Shri Rawatpura Sarkar University, Raipur

Examination Scheme & Syllabus

for

Diploma in Mechanical Engineering

Semester-III

(Effective from the session: 2022-23)

SHRI RAWATPURA SARKAR UNIVERSITY, RAIPUR, CHHATTISGARH
FACULTY OF ENGINEERING

Three Years Diploma Programmme
Scheme of Teaching and Examination
Diploma Third Semester Mechanical Engineering
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the session: 2022-23)

S.N	Course Code	Course Title	Hours per week			Credit	Examination Scheme			Sem End Exam Duration (Hrs)
			L	T	P		Continuous Evaluation	Sem End Exam	Total	
1.	DENME301T	Machine Drawing	3	1	-	4	**30**	**70**	**100**	**3**
2.	DENME301P	Machine Drawing Lab	-	-	4	2	**15**	**35**	**50**	**-**
3.	DENME302T	Strength of Material	3	1	-	4	**30**	**70**	**100**	**3**
4.	DENME302P	Strength of Material Lab	-	-	4	2	**15**	**35**	**50**	**-**
5.	DENME303T	Thermal Engineering	3	1	-	4	**30**	**70**	**100**	**3**
6.	DENME303P	Thermal Engineering-Lab	-	-	4	2	**15**	**35**	**50**	**-**
7.	DENME304T	Basic Electrical & Electronics	3	1	-	4	**30**	**70**	**100**	**3**
8.	DENME304P	Basic Electrical & Electronics-Lab	-	-	4	2	**15**	**35**	**50**	**-**
9.	DENME305T	Industrial Engineering	3	1	-	4	**30**	**70**	**100**	**3**
						28			**700**	

Diploma in Mechanical Engineering
Semester-III
2022-23

Course Title	**MACHINE DRAWING**				
Course Code	**DENME301T**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	engineering drawing geometry etc.				
Course Objectives	**This course will enable students to**: - • The purpose of this subject is to introduce concepts of general machine drawing • The students of mechanical engineering to make them aware of the fundamental principles, concepts involve in shaping, designing, drafting and deformation.				
Course Contents	**UNIT–I** **Projection and Multi-View Representation** Projection, orthographic projection. First and Third Angle Projection, Superfluous view, choice of views, Auxiliary views-full and partial Conversion of pictorial views into orthographic views Conventional representation as per IS 696. **Sectional Views**: Full section, half section, partial or broken section, revolved sections, removed section, offse Section. Sectioning conventions, section lines. Hatching Procedure for different materials as per IS code 689-1972. Sectional views of assembled parts choosing from IC engine such as steam engine parts, valves, Couplings, clutches, brackets, bearings etc. (use 1st and 3rd angle projections both.) **UNIT–II** **Dimensioning, Tolerancing, Machining And Welding Symbols** Types of dimension (size and location) Dimensioning terms and notation (use of I.S. code 696 and 2709) General rules for dimensioning and practical hints on dimensioning, systems of dimensioning Dimensioning of cylinder, holes, arcs of circle, narrow space, angles, counter sunk hole, screw thread, taper etc. , Application of tolerances (use I.S. code 696), machining marks, finish marks, counter sunk, counter boring, spot facing and figures. Representation of characteristics machining (circularity, angularity etc.) (Refer I.S. 696) , Representation of welding joints, welding symbols, tolerance of forms and position. Procedure of drawing fits, limits, size, tolerance, etc. **UNIT–III** **Production Drawing And Pipe Drafting** Detailed drawing, Assembly drawing, scale, finish, tolerances, procedures, notes				

