



# **First Year Curriculum**

**Admission Year 2026-27**

**Diploma Engineering  
Mechanical Engineering**

**Faculty of Engineering & Technology**

**Parul University**

**Vadodara, Gujarat, India**

## Semester 1

- a. **Course Name:** Elements of Mechanical Engineering
- b. **Course Code:** 03061901PC01
- c. **Prerequisite:** Basic understanding of science and mathematics concepts studied in secondary school.
- d. **Rationale:** This subject builds foundational knowledge of mechanical engineering components, processes, and systems used in industry and daily life.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the scope of mechanical engineering and identify basic mechanical components, hand tools, and power tools used in industries. Develop knowledge of specifications, functions, and applications of common engineering tools and components.
<b>CLOBJ 2</b>	Explain the working principles of belt, rope, chain, and gear drives along with couplings used in power transmission systems. Understand industrial safety norms, accident prevention methods, and transmission ratio calculations.
<b>CLOBJ 3</b>	Understand welding, casting, metal forming, and machining processes used in manufacturing industries. Develop knowledge of machine tools, machining operations, and safety precautions during workshop practices.
<b>CLOBJ 4</b>	Explain basic thermodynamic concepts, laws of thermodynamics, and properties of heat and energy systems. Understand the construction and working principles of petrol and diesel engines.
<b>CLOBJ 5</b>	Understand steam formation, steam properties, and the use of steam tables in engineering applications. Explain the construction, working, mountings, and accessories of various boilers.
<b>CLOBJ 6</b>	Explain the working principles of pumps, compressors, and hydraulic devices used in industries. Understand the applications of hydraulic and pneumatic systems in engineering operations.
<b>CLOBJ 7</b>	Understand the principles, classifications, and applications of material handling equipment used in industries. Develop the ability to select suitable equipment and identify common operational problems with remedies.

### f. Course Learning Outcomes:

<b>CLO 1</b>	Recognize and classify commonly used mechanical components (e.g., bolts, nuts, bearings, belts) by type, specification, and function.
<b>CLO 2</b>	Explain the importance and various modes of power transmission including belt, rope, chain, and gear drives
<b>CLO 3</b>	Describe different welding processes, machining operations, setups, and follow safety precautions during welding and machining.
<b>CLO 4</b>	State and explain the Zeroth and First Laws of Thermodynamics with practical relevance.
<b>CLO 5</b>	Explain the construction and working of boilers like Cochran, Lancashire, and Babcock & Wilcox.
<b>CLO 6</b>	Explain general properties of fluids and working principles of pumps and air compressors.
<b>CLO 7</b>	Explain the working principles and applications of hoisting, conveying, surface, overhead, earth-moving, and construction machinery

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	2	4	20	20	50	60	-	40

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Introduction</b> Introduction of mechanical engineering. Use of mechanical engineering: In day to day life, Interdisciplinary use. Items in general use- identification criteria, major types, specifications and uses : such as bolts, nuts, washers, bearings, bushes, belts, springs, levers, couplings, brakes, screws, rivets, keys' rings, oil seals, gears, pulleys, shafts, axles,etc. Hand and power tools: Types, specifications and uses of spanners. Types, specifications and uses of hand tools. Types, specifications and uses of power tools.	15	6
2	<b>Power Transmission &amp; Safety</b> Power transmission: Importance, Modes (belt drives, rope drives, chain drives and gear trains). Types of belts, Gear train-concept, transmission ratio, Applications. Types and applications of couplings in power transmission. Causes and remedies of general accidents in power transmission. Safety norms to be followed for preventing accidents and damage in power transmission. Safety norms to be followed in mechanical based industries.	15	6
3	<b>Processes On Material</b> Welding: Types, Working setup of arc and gas welding, Precautions and safety during arc and gas welding. Brazing and Soldering. Foundry: Concept, Process of casting, Applications. Other metal forming and cutting operations - bending, shearing-concept and applications. Basic machine tools: Working principle of lathe, drill and milling machines, Types of operations / jobs which can be performed on machine tools listed above.	15	6
4	<b>Fundamentals of Thermodynamics and Heat Engine</b> Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law. Heat Engine: IC Engine, Classification, Working principle of 2 stroke and 4 stroke Petrol and Diesel Engine.	20	10
5	<b>Properties of Steam and Steam Generation</b> Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and Dryness Fraction of Steam, Use of Steam Tables, Steam Calorimeters. Steam Generation: Introduction,	15	8

	Classification, Cochran, Lancashire and Babcock and Wilcox boiler, Functioning of Different Mountings and Accessories.		
<b>6</b>	<b>Hydraulic and Pneumatic Devices</b> General Properties of Fluids. Pump: Working principle, Types, Working of Centrifugal and Reciprocating pumps. Air Compressors: Types and Operation of Reciprocating and Rotary Air Compressors, Working Principle of Hydraulic Lift, Hydraulic Jack.	<b>10</b>	<b>5</b>
<b>7</b>	<b>Material Handling</b> Types, Principle Of Working And Applications Of Material Handling Equipment's, Hoisting Equipment's, Conveying Equipment's, Surface & Overhead Equipment's, Earth Moving Machineries, Construction Machineries. Criteria For Selection Of Material Handling Equipment's. Factors Affecting Selection Of Material Handling Equipment's. Selection Of Suitable Material Handling Equipment For The Given Situation. Common Troubles And Remedies.	<b>10</b>	<b>4</b>

