
24		Introduction to ISO system of tolerances - unilateral and bilateral tolerance, its representation on drawing.		
25		dimensional tolerances, elements of interchangeable system, hole & shaft base systems, tolerance diagram.		
26		Selection of fit (clearance, transition and interference) for engineering applications.		
27		Geometrical tolerances: Definitions		
28		Tolerances of form and position and its geometric representation-tolerance frame, datum feature.		
29		magnitude of tolerance and symbol, interpretation of a given symbol on drawing, simple examples.		
30		General welding symbols, length and size of weld		
31		surface contour and finish of weld, all round and site weld.		
32		symbolic representation in Engineering practices and its interpretation.		
33		Characteristics of surface roughness Indication of machining symbol showing direction of lay.		
34		roughness grades, machining allowances, manufacturing methods, using ISO code.		
35		Relation of surface roughness values with manufacturing processes.		

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT-5 Assembly to Detail drawing		
36	5	Introduction, types of assembly drawing, accepted norms to be observed for assembly drawings.	18.11.2024 - 30.11.2024	
37		sequence for preparing assembly drawing.		
38		Bill of Material.		
39		Exploded view of Flange coupling		
40		Exploded view of Bushed Bearing		
41		Exploded view of Plummer Block		
42		Exploded view of Lathe Square Tool Post		
43		Exploded view of Knuckle Joint		
44		Exploded view of Cast Iron Pulley		

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT- 6 Assembly to Detail		
45	6	Introduction, types of assembly drawing, accepted norms to be observed for assembly drawings.	1.12.2024 - 15.12.2024	
46		sequence for preparing assembly drawing.		
47		Bill of Material.		
48		Flange coupling		
49		Plummer Block		
50		Lathe Square Tool Post		
51		Knuckle Joint		
52		Cast Iron Pulley		

LECT. NO.	UNIT NO.	TOPIC TO BE COVERED	DATE OF LECTURE	REMARKS
		UNIT- 7 Isometric and Orthographic Sectional views.		
53	7	Recall Isometric and orthographic projections.	16.12.2024 - 30.12.2024	
54		Conversion of pictorial view into Orthographic views.		
55		Conversion of orthographic views into isometric View/projection.		
56		Need for sectional views, Cutting plane and line.		
57		Sectioning conventions and section lines.		
58		Types of sections: Full, Half, Broken, Removed, Revolved and Offset.		
59		Recall AutoCAD Draw, Modify, Edit and Plot commands.		
60		Isometric and Orthogonal drawings using any computer aided drafting software (AutoCAD).		

GOVERNMENT CO-ED POLYTECHNIC JAGDALPUR

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Course- Material Technology

Course Instructor – SHAILESH SIDAR

Semester - 3

TOPIC	NO. OF PERIODS (HOURS)
Unit-1.0 Properties and Structure of Engineering Materials	10
1.1 Classification of engineering materials –Metals and Non-metals	01
1.2 Properties of engineering materials Physical, Thermal, Electrical, Magnetic and Mechanical properties	01
1.3 Structure of crystalline solids: Concept of Amorphous and crystalline structure, Crystallization of liquid into solid state, nucleation and growth, formation of polycrystalline and single crystals, effect of grain size on material properties.	02
1.4 Crystal Structure – space lattice, unit cell, BCC, FCC, HCP lattice	02
1.5 Structural imperfections: impurity atoms, point imperfection, line imperfection, dislocations, surface imperfection, volume defects	02
1.6 Metallurgical microscope, its use and care	02
Unit-2.0 Plastic deformation	13
2.1 Elastic and Plastic deformation	02
2.2 Mechanisms of deformation in crystalline materials – Slip and Twinning	02
2.3 Stress – Strain curves for polycrystalline materials	02
2.4 Yield point phenomena	03
2.5 Strain hardening	02
2.6 Recovery, recrystallisation and grain growth	02
Unit-3.0 Phase diagrams	13
3.1 Concept, definitions and need	02
3.2 Solid Solution – Types	01
3.3 Alloy – need for alloying, effect on material properties	02
3.4 Cooling curves and their importance.	02
3.5 Types of phase equilibrium diagram - monotectic, Eutectic, Hyper eutectic, hypoeutectic, eutectoid, Hyper andHypo eutectoid, peritectic and peritectoid system.	02
3.6 Iron-carbon equilibrium diagram: Development of iron-carbon system, Allotropic transformations in Iron and Steel	02
3.7 Microstructure examination: Preparation of microspecimen, selecting the specimen, grinding and polishing, Etching and etching reagents. use and care of microscope	02
Unit-4.0 Metallic Materials	10
Micro- Structure, Properties and application, designation and coding methods of:	03
4.1 Cast Iron: Gray,White, Malleable, Nodular Cast iron.	
4.2 Steels: Low, medium and high carbon steels, Stainless steel, High speed steel, Tool steel, Alloy steels	04
4.3 Copper, Aluminum, Zinc and their alloys, Bearing materials, Alloying elements	03

Unit-5.0 Non-metallic Materials	10
5.1 Polymers: Types, properties and industrial applications	03
5.2 Ceramic and refractory: Types, properties and applications	02
5.3 Composites: types, properties and applications.	02
5.4 Nano and Smart materials: Definition, types - piezoelectric, thermoresponsive, shape memory alloys, polychromic, chromogenic or halochromic materials, Applications	03
Unit-6.0 Heat treatment of Steels	
6.1 Introduction, purpose and advantage of heat treatment	02
6.2 TTT Curve: Significance and construction of TTT curve for eutectoid steel	02
6.3 Introduction to Pearlitic, Bainitic and Martensitic Transformation	03
6.4 Heat treatment processes: Annealing, Normalizing, Hardening, Tempering, Surface and Case hardening	03
6.5 Heat treatment furnaces: Muffle furnace, Box type furnace	03
Unit-7.0 Testing of Materials	
7.1 Destructive and nondestructive testing	03
7.2 Destructive testing - Hardness test (Brinell, Rockwell and Vickers)	04
7.3 Non-destructive testing – Magnetic particle crack detection test, Dye penetration test, Ultrasonic test, Radiography test, Eddy current testing	04

No. of Periods (Hours): 80