	etc. Title block, tool list, gauge list, style list, parts list zoning, Preparation of production drawing for pattern shop, forging shop, machine shop Preparation of assembly drawing from detailed drawing. Exploded views, sectional pictorial views. Assembly drawing of Plummer block, flange coupling, stepped pulleys, foot step bearing, universal coupling, stuffing box, eccentric of steam engine, connecting rod, piston of I.C. engine, stop valves, feed check valves, dead weight safety valve for boiler, cross heads. Preparation of detailed drawing from assembly drawings and assembled pictorial views, interpretation of production drawings. Various symbols used in pipe line work as per IS code of practice, C.I. flanged joint, socket and spigot joint, gland and stuffing box, expansion joint, pipe fittings, typical pipe bends, pipe supports and accessories. **UNIT–IV** **Gear Drawing** Gear terminology such as pitch, pitch circle diameter, module, addendum, root circle diameter, whole depth, blank diameter. Construction of cycloid, involutes teeth-profiles Pinion and rack meshing, spur gear meshing. Re-production and Preservation of Drawings, Graphs and Charts Tracing, Blue printing, Brown print, white print, ammonia printing, xerography, photographic reproduction, micro films. Indexing, folding and codification methods. (Use IS code of practice 696 – 1972).Quantitative and qualitative charts and graphs. Making titles, legends, notes etc. Procedure for making a Graphical Representation in Ink. Logarithmic Graphs, Semi logarithmic Graphs, Bar charts, Area (percentage) charts, Pie Chart, Polar charts, Trainer chart, Pictorial chart, Alignment charts (Nomo graphs)- Forms and construction, construction of functional scale, parallel scale charts for equations of the Form Three-scale alignment chart, Graphical construction of a z-chart, Four variable Relationship parallel scale Alignment chart. **UNIT–V** **Computer Graphics** Introduction to computer graphics geometric modeling - Types of commands Methods of Representing objects in geometric modeling. Automatic Drafting-Generating hard copy engineering drawing direct form CAD base Graphic features of CAD helpful in automatic drafting. Graphic terminal and other hardware for computer graphics their function and use. Types of graphic terminals. Input devices – cursor control, input functions, digitizer, keyboard, terminals. Plotters and other output devices - Familiar with a set of commands for generating simple orthographic views.
Course outcomes	**At the End of this course, students are able to -** • Understand Technical Graphics is used to communicate the necessary technical information required for manufacture and assembly of machine components. • Understand and apply national and international standards while drawing machine component. To understand the concept of various tolerances and fits used for component design

Text Books	1. Elements of Machine Drawing N.D.Bhatt. Anand Charotkar 2. Machine Drawing R.K.Dhawan, S. Chand 3. Fundamentals of Engineering Drawing Warren J Luzadder (Prentice-Hall)
Reference Books	1. Mechanical Drawing Gie secke, Michell Specer, Hill (Collier Macmillan Internal Edition) 2. Engineering Graphics. Giesecke/Mitchell/Spencer/Hill/Loving (Macmillan)

Course Title	**STRENTH OF MATERIAL**				
Course Code	**DENME302T**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	basics of engineering mechanics etc				
Course Objectives	**This course will enable students to:-** • Understand the effects of loads on any part to predict about the strength, reliability and durability of a component. • Machine parts are subjected to various types of loads resulting in development of stresses and strains. If, these stresses and strains are allowed to develop. • The knowledge is very essential for those who are engaged in Design, Maintenance, shop floor, Inspection, quality control and production departments. • This course includes the study of behavior of Engineering materials and stresses produced due to various types of loading system.				
Course Contents	**UNIT–I** **Simple Stress And Strain** Introduction, Types of loads and deformation, Types of stresses and strains, Hooke's law, stress-strain diagram for ferrous and non-ferrous materials, Modulus of elasticity (E) & rigidity (G), Bulk modulus (K) of materials, Stresses in Bars of varying cross sections, composite sections, Thermal stresses and strains, thermal stresses in composite sections, Poisson's ratio, volumetric strain, Relation between E, G and K, Strain energy, Resilience, Proof resilience, Modulus of resilience, Suddenly applied loads and Impact loads. Mechanical Properties of Materials Definitions of various mechanical properties. Types of tests - destructive and non-destructive tests. Tensile test, Compression test, Bending test, Shear test, Hardness test, Impacts test, Fatigue test. **UNIT–II** **Shear Force & Bending Moment Diagram** Definitions, types of loading, types of beams, Shear force and bending moment, sign conventions, S.F. and B.M. diagrams for Cantilever, Simply supported and subjected to Point loads, Uniformly distributed loads and Combination of these loads Point of centraflexure, numerical problems on above. Bending Stresses in				