**i. Text Book and Reference Book:**

1. Elements of Mechanical Engineering (TextBook) By P.S. Desai, S.B. Soni | Atul Prakashan
2. Basic Mechanical Engineering By M.P. Poonia & S.C. Sharma | Khanna Publishing House
3. Fundamental of Mechanical Engineering By G.S. Sawhney | PHI Publication, New Delhi | Third Edition, Pub. Year 2015
4. Elements of Mechanical Engineering (TextBook) By S.B. Mathur, S. Domkundwar | Dhanpat Rai & Sons Publications | Pub. Year 2013

**j. List of experiment:**

<b>Ex p. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	Demonstration of Different Types of Spanners, Hand Tools, and Power Tools.
<b>2</b>	Study and Demonstration of Different Belt Drives, Chain Drives, and Gear Trains.
<b>3</b>	Study and Demonstration of Different Types of Welding and Machine Tools.
<b>4</b>	Study and Demonstration of IC Engine Parts and Their Functions.
<b>5</b>	Study and Demonstration of Boilers.
<b>6</b>	Study about Boiler Mountings and Boiler Accessories.
<b>7</b>	Study and Demonstration of the Working Principle of Centrifugal and Reciprocating Pumps and Compressor.
<b>8</b>	Study of Different Types of Material Handling Equipment.
<b>9</b>	Activity Suggested by Lab Teacher.
<b>10</b>	Mini Project – Student Making Chart, Model, Presentation.

- a. **Course Name:** Mathematics - I  
 b. **Course Code:** 03069101BS01  
 c. **Prerequisite:** Students must be passed class 10th examination from a recognized board of education. Also, students has knowledge of basic concept studied till 10th standard.  
 d. **Rationale:** The goal of this Mathematics course is to give students a strong foundation in fundamental ideas and procedures that are essential for both everyday problem-solving and future education. This course aims to foster logical reasoning and critical thinking skills while covering subjects that are directly relevant to a variety of engineering, technology, business, and scientific domains.  
 e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the concept of logarithms and partial fractions for algebraic simplifications with examples
<b>CLOBJ 2</b>	Understand trigonometric functions and relationship between them with examples
<b>CLOBJ 3</b>	Solve the complex numbers in various forms like modulus-amplitude (polar) form, Exponential (Euler) form for engineering applications with examples
<b>CLOBJ 4</b>	Understand the concept of functions and limits with examples
<b>CLOBJ 5</b>	Understand concept of differentiation engineering related problems based on applications of differentiation with examples

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Apply logarithms for calculations and convert rational fractions into sums of partial fractions with examples
<b>CLO 2</b>	Analyze basic functions used in trigonometry with examples
<b>CLO 3</b>	Explain complex numbers in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples
<b>CLO 4</b>	Evaluate and Interpret the function graphically, numerically and analytically with limit of function
<b>CLO 5</b>	Solve engineering related problems based on applications of differentiation

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	1	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Logarithms and Partial Fractions</b> Logarithms: Definition, Logarithm as a transformation, Antilogarithm, Rules of Logarithms and examples, Use logarithmic functions for simplifying arithmetic computations. Partial fractions: Definition of partial fractions, Types of partial fraction (denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors).	17	8

<b>2</b>	<b>Trigonometry</b> Units of Angles (degree and radian), Trigonometric Functions, Allied & Compound Angles, Multiple –Submultiples angles, Graph of Sine and Cosine, Periodic trigonometric functions, Sum and factor formulae	<b>23</b>	<b>9</b>
<b>3</b>	<b>Complex Numbers</b> Definition of a complex number, real and imaginary parts of a complex number, Polar and Cartesian representations of complex number, Conjugate of complex number, Geometric representation of complex numbers and their operations, Modules and Amplitude form, De Moivre's Theorem, Root of Complex Number, Use of De Moivre's Theorem to simplify mathematical expressions.	<b>20</b>	<b>9</b>
<b>4</b>	<b>Function and Limit</b> Definition and concept of function, Concept of limits and standard forms of limits, Standard formulae of Limit and related simple examples.	<b>17</b>	<b>8</b>
<b>5</b>	<b>Differentiation</b> Definition of derivative, differentiation of standard function by first principle, Rule of Differentiation, Differentiation of algebraic, trigonometric, Exponential, Logarithmic, Implicit functions and Composite functions, Higher order derivatives.	<b>23</b>	<b>11</b>

**i. Text Book and Reference Book:**

1. Advanced Mathematics for Polytechnic By Pandya N R | Macmillan Publishers India Ltd.,2012
2. Mathematics-I By Deepak Singh | [Khanna Book Publishing Co](#)
3. Mathematics II By Garima Singh | [Khanna Book Publishing Co.](#)
4. A text book of Engineering Mathematics By N.P. Bali and Manish Goyal | [Laxmi Publications](#)
5. Polytechnic Mathematics By S P Deshpande | Pune Vidyarthi Gruh Prakashan
6. Applied Mathematics By H.K.Das | [S.Chand Publication](#)
7. Calculus and Analytic Geometry By G. B. Thomas, R. L. Finney | [Addison Wesley](#) | 9th Edition
8. Engineering Mathematics(Third edition) By Croft, Anthony | Pearson Education, New Delhi
9. Advanced Engineering Mathematics (9th Edition) By Erwin Kreyszig, [Wiley India](#)

- a. **Course Name:** Applied Physics
- b. **Course Code:** 03069201BS01
- c. **Prerequisite:** High School Level Physics
- d. **Rationale:** The Applied Physics course lays a foundational understanding of physical principles essential for engineering. It helps students relate theoretical concepts like motion, energy, heat, and properties of matter to real-world engineering applications, thereby enhancing their problem-solving and analytical skills for practical situations in mechanical, civil, automobile, and related fields.