	Beams Theory of simple bending, assumptions made in simple bending theory, Position of Neutral axis and neutral surface, Moment of resistance, Section Modulus of symmetrical sections such as rectangular, circular & I- sections, Bending stresses in symmetrical section and simple problems, Beam of uniform strength. **UNIT–III** **Shear Stress In Beam** Introduction, Shear stress equation, assumptions made, Distribution of shear stresses over various sections, such as rectangular, circular, I, L & T sections, Simple numerical problems. Deflection of Beams: Introduction, Strength and Stiffness of a beam, Curvature of a bent beam, Derivation of equation for slope and deflections of beam in case of cantilever & simply supported beam loaded with point loads, UDL Simple numerical problems, Importance of deflection and practical applications. **UNIT–IV** **Torsion of Shaft** Definition of torsion, Relation between stress, strain and angle of twist, Assumptions made, Strength of solid and hollow circular shafts, polar moment of inertia, Calculation of shaft diameter on the basis of strength and stiffness for given power transmitted, Torsional Rigidity, Maximum torque comparison of solid and hollow shaft, Size of shaft for a given torque. Springs- Definition, types and use of springs, Spring classification based on size, shape and load-leaf spring, helical and spiral spring, Stiffness of a spring and maximum Shear stress. **UNIT–V** **Columns And Strut** Definition, Crippling load, different end conditions, Slenderness ratio, equivalent length, radius of gyration, Euler's theory, Limitation of Euler's formula, Rankine's formula, Rankine constant, for different materials, Simple problems & D.T.S. code for columns. Stresses in Frames, Thin Pressure Vessels: Definition of frame, perfect, deficient and redundant frames, Assumptions made in finding stresses in members, Bows notation, solution of problems using threes methods, Cylindrical and spherical vessels subjected to internal pressure, Hoop stress, longitudinal, Stress, Volumetric strain, change in volume.
Course Outcomes	**At the End of this course, students are able to -** • Understood the properties of Engineering Materials. • They can find how to load distributed and where we can use different type of load for engineering applications.

Text Books	1. Strength of materials B.C. Punamia 2. Strength of materials R.S. Khurmi 3. Strength of materials Sadhu Singh 4. Strength of materials K.D. Saxena 5. Strength of materials S. Ramamurutham 6. Strength of materials I.B. Prasad
Reference Books	1. Strength of materials Timoshenko & Young 2. Laboratory Experiments in Strength of materials B.P. Sharma. 3. Testing of Metallic materials by Surya Narayan.

<table>
<tr><td>Course Title</td><td colspan="5">THERMAL ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="5">DENME303T</td></tr>
<tr><td rowspan="2">Course Credits</td><td>L</td><td>T</td><td>P</td><td>TC</td><td></td></tr>
<tr><td>3</td><td>1</td><td>-</td><td>4</td><td></td></tr>
<tr><td>Prerequisites</td><td colspan="5">basic science & thermal chemistry etc</td></tr>
<tr><td>Course Objectives</td><td colspan="5">This course will enable students to:-
Thermal Engineering incorporates the basic principles of thermodynamics and its application.
Mechanical engineers and have wide application in industries and power plants.
It plays foundation for other important courses to be taught later to the Mechanical Engineering students.
Its principles are used in the designing of energy converting devices such as Steam engines, Internal combustion engines, Steam and Gas turbines, Non-conventional energy resource, Air- conditioning, Heat transfer and Nuclear plants.</td></tr>
<tr><td>Course Contents</td><td colspan="5">UNIT–I
Basic Concepts of Thermodynamics
Definition and importance of Thermodynamics. Thermodynamic system open, close and isolated system, Boundary and surrounding. Forms of energy. Point and path functions Properties of system, intensive and extensive properties, definition of work, Heat and work as energies in transitions Thermal, mechanical, chemical and thermodynamic equilibrium.Quasi-static process, work done during Quasi-static process. Definition of an ideal gas, gas law, characteristics, gas equation, specific and universal gas constant, specific heat at constant pressure and constant volume. First Law of Thermodynamics Concept of heat reservoir, Heat source and heat sink Statement of first law-mathematical representation Application of first law to open and closed system. Steady flow energy equation and its application such as Boiler, Nozzle, Turbine, Compressor Enthalpy. Ideal gas processes-isobaric, isochoric, isothermal, adiabatic, polytrophic, and throttling process as applied to open and close system, representation of these processes on P-V & T-S diagram. Computation of net heat transfer and work done and enthalpy.
UNIT–II
Second Law of Thermodynamics</td></tr>
</table>

Limitations of First law. Statement of second law-Kelvin plank's and clausius Statements Concept of heat pump, refrigerator and heat engine Thermal Efficiency, Parameters affecting Thermal efficiency, Means of increasing efficiency Equivalence of Kelvin Planck and clausius statements. Thermodynamics reversible and irreversible processes. Factors that makes a process irreversible. Reversible cycle, Carnot cycle, its efficiency and limitations, Carnot theorem, claussius inequality, concept of Entropy, Principle of increase of entropy, determination of increase of entropy.: Thermodynamics Cycles Air-Standard cycles-definition and its purpose Carnot, Otto, Diesel and Dual cycles their representation on P.V & T.S. diagrams. Derivation of air standard efficiency and their comparison and limitation.

UNIT–III

Two Phase System

Pure substance, phase, phase changes, steam as a two phase system, steam formation and its representation on the enthalpy plane, properties changes, Representation of wet, dry and saturated and superheated steam on PV,T-S and h-s planes. Dryness fraction of steam, methods of determination of dryness fraction-separating and throttling calorimeter. Use of steam tables and Mollier's diagram. Determination of change in properties such as entropy, enthalpy, internal energy and work and heat transfer in the following processes-Isobaric, Isochoric, Isothermal, Isentropic, Polytrophic, Throttling etc. Representation of various processes on p-v, T-s and H-s planes. Rankine cycle-modified Rankine cycle – their representation on P.V., T.S. and H.S. planes Derivation of Expression for thermal efficiency.

UNIT–IV

Steam Generators

Definition, classification Working of Babcock and Wilcox boiler and Lancashire boiler Mountings and accessories. Steam Turbine Classification, working principle Difference between impulse and reaction turbine Compounding of steam turbine, velocity diagram (introductory) and its use. Governing of steam turbine.

UNIT–V

Internal Combustion Engines

Introduction, classification I.C. engine components and their function Working of two-stroke and four stroke cycle engines and their comparison. Indicator diagram, calculation of IHP, BHP, Thermal Efficiency, Mechanical efficiency and relative efficiency Governing and lubrication of I.C. engines. Air Compressors Industrial uses of compressed air Classification of compressors and their field of application Description of reciprocating compressor Work done in