**e. Course Learning Objective:**

<b>CLOBJ 1</b>	Develop understanding of fundamental physics concepts including measurements, electricity, magnetism, semiconductors, and modern physics relevant to engineering applications.
<b>CLOBJ 2</b>	Apply principles of electrical and electronic physics to analyze basic circuits, semiconductor devices, and electromagnetic systems used in information technology and engineering fields.
<b>CLOBJ 3</b>	Build scientific and analytical skills through practical experiments, measurements, error analysis, and interpretation of physical phenomena for technological problem solving.
<b>CLOBJ 4</b>	Understand the working principles and applications of modern technologies such as lasers, optical fibers, solar cells, and nanotechnology used in communication and electronic systems.
<b>CLOBJ 5</b>	Develop competency in conducting physics laboratory experiments, interpreting observations, and presenting results systematically using scientific methods and engineering practices.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Apply concepts of units, measurements, and error analysis to perform accurate physical measurements and validate results using dimensional analysis.
<b>CLO 2</b>	Analyze basic electric and magnetic phenomena, including electrostatics, current electricity, and electromagnetic induction, and solve related numerical problems.
<b>CLO 3</b>	Interpret the characteristics and functioning of semiconductor devices such as diodes and transistors, and apply them in basic electronic circuits.
<b>CLO 4</b>	Explain the working principles and applications of modern physics tools including lasers, optical fibers, and nanotechnology-based devices.
<b>CLO 5</b>	Demonstrate the ability to relate theoretical physics concepts to practical engineering applications across electrical, electronics, and communication fields.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	50	60	-	150

**L-** Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<p><b>Physical world, Units and Measurements</b></p> <p>Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis. Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures.</p>	20	8
2	<p><b>Force and Motion</b></p> <p>Scalar and Vector quantities – examples, representation of vector, types of vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application to inclined plane and lawn roller. Force, Momentum, Statement and derivation of conservation of linear momentum, its applications such as recoil of gun, rockets, Impulse and its applications.</p>	25	10
3	<p><b>Work, Power and Energy</b></p> <p>Work: Concept and units, examples of zero work, positive work and negative work Friction: concept, types, laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications. Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, transformation of energy (examples). Power and its units, power and work relationship, calculation of power (numerical problems).</p>	15	7
4	<p><b>Properties of Matter</b></p> <p>Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress-strain curve. Pressure: definition, units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications. Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension. Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems. Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number Equation of continuity, Bernoulli's Theorem (only formula and numericals) and its applications</p>	25	12
5	<p><b>Heat and Thermometry</b></p> <p>Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), specific heats, scales of temperature and their relationship, Types of Thermometer (Mercury thermometer, Bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses. Expansion of solids, liquids and gases, coefficient of linear,</p>	15	8

	surface and cubical expansions and relation amongst them, Co-efficient of thermal conductivity, engineering applications		
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**i. Text Book and Reference Book:**

1. Text Book of Physics for Class XI& XII (Part-I, Part-II) By N.C.E.R.T., Delhi
2. Comprehensive Practical Physics - Volume I and II By by IN Jaiswal | Laxmi Publishers
3. Practical Physics By C. L. Arora | S. Chand & Company Ltd
4. ENGINEERING CHEMISTRY By JAIN & JAIN | DHANPAT RAI
5. A Text Book of Polytechnic Chemistry By V.P. Mehta | Jain Brothers
6. Engineering Chemistry By S S dhara

**j. Experiment List:**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier calliper and find the volume of each object.
<b>2</b>	To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
<b>3</b>	To find the moment of inertia of a flywheel.
<b>4</b>	Measurement of Viscosity by Redwood Viscometer.
<b>5</b>	To find the coefficient of linear expansion of the material of a rod.(Young's Modulus).
<b>6</b>	To find surface tension of a liquid using capillary rise method.
<b>7</b>	To find frequency of a given tuning fork with the help of a sonometer.
<b>8</b>	To determine Force constant with the help of periodic time of oscillations of spring.

- a. **Course Name:** Engineering Graphics
- b. **Course Code:** 03061901ES02
- c. **Prerequisite:** Drawing basic knowledge
- d. **Rationale:** Engineering drawing is the essential language of engineers that transforms ideas into precise, standardized technical visuals. This course builds foundational skills in drawing tools and standards, enabling clear and effective communication in engineering.

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Identify and use various drawing equipment, instruments, and materials as per their specifications and applications.
<b>CLOBJ 2</b>	Apply standards, standard practices, and suitable scale factors in technical drawing layouts.
<b>CLOBJ 3</b>	Demonstrate proper use of different types of lines, lettering styles, and dimensioning methods in engineering drawings.
<b>CLOBJ 4</b>	Construct basic geometrical entities such as angles, polygons, tangents, and circles using standard construction techniques.
<b>CLOBJ 5</b>	Draw conic sections, cycloidal curves, involutes, and spirals using geometrical methods.
<b>CLOBJ 6</b>	Develop orthographic projections of points, lines, and planes with correct inclinations and true lengths.
<b>CLOBJ 7</b>	Convert pictorial views into orthographic projections using standard projection methods as per standard norms.
<b>CLOBJ 8</b>	Develop isometric views and isometric drawings of objects involving lines, circles, and arcs.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Identify and use various drawing equipment, instruments, and materials as per their specifications and applications.
<b>CLO 2</b>	Apply standard practices and appropriate scale factors as per BIS norms for planning and layout of drawings.
<b>CLO 3</b>	Demonstrate different types of lines, lettering styles, and dimensioning methods in technical drawings.
<b>CLO 4</b>	Construct basic geometric shapes, angles, polygons, tangents, and circles using standard construction methods.
<b>CLO 5</b>	Draw conic sections, cycloidal curves, involutes, and spirals using standard geometric methods.
<b>CLO 6</b>	Develop orthographic projections of points, lines, and planes with correct inclination and true lengths.
<b>CLO 7</b>	Convert simple pictorial views into orthographic views by applying projection methods as per BIS standards.
<b>CLO 8</b>	Develop skills to create isometric views and drawings of objects involving lines, circles, and arcs.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	4	3	20	20	100	60	-	200