	single stage reciprocating compressor Volumetric, Isothermal and Isentropic efficiencies of reciprocating air compressor. Advantages of isothermal compression. Multistage compression and its advantages Inter cooling necessity and advantages. Heat Transfer Modes of heat transfer Fourier's law of heat conduction, temperature gradient Expression for determination of heat transfer across a flat plate, thermal conductivity and thermal Resistance Newton's law for heat transfer by convection, Free and Forced Convection Heat transfer by radiation, Stefan- Boltz man law of thermal radiation Define the terms- absorptivity, refractivity and transmissivity, Black body, Emissive power, Grey body.
Course Outcomes	**At the End of this course, students are able to -** • Do effective work in industries. • Work In these subject cover all modes of heat transfer and how to applicable in power factory.
Text Books	1. Thermal Engineering P.L. Ballancy - Khanna Publisher's 2. A Course in Thermodynamics and Heat Engines Kothanandran, Khajuria and arrora. 3. Thermodynamics and heat Engines - Vol-I R Yadav, Central Book Depot, Allahabad.
Reference Books	1. Thermal Engineering – Vol-I & II R.K.Kapoor, Tata McGraw Hill Thermodynamics V.M.Domkundwar, Dhanpat Rai & Sons 2. I.S. 2986 – 1966 BIS, New Delh 3. Engineering Thermodynamics P.K.Nag, TMH

Course Title	**BASIC ELECTRICAL & ELECTRONICS**				
Course Code	**DENME304T**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	basic electrical & electronics engineering				
Course Objectives	**This course will enable students to** : • A Mechanical Engineering Diploma in his job in industry has to interact with many electrical and electronic gadgets in operation of various machine tools. • Machine control system and basic knowledge about electrical and electronics engineering relevant to his job requirement of operation and maintenance in industry will give him a new confidence to perform his job efficiently.				
Course Contents	**UNIT–I** **D.C. Circuit &machine** Concept of Electrical Engineering – Electrical Phenomena and their causes, electrical current, potential and voltage Methods of voltage generation, type of voltage and voltage measurement, Types of current, effect of electric current, current measurement Power resistance, D.C Circuit, Kirchhoffs' Law, Resistance law. Constructional feature of D.C Machine, Significance of e.m.f., and e.m.f. equation Characteristics of D.C series and shunt motors, Application of D.C. motor Method of speed control of D.C Motor, D.C. Motor starter and efficiency of D.C. Motor D.C. Generators Construction, working principle and types of D.C. Generators. **UNIT–II** **A.C. Fundamental** A.C Circuit, A.C Circuit wave forms, Root Mean Square (RMS) value, Average Value, Power in A.C. Circuits and Power Factor RLC in A.C Circuit-series R-L-C circuit, & parallel AC circuit. Three Phase A.C. System Phase /Star and Delta connection Different types of AC supply Different method for three phase power mmt., two watt meter method. **UNIT–III** **Transformer** Construction of Transformer, its working principle and types Efficiency of transformer, Transformer ration and e.m.f. equation Transformer Testing - Open circuit test and short circuit test. Three phase A.C Machine Constructional				

	Feature of Induction Motor Types of induction motor - Cage type and slip ring type 3 phase Slipping induction motor and its application Alternator, Synchronous Motor - Constructional and their Working Principle. **UNIT–IV** **Single Phase Motor** Working principle and operation Single Phase Capacitor Start, Capacitor run Motor, Shaded Pole Motor & Universal motor Application of motors. Electrical Measuring Instruments Working principle of moving iron and moving coil meter Commonly used electrical measuring instruments (Ammeter, voltmeter, wattmeter and Energy meter) their working principle and constructional features Dynamometer instruments. Multi meter. **UNIT–V** **Semi-Conductor Devices** Semiconductor Device –pn junction, diode, transistor, SCR, and their application. Amplifier action of transistor, S.C.R and its application. Rectifier & filters Controlled and uncontrolled rectification (H.W. F.W.), Bridge rectifier. Filters and power supply.
Course Outcomes	**At the End of this course, students are able -** • To get an insight about the basic introduction of Digital electronics. • To analysis of Resistive Circuits and Solution of resistive circuits with independent sources. • Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits.
Text Books	1. Electrical Technology B.L Therja 2. Electrical Technology S.L Uppal, Khanna Publisher 3. Electrical measurement J.BGupta Dhanpat Rai & Sons Publisher 4. Elementary electrical engineering H. Pratab.
Reference Books	1. Electrical Machine S.K Bhattacharya (Tata Mc Hill) 2. Basic electronics S.K Bhattacharya (Tata Mc Hill) 3. Electronic Devices V.K. Mehta 4. Electrical Machines Nagrath & Kothari.