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
<b>i. T</b>			
<b>1</b>	<b>Drawing Instruments and materials</b> Equipments-Types, Specifications, Method to Use Them, Applications. Instruments-Types, Specifications, Methods to Use Them and Applications. Pencils-Grades, Applications, Types of Points and Applications. Other Materials-Types and Applications.	<b>4</b>	<b>1</b>
<b>2</b>	<b>Planning, Layout and Scaling of Drawing</b> Follow and Apply Standard Practice as Per Bureau of I.S. For Planning and Layout, Choose Appropriate Scale Factor for The Drawing As Per Given Situation.	<b>4</b>	<b>1</b>
<b>3</b>	<b>Lines, Lettering and Dimensioning</b> Different Types of Lines. Vertical Capital and Lowercase Letters. Inclined Capital and Lowercase Letters. Numerals and Greek Alphabets. Dimensioning Methods. Aligned Method. Unilateral with Chain, Parallel, Progressive and Combined Dimensioning.	<b>4</b>	<b>1</b>
<b>4</b>	<b>Geometric Construction</b> Geometric Construction Related with Line Like Bisecting a Line, to Draw Perpendicular with a Given Line, Divide a Line, Etc. Geometric Construction Related with Angle Like Bisect an Angle, Trisect an Angle, Etc. to Construct Polygon. Triangle, Square / Rectangle, Pentagon with Special Method. Hexagon with Special Method. To Draw Tangents. Geometric Construction Related with Circle & Arc	<b>7</b>	<b>2</b>
<b>5</b>	<b>Engineering Curves</b> Conic Sections: Concept and Understanding of Focus, Directrix, Vertex and Eccentricity and Drawing of Conic Sections. Using Various Methods, Understand Construction of Ellipse. Parabola. Hyperbola. Cycloidal Curves (Cycloid, Epicycloid, Hypocycloid) Involutes. Involutes of A Circle, Involutes of A Polygon, Spiral (Archimedean Spiral Only).	<b>22</b>	<b>3</b>

<b>6</b>	<b>Projection Of Points, Lines And Planes</b> Reference Planes, Orthographic Projections. Concept Of Quadrant. 1st Angle And 3rd Angle Projection And Their Symbols. Projection Of Points. Projection Of Lines – Determination Of True Length And Inclinations For Following Cases. Line Parallel To One Or Both The Plane. Line Perpendicular To One Of The Plane. Line Inclined To One Plane And Parallel To Another. Line Inclined To Both The Planes. Projection Of Planes: Types Of Planes, Projection Of Planes Parallel To One Of The Reference Planes, Projection Of Plane Inclined To One Reference Plane And Perpendicular To Another, Projection Of Planes Inclined To Both Reference Planes.	<b>25</b>	<b>2</b>
<b>7</b>	<b>Orthographic Projections</b> Types Of Projections-Orthographic, Perspective, Isometric And Oblique: Concept And Applications. Various Term Associated With Orthographic Projections. Theory Of Projection. Methods Of	<b>22</b>	<b>3</b>

**j. Text Book and Reference Book:**

1. "A Text Book of Engineering Graphics (TextBook) By P.J. Shah | S. Chand & Company Ltd., New Delhi | 2021 Edition
2. Engineering Graphics By P.J. Shah | S. Chand & Co., New Delhi Publications
3. Engineering Graphics & Design (TextBook) By Jain & Gautam | Khanna Publishing House
4. Engineering Drawing By N.D. Bhatt | Charotar Publishing House | 55th Edition, Pub. Year 2010
5. Engineering Drawing By R.K. Dhawan | S. Chand and Company

**j. List of experiment:**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	Practice Sheet Which Includes Dimensioning Methods, Different Types of Line, Construction of Different Polygon, Divide the Line and Angle in Parts, Use of Stencil.
<b>2</b>	Engineering curves Draw Different types of curves like Ellipse, Parabola, Hyperbola, Cycloid, Involute and Spiral
<b>3</b>	Projection of Points and line Draw at Least Four Problems of Projections of Lines and One problem of Projections of Points.
<b>4</b>	Projection of Plane Draw at least four Problems of Projections of Plane Like Rectangle, Hexagon, Circle and Triangle Plane.
<b>5</b>	Orthographic projection Draw at least two Problems of Orthographic Projection from Given 3D Object.
<b>6</b>	Isometric Projection Draw at Least two Problems of Isometric Projections from Given 2D Object.

- a. **Course Name:** - Engineering Workshop
- b. **Course Code:** 03061901ES03
- c. **Prerequisite:** Engineering Workshop Practice requires basic knowledge of science, mathematics, and engineering drawing. Students should also be aware of safety rules and be ready to perform hands-on tasks with discipline and teamwork.
- d. **Rationale:** The Engineering Workshop Practice course is designed to provide diploma-level mechanical engineering students with practical skills essential for their professional development. The hands-on experience gained through this course enables students to understand the operation of various hand tools, ensuring they can perform fundamental mechanical tasks efficiently. By exploring fitting, carpentry, welding, and plumbing operations, students build a strong foundation in practical engineering techniques. This course also emphasizes the importance of safety, and adherence to industry standards, preparing students for real-world challenges in mechanical engineering environments.