Course Title	**INDUSTRIAL ENGINEERING**				
Course Code	**DENME305T**				
Course Credits	**L**	**T**	**P**	**TC**	
	3	**1**	**-**	**4**	
Prerequisites	basic science & commerce				
Course Objectives	**This course will enable students to:-** • Industrial Engineering, which can significantly contribute towards the cost saving and help in increasing the productivity of an industry. • Adequate opportunities have been planned for the technician to apply theory to solve practical/simulated industrial problems. • The course is kept with a view to appreciate the changes and alternation proposed by Industrial Engineering for shop floor methods and processes.				
Course Contents	**UNIT–I** **Productivity and Work Study** Definition of Industry and Industrial Engineering, Scope and role of industrial engineering, fields of application, Production and productivity, Production systems and their impact on productivity, significance and benefits of higher productivity, Long term and short term factors affecting productivity, Productivity cycle, Aims, objectives and application of work study, Basic procedure and techniques of work study, Human factors in work study, Role of manager, supervisor and workers, Working conditions, environment of industry affecting work-study. Method Study Definition, objectives of method study, Basic procedures & Recording techniques of method study, Operation process chart, flow process chart, man-machine chart, Flow diagrams, String Diagrams, two hand process charts. **UNIT–II** **Motion Economy and Micro Motion Study** Meaning & basic rules of design of efficient work-place-layout, Classification of human body movements and their preferred order, Definition and objectives micro motion Study, Techniques of micro motion Study, Therbligs, their symbols & use, SIMO Chart and its application. Material Handling and Plant Layout: Importance and its effect on productivity, Requirements of good material handling system. Classification and selection of material handling equipment, Requirements of good layout, effect of bad layout, Factors affecting plant layout, Types of layout, Advantages and limitations of each type of layout,				

Selection of layout, factors affecting the plant location.

UNIT–III

Work Measurement

Definition, basic procedure and techniques of work measurement, Stop watch time study & its types, Factors considered in selecting a job for time study, Qualified and representative workers, Procedure of stop watch time study, Job element and their need of identification, General rules for breakdown of job into elements, Work cycle, methods of time measurement. Performance Rating and Work Sampling Performance rating, its meaning, standard rating, Rating of operators, Conditions for operators, Variation at work place, rating Scales, rating factors, calculation of basic time, Allowances-Purpose & types, Calculation of standard time using synthesis method- meaning, data, advantages and limitations, PMTS- Definition, principle and use, calculation of standard time. MTM- Meaning, tables and use, application of MTM analysis for LH-RH charts, Calculation of standard time, WORK/ACTIVITY SAMPLING- Definition, statistical basis determination of number of observations for given accuracy, sources of error, Application and calculation of standard time.

UNIT–IV

Job Evaluation, Wages and Incentives

Definition, need and scope of job evaluation, Job Evaluation systems and their comparative merits and demerits, Wage- Definition &components, Wage fixation, Real, Minimum and Fair wage, Financial and non-financial incentives and their examples, Wage plans-Halsey, Taylor, Differential plan, Gantt task and Bonus plan, 100% Premium plan. **Statistical Quality Control:** Definition of quality and total quality, Three stages of quality, quality control and SQC Difference between inspection and Quality control, Concept of variability natural variation, its importance to quality control, classification of quality characteristics, Basic tools of S.Q.C. and their applications, Frequency distribution, measures of central tendency and dispersion, their need and calculations, NORMAL CURVE: Definition, characteristics, calculation of area under normal curve.