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Apply safety rules, precautions, and safe working practices while performing operations in different workshop environments.
<b>CLOBJ 2</b>	Demonstrate the use of measuring instruments, hand tools, and workshop equipment for basic engineering operations.
<b>CLOBJ 3</b>	Perform fitting, carpentry, sheet metal, welding, and plumbing operations for fabrication of simple engineering components.
<b>CLOBJ 4</b>	Explain piping systems, components, material selection, and layout practices used in industrial applications.
<b>CLOBJ 5</b>	Interpret standard codes, specifications, and engineering practices related to workshop and mechanical operations.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Apply safety measures and practices while handling tools, machines, and materials in various workshop environments to ensure safe operations.
<b>CLO 2</b>	Demonstrate proficiency in using fundamental tools and techniques for mechanical tasks, including measurements, marking, and basic engineering operations.
<b>CLO 3</b>	Perform fitting, carpentry, sheet metal, welding, and plumbing operations to fabricate simple components.
<b>CLO 4</b>	Outline piping systems and their industrial applications, including material selection, layout design, and component identification.
<b>CLO 5</b>	Interpret codes and standards relevant to mechanical engineering practices.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	4	2	-	-	100	-	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. **List of Experiment**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	Prepare workshop layout with general specifications of equipment's available in various shops.
<b>2</b>	Workshop Safety Practices
<b>3</b>	Fundamentals of unit Conversions, Mechanical Measurements, Materials and Engineering Specifications.
<b>4</b>	Demonstration of Hand Tools and Power Tools with general Specifications.
<b>5</b>	FITTING SHOP
<b>6</b>	CARPENTRY SHOP
<b>7</b>	SHEET METAL WORKING
<b>8</b>	WELDING SHOP
<b>9</b>	PLUMBING

**i. Text Book and Reference Book:**

1. Mechanical Workshop Practice By K.C. John
2. A Course in Workshop Technology By Raghuwamsi B.S. | Dhanpat Rai and Sons, New Delhi | Pub. Year 1982
3. Workshop Practice Manual By K. Venkat Reddy | BS Publications
4. Elements of Workshop Technology Vol. I By Hajra Chaudhary S.K. | Asia Publishing House
5. Comprehensive Workshop Technology By S.K. Garg | Laxmi Publications

- a. **Course Name:** Fundamentals of Communication Skills  
 b. **Course Code:** 03060001HM01  
 c. **Prerequisite:** Knowledge of English Language till 10<sup>th</sup> standard.  
 d. **Rationale:** Basic Communication Skills are essential for all Engineers.  
 e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Develop basic interpersonal communication skills through effective listening, structured self and peer introductions, ice-breaker activities, and role plays in everyday contexts.
<b>CLOBJ 2</b>	Understand and apply fundamental grammatical structures including parts of speech, tenses, and voice for accurate sentence construction.
<b>CLOBJ 3</b>	Enhance pronunciation and vocabulary usage through basic phonetics, IPA symbols, one-word substitutions, synonyms, antonyms, and contextual application.
<b>CLOBJ 4</b>	Develop reading and writing skills by applying reading strategies and constructing coherent narratives, picture-based descriptions, and functional written texts such as applications.
<b>CLOBJ 5</b>	Improve personal and academic development through goal-setting using SMARTER principles and reflective language use.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Remember and identify correct pronunciation patterns using basic phonetic symbols, and recall appropriate vocabulary—including one-word substitutions, synonyms, and antonyms—for accurate spoken and written communication.
<b>CLO 2</b>	Understand written texts using basic reading strategies and explain the concept of SMARTER goals for personal and academic development.
<b>CLO 3</b>	Demonstrate understanding of basic interpersonal communication skills through effective listening, structured self and peer introductions, ice-breaker activities, and simple role-plays in everyday contexts.
<b>CLO 4</b>	Apply fundamental grammatical structures including parts of speech, basic tenses, articles and determiners to construct grammatically correct sentences.
<b>CLO 5</b>	Analyse and organize information to produce coherent written texts such as short narratives, and formal or informal applications.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	-	2	1	-	-	20	-	30	50

Lect. - Lecture, Tut - Tutorial, Lab - Lab, T - Theory, P - Practical, CE – Continuous Evaluation

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Ice Breaker + Introducing your Friend Fun Fact Exchange (e.g., Two Truths and a Lie) Describing Personality and Hobbies, Using Adjectives to Talk About People (Link to Parts of Speech), Structured Self and Peer Introduction (Name, Interests, Goals)	8%	2
2	Parts of Speech & Tenses Identification of Parts of Speech in Simple Sentences, Sentence Formation Using Basic Parts of Speech, Concept of time and verb forms, Sentence Construction and Error Correction Using Tenses	12%	6
3	Introduction to Phonetics - symbols and pronunciation Basics of Phonetics, Introduction to IPA (International Phonetic Alphabet), English Vowel & Consonant Sounds, Pronunciation Practice	10%	4
4	Articles & Determiners Definite, Indefinite Articles and Zero Articles, Demonstrative	10%	2

	& Possessive Determiners, Quantifiers & Numerals, Common errors of Articles & Determiners		
<b>5</b>	Vocabulary Building : One-word Substitution, Synonyms, and Antonyms List and Practice Common One-word Substitutions, Synonym-Antonym Match-Up Games, Use New Words in Sentences/Short Paragraphs	10%	2
<b>6</b>	Listening Skills Introduction and Importance of Good Listening, Difference Between Listening and Hearing, Types of listening, Barriers to effective Listening, Traits of a good listener	8%	2
<b>7</b>	Types of Application Formal vs Informal Applications, Structure and Format of an Application, (Salutation, Body, Closing), Writing Leave Applications	10%	2
<b>8</b>	Role Play Generic Situations (Buying, Asking for Directions, At a Doctor, etc.), Customer Service and Complaint Handling	12%	6
<b>9</b>	Goal Setting SMARTER Goals (Specific, Measurable, Achievable, Relevant, Time-bound, Evaluate, Revise), Short-term vs. Long-term Goals, Overcoming Obstacles to Goals	10%	2
<b>10</b>	Reading Skills – Basic Level Types of reading, Strategies of reading, Reading comprehension	10%	2
	<b>Total</b>	<b>100</b>	<b>30</b>

**i. Text Book and Reference Books:**

- 1) Murphy, Raymond. English Grammar in Use. Cambridge University Press, 2019.
- 2) Mohan, Krishna, and Meera Banerji. Developing Communication Skills. Macmillan Publishers India, 2009.
- 3) Lewis, Norman. Word Power Made Easy. Goyal Publishers, 2014.
- 4) Rizvi, M. Ashraf. Soft Skills: Enhancing Employability and Career Development. McGraw Hill Education, 2010.
- 5) Wren, P. C., and H. Martin. High School English Grammar and Composition. S. Chand Publishing, 2017.

- a. **Course Name:** Environmental Science
- b. **Course Code:** 03061501MC01
- c. **Prerequisite:** Basic knowledge of science (biology, chemistry, physics), environmental awareness, geography, data interpretation, and ethical responsibility towards sustainability.
- d. **Rationale:** Sustainable development is essential for a nation's progress, making environmental conservation and hazard management crucial for every Indian citizen. The country has endured numerous natural disasters, and significant energy wastage remains a challenge. Saving energy is as valuable as producing it. Industrial mismanagement and lack of discipline have led to rising environmental pollution. Embracing renewable energy is a key solution to both the energy crisis and pollution control. This course aims to raise awareness of these pressing issues, inspiring students to act responsibly and contribute to a cleaner, more sustainable future for the country and the world.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To introduce the fundamental concepts of ecological balance and the flow of energy/matter in nature.
<b>CLOBJ 2</b>	To provide knowledge on pollutants affecting the atmosphere and sound levels, and the legal framework for control.
<b>CLOBJ 3</b>	To examine the chemical/biological nature of water and soil contaminants and evaluate technical treatment solutions.
<b>CLOBJ 4</b>	To explore the mechanics and benefits of green energy technologies like solar, wind, and biomass.
<b>CLOBJ 5</b>	To categorize different waste streams and understand the "3R" principles (Reduce, Reuse, Recycle) for waste management.
<b>CLOBJ 6</b>	To impart an understanding of seismic risks and the protocols for managing natural and man-made disasters.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Explain ecosystem structure, biotic/abiotic components, food chains, webs, and cycles.
<b>CLO 2</b>	Identify sources, types, effects, and control of air and noise pollution, including regulations.
<b>CLO 3</b>	Analyse water and soil pollution sources, characteristics, treatment, and prevention.
<b>CLO 4</b>	Describe various renewable energy sources, working principles, and environmental impacts.
<b>CLO 5</b>	Classify solid waste types, management techniques, recycling, and disposal methods.
<b>CLO 6</b>	Explain seismic engineering principles and disaster management strategies.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	-	0	20	20	-	-	-	50

**L-** Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

#### h. Course Content:

Sr. No.	Content	Weight age	Teaching Hours
1	<b>Ecosystem</b> Structure of ecosystem, Biotic & Abiotic components, Food chain and food web Carbon, Nitrogen, Sulphur, Phosphorus cycle.	10	2
2	<b>Air and Noise Pollution</b> Definition of pollution and pollutant, Natural and manmade sources of air pollution (Refrigerants, I.C., Boiler). Air Pollutants: Types, Particulate Pollutants: Effects and control (Bag filter, Cyclone separator, Electrostatic Precipitator). Gaseous Pollution Control: Absorber, Catalytic Converter, and Effects of air pollution due to Refrigerants, I.C., Boiler, Noise pollution: sources of pollution, measurement of pollution level, Effects of Noise pollution, Noise pollution (Regulation and Control) Rules, 2000.	25	3
3	<b>Water and Soil Pollution</b> Sources of water pollution, Types of water pollutants, Characteristics of water pollutants Turbidity, pH, total suspended solids, total solids BOD and COD: Definition, calculation. Waste Water Treatment: Primary methods: sedimentation, froth floatation, Secondary methods: Activated sludge treatment, Trickling filter, Bioreactor, Tertiary Method: Membrane separation technology, RO (reverse osmosis), Causes, Effects and Preventive measures of Soil Pollution: Causes-Excessive use of Fertilizers, Pesticides and Insecticides, Irrigation, E-Waste.	25	3
4	<b>Renewable Sources of Energy</b> Solar Energy: Basics of Solar energy. Flat plate collector (Liquid & Air). Theory of flat plate collector. Importance of coating. Advanced collector. Solar pond. Solar water heater, solar dryer. Solar stills. Biomass: Overview of biomass as energy source. Thermal characteristics of biomass as fuel. Anaerobic digestion. Biogas production mechanism. Utilization and storage of biogas. Wind energy: Current status and future prospects of wind energy. Wind energy in India. Environmental benefits and problem of wind energy. New Energy Sources: Need of new sources. Different types new energy sources. Applications of (Hydrogen energy, Ocean energy resources, Tidal energy conversion.) Concept, origin and power plants of geothermal energy.	10	2
5	<b>Solid Waste Management</b> Solid waste generation- Sources and characteristics of: Municipal solid waste, E- waste, biomedical waste. Metallic wastes and Non-Metallic wastes (lubricants, plastics, rubber) from industries. Collection and disposal: MSW (3R, principles, energy recovery, sanitary landfill), Hazardous waste.	5	2

#### i. Text Book and Reference Book:

1. "Principles of Solar Engineering" By Yogi Goswami D., Frank Kreith, Jan F. Kreider | Taylor & Francis, 2003 | Second.