UNIT–V

Control Charts For Variables & Attributes

statistical basic for control charts for variables, construction of x and r charts-their interpretation, use of x and r chart in establishment of process capability, limitation of x and r charts, meaning, use and advantages of attributes, calculation, construction, interpretation & application of p, c & p0 charts, need of calculating the revised values of mean, and control limits and their calculation. acceptance sampling and reliability meaning, different techniques of sampling, procedure involved, sampling, inspection -meaning and comparison with 100% inspection, factors affecting sampling and their effects,

	single and double sampling plans, use of is codes. o.c. curve : meaning, terms used, their definition, construction and use, selection of sampling plans, reliability: definition, quality control and reliability, factors affecting reliability of product, measure to ensure reliability of a product, effect of product reliability marketing, m.t.b.f. and m.t.t.f. – definition, programmed for reliability.
Course outcomes	**At the End of this course, students are able to know-** • Ability to apply mathematics, science, and engineering. • Ability to design and conduct experiments, as well as to analyze and interpret data. • Ability to identify, formulate, and solve engineering problems • Communicated effectively across disciplines and cultures to manage.
Text Books	1. Introduction to Industrial Engineering Phillip Hicks, McGraw Hills. 2. Productivity means property Asian Productivity Organization, Tokyo 3. Introductive to work study International labor office. 4. Work study M.D. Schmid & Subramaniam. 5. Motion & time study Ralph M. Barnes, John Willey, New York 6. Work study Dalela. 7. Wage Administration D.K. Roy, N.P.C. Pub. 8. Quality Assurance Engineering M.D. Schmid & Subramanian.
Reference Books	1. S.Q.C. E.L. Grant. 2. S.Q.C. R.C. Gupta. 3. Industrial Engineering & management O.P. Khanna. 4. Industrial Engineering Saxena. 5. Material handling Equipment N. Rudenki Place Pub. 6. Learning package in Industrial Engineering C.D.C., N.T.T.T.I. Bhopal 7. Laboratory manual Industrial Engineering

Diploma in Mechanical Engineering
Semester-III
2022-23

Course Title	**MACHINE DRAWING-LAB**				
Course Code	**DENME301P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	engineering drawing-lab				
Course Objectives	**This course will enable students:** • To introduce concepts of general Mechanical Engineering to the students of mining engineering • To make them aware of the fundamental principles, concepts involve in shaping, designing, transmission and deformation				
Course Contents	**LIST OF EXPERMENTS** 1. To be performed minimum ten experiments: 2. One Sheet on multi view representation. 3. Two sheets on sectional views of assembled parts on like I.C.engine parts and steam engine parts. 4. One sheet on welding symbols. 5. One sheet on dimensioning, limits and tolerance. 6. Two sheets on detailed drawing like drill jigs, fixtures, screw jack etc. 7. Two sheets on assembly drawing like flange coupling, stepped pulleys, foot step bearing, universalCoupling, etc. 8. One sheet on Pipe joints and pipe fittings. 9. Two sheet on production drawing from any of the following using CAD. 10. Hexagonal nut 11. Spur gear 12. Stepped pulley 13. Connecting rod				
Course Outcomes	**At the end of these experiments students will able to:** 1. Understand Machine Drawings, Principles of Drawings, Sectioning, Dimensioning, Limits, Fits and Tolerance, Symbols. 2. Conventional Representation, Screw Fasteners, Key Joints, Coupling and its Types, Riveted Joints, Welded Joints, Structural Applications. 3. Assembly Drawings, Production Drawings.				