2. "Environmental Studies" By M.P. Poonia, S.C. Sharma | Khanna Publishing House, NewDelhi | 2017.
3. "Renewable Energy Sources" By Twidell J.W. and Weir. A | EFN Spon Ltd"Linear Systems and Signals" by B.P. Lathi.
4. "Environmental Sciences", By Daniel B Botkin & Edward A Keller, | John Wiley & Sons
5. "Air Pollution", By M. N. Rao and H. V. N. Rao | Tata McGraw-Hill Publishing Company
6. "Environmental Pollution Control Engineering", By Rao C.S | 2nd edition
7. "Solid Waste Treatment and Disposal", By G. Tchabanoglous | McGraw Hill Pub.

- a. **Course Name: Energy Conservation**
- b. **Course Code: 03061701UE01**
- c. **Prerequisite:** A basic understanding of science and environmental studies at the 10th-grade level. No prior technical knowledge is required, but awareness of energy sources, electricity usage, and environmental impact will be beneficial.
- d. **Rationale:** Energy conservation is essential for reducing waste, lowering costs, and minimizing environmental harm by optimizing energy use, decreasing dependence on non-renewable resources, and mitigating greenhouse gas emissions. It also enhances sustainability, strengthens energy security, and promotes economic growth through innovation in energy-efficient technologies and job creation.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Explains basic concepts of energy, types of energy sources, importance of energy conservation, energy problems in India, and concepts of energy efficiency and energy intensity.
<b>CLOBJ 2</b>	Covers the Energy Conservation Act, 2001, role of the Bureau of Energy Efficiency and Gujarat Energy Development Agency, energy conservation programs, star labelling, and energy audits.
<b>CLOBJ 3</b>	Focuses on energy-saving methods in lighting systems, motors, pumps, HVAC systems, compressed air systems, and household electrical appliances.
<b>CLOBJ 4</b>	Explains energy conservation techniques used in industries, homes, buildings, and IT systems including green computing and e-waste management.
<b>CLOBJ 5</b>	Covers fuel-efficient transportation methods, electric and hybrid vehicles, renewable energy in transport, and future trends in energy conservation.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Students will define energy, its various forms, energy resources (renewable and non-renewable), the need for energy conservation, and the environmental impacts of energy usage
<b>CLO 2</b>	Students will recall the Energy Conservation Act, 2001, the role of the Bureau of Energy Efficiency (BEE), energy labelling and star rating programs, and government schemes for energy conservation.
<b>CLO 3</b>	Students will explain the energy scenario in India, challenges in conventional energy sources, energy problems, the demand- supply gap, and future energy innovations and emerging technologies.
<b>CLO 4</b>	Students will describe energy conservation techniques in industries, energy-efficient building designs, energy-saving practices in households, and the role of automation and sensors in energy conservation.
<b>CLO 5</b>	Students will describe energy conservation techniques in industries, energy-efficient building designs, energy-saving practices in households, and the role of automation and sensors in energy conservation.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Marks			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	0	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Introduction to Energy and Its Conservation</b> Basics of energy: Types and sources (renewable & non-renewable), Need for energy conservation: Environmental and economic aspects, Energy problems in India: Demand-supply gap, dependency on fossil fuels, power shortages, Energy intensity and energy efficiency.	20	09
2	<b>Energy Conservation Act, Policies &amp; Key Organizations</b> Energy Conservation Act, 2001 – Key provisions, Bureau of Energy Efficiency (BEE) and its role, Flagship programs of BEE (PAT, S&L, ECBC, DSM), Gujarat Energy Development Agency (GEDA) – Roles and responsibilities, Star labelling of appliances, Energy audit types: Preliminary & detailed.	20	09
3	<b>Energy Conservation in Electrical &amp; Mechanical Systems</b> Energy-efficient lighting systems: LED, CFL, and automation, Energy conservation in motors, pumps, and HVAC systems, Energy-saving techniques in compressed air systems, Energy Conservation in Household Electrical Appliances.	22	10
4	<b>Energy Conservation in Industrial, Domestic &amp; IT Applications</b> Energy-saving measures in industries: Boilers, furnaces, and refrigeration, Case studies on energy-efficient buildings, Simple Energy Conservation Techniques for Homes and Small Businesses, Energy Conservation in Computers & IT (Power management in computers, green data centres, Energy-efficient software and hardware, Cloud computing for energy reduction, E-waste management and recycling).	20	09
5	<b>Energy Conservation in Transportation and Emerging Technologies</b> Fuel-efficient driving techniques and electric vehicles, Energy efficiency in railways and aviation, Hybrid and renewable energy in transport systems, Future trends in energy conservation.	18	08

**i. Text Book and Reference Book:**

1. Energy Conservation and Management By S. K. Kataria | S. K. Kataria & Sons
2. Energy Management Handbook By Wayne C. Turner | The Fairmont Press, Inc
3. Non-Conventional Energy Resources By G. D. Rai | Khanna Publishers
4. Guide to Energy Management By Barney L Capehart, William J Kennedy and Wayne C Turner | The Fairmont Press and CRC Press.