Course Title	**STRENGTH OF MATERIAL- LAB**				
Course Code	**DENME302P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	fundamental of mechanical engineering				
Course Objectives	**These experiments will enable students:** • To develop intuitive understanding of the subject to present a wealth of real world engineering examples to give students a feel of how material science is useful in engineering practices.				
Course Contents	**LIST OF EXPERIMENTS** 1. To be performed minimum ten experiments: 2. Study and use of metallurgical microscope. 3. Preparation of micro specimen. 4. To study micro structural characteristics of gray cast Iron, white cast iron and malleable cast iron. 5. To study microstructure of carbon steel. 6. To study of effect of normalizing & annealing on the hardness and micro-structure of high carbon steel. 7. To study the effect of carbon and temperature on hardening of steel. 8. To study the effect of temperature & properties during tempering of steel. 9. To study the effect of quenching media on hardness of steel 10. To study the Carbonizing and hardening of steel. 11. To study Jommy Harden ability test and its industrial use. 12. To observe the micro structural characteristics and other properties of various cast irons and prepare a report there of for industrial use.				
Course Outcome	**At the end of these experiments, students are able to:** • Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms • Demonstrate understanding of various failure mechanisms of materials. • Interpret Iron-Iron carbide phase diagram, and different phases in				

	microstructures of materials at different conditions. • Select appropriate heat treatment process for specific applications. • Identify effect of alloying elements on properties of steels.

Course Title	**THERMAL ENGINEERING - LAB**				
Course Code	**DENME303P**				
Course Credits	**L**	**T**	**P**	**TC**	
		-	**4**	**2**	
Prerequisites	basic of thermal properties				
Course Objectives	**This experiment will enable students:** • It plays foundation for other important courses to be taught later to the Mechanical Engineering students • Its principles are used in the designing of energy converting devices such as Steam engines, Internal combustion engines, Steam and Gas turbines, Non-conventional energy resource, Air- conditioning, Heat transfer and Nuclear plants.				
Course Contents	**LIST OF EXPERIMENTS** 1. Study of Lancashire boiler. 2. Study of Babcock & Wilcox boiler 3. Study of separating and throttling calorimeter. 4. Study of steam Turbine. 5. Study of different types of I.C. Engines (Four stroke and two Stroke Engine) 6. Study of various systems of I.C. engines. 7. Study of Cooling System. 8. Study of Ignition system. 9. Study of Governing system. 10. Study of Lubrication system. 11. Study of Fuel pump. 12. Study of Fuel Injector. 13. Study of Carburetor. 14. Study of two stage reciprocating – air compressor.				
Course Outcomes	**The end of these experiments students will be able to:** • Apply the laws of thermodynamics to analyze and solve the problem related to				

	various thermal engineering systems. • To define the various power plant cycles. Describe the basic concept of heat transfer.

Course Title	**BASIC ELECTRICAL & ELECTRONICS-LAB**				
Course Code	**DENME304P**				
Course Credits	**L**	**T**	**P**	**TC**	
	-	**-**	**4**	**2**	
Prerequisites	basic electrical & electronics				
Course Objectives	**These experiments will enable students:** • A Mechanical Engineering Diploma in his job in industry has to interact with many electrical and electronic gadgets in operation of various machine tools. • Machine control system and basic knowledge about electrical and electronics engineering relevant to his job requirement of operation and maintenance in industry will give him a new confidence to perform his job efficiently.				
Course Contents	**LIST OF EXPERIMENTS** 1. Study of D.C machine 2. Study of D.C motor Starters 3. Speed control of D.C motor by (i.) Shunt field Control (ii.) armature voltage control 4. Study of Induction Motor Slip ring and Cage type 5. Connection of various measuring instrument of the motor circuit and measure A,V&W (Current, Voltage, & Power) 6. Study of a H.W&F.W rectifier and measure input/output voltage with the help of multi meter 7. Use of multi meter to be encouraged in all practical use for measurement of Resistance, Current, Voltage in AC & DC circuit 8. Study of Various electronic component /device. 9. Find out transformer ratio. 10. Verification of KCL. 11. Verification of KVL. 12. Perform open circuit Test &short circuit Test.				
Course Outcomes	**The end of this experiments students will be able to:** • Different meters and instruments for measurement of electrical quantities.				

	• Experimentally verify the basic circuit theorems. • Measure earth resistance and insulation resistance.