## Semester 2

- a) **Course Name: Engineering Drafting**
- b) **Course Code: 03061902PC01**
- c) **Prerequisite:** Basic knowledge of geometry, drawing instruments (scale, compass, set square), and free-hand sketching is essential. Students should also have spatial visualization skills to understand and interpret 2D and 3D objects. Familiarity with basic computer usage is helpful for digital drafting tools.
- d) **Rationale:** Engineering Drawing is a fundamental language of engineers and an essential communication tool in all fields of engineering. This subject Enables students to convert ideas into precise and standardized graphical representation.
- e) **Course Learning Objective:**

<b>CLOBJ 1</b>	To understand projections, sectional views, and true shapes of standard solids in different positions with respect to reference planes.
<b>CLOBJ 2</b>	To develop surfaces of prism, pyramid, cylinder, and cone including sectioned and combined solids.
<b>CLOBJ 3</b>	To identify and interpret standard drafting, machining, and geometrical symbols used in engineering drawings.

<b>CLOBJ 4</b>	To understand welded joints, weld symbols, piping layouts, and duct drawings as per BIS-813 / ASME standards.
<b>CLOBJ 5</b>	To prepare assembly drawings, detail drawings, and bill of materials from given machine components.
<b>CLOBJ 6</b>	To draw and apply standard fastening elements such as threads, bolts, nuts, screws, rivets, studs, and keys.

### f) Course Learning Outcomes:

<b>CLO 1</b>	Draw the development of surfaces of standard solids (prism, pyramid, cylinder, and cone), including sectioned and composite forms.
<b>CLO 2</b>	Create sectional views and true shapes of the sections of solids in different positions.
<b>CLO 3</b>	Recognize and interpret different machining, geometrical, and other standard drafting symbols.
<b>CLO 4</b>	Interpret welded joints and weld symbols as per BIS-813 / ASME standards.
<b>CLO 5</b>	Prepare detail drawings from given assemblies and vice versa.
<b>CLO 6</b>	Draw standard thread profiles and fastening elements such as bolts, nuts, screws, studs, rivets, and keys.

**g) Teaching and Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	2	3	20	20	50	60	-	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr No	Topic	Weightage	Teaching Hrs.
1	<b>Projections and Sections of Solids</b> Types and dimensional specifications of solids (prism, pyramid, cylinder, cone). Projections of solids - in various positions with respect to the reference planes. (Parallel, perpendicular and inclined to HP and / or VP.) Sectional views of different solids in given various positions. True shape of section.	30	8
2	<b>Development of Surfaces</b> Importance of development of surfaces, Drawing of Development of Surfaces of Prism, Pyramid, Cylinder and Cone – Independent, Sectioned and Combination	15	6
3	<b>Drafting Symbols</b> Use & Interpret drafting symbols. Machining symbol and its Interpretation. Geometrical symbols and its interpretation. Other drafting symbols like Threading, Dowels, Pins, Ribs, Bearings	15	4
4	<b>Welded Joints, Piping &amp; Duct Layouts</b> Draw & interpret weld joints, piping layout and duct drawings. Interpret Process Weld symbols as per BIS-813 / ASME (primary symbols & supplementary symbols). Weld nomenclature. Weld dimensions.	18	6
5	<b>Production Drawing</b> Assembly drawing & Detail drawing, Importance and Difference of these Drawings. Detail Drawing from Given Assembly. Assembly Drawings from Given Details. Preparing Bill of Material with Part List	15	4
6	<b>Fasteners</b> Use appropriate fasteners for given situations. Draw sketches for different types of fasteners. Detachable & permanent fasteners. Sketches of threads (square, acme, knuckle, Internal – external threads, Left hand – right hand threads, Single & multi start threads). Sketches of studs (cap screws, machine screws, set screws). Sketches of bolts & nut (hexagonal, square). Sketches of rivets (snap, pan, countersunk, conical). Sketches of keys.	7	2

**i. Reference Books:**

1. Engineering Drawing : Plane and Solid Geometry  
By N. D. Bhatt | Charotar Publishing House Pvt. Ltd. | 55th Edition, 2010
2. Engineering Drawing  
By R. K. Dhawan | S. Chand & Company Ltd.
3. Fundamentals of Engineering Drawing  
By Warren J. Luzadder and Jon M. Duff | Prentice Hall Publications
4. A Text Book of Machine Drawing  
By P. S. Gill | S. K. Kataria & Sons
5. A Text Book of Machine Drawing  
By Laxmi Narayana and Mathur | Jain Brothers, New Delhi

**j. List of the Experiment**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	Projections of Solids – Draw at least four problems of projections of solids
<b>2</b>	Sections of Solids – Draw at least four problems of sections of solids
<b>3</b>	Surface Development – Draw at least four problems of surface development
<b>4</b>	Drafting Symbols – Draw all necessary symbols as per given syllabus
<b>5</b>	Welded Joints, Piping & Duct Layouts – Draw welding and piping symbols used in fabrication and plant drawing. Also show duct layout
<b>6</b>	Production Drawing – Draw assembly drawing and detail drawing of knuckle joint
<b>7</b>	Fasteners – Draw appropriate fasteners for given situations

- a. **Course Name: Thermodynamics**
- b. **Course Code: 03061902PC02**
- c. **Prerequisite:** Thermodynamics requires a fundamental understanding of physics and mathematics, especially calculus and algebra. Basic concepts of energy, heat, and mechanical systems are essential for grasping thermodynamic principles.
- d. **Rationale:** Thermodynamics is essential for understanding energy interactions and conversions in engineering systems. It forms the foundation for analyzing engines, refrigerators, power plants, and other thermal devices. The subject helps students apply laws of thermodynamics to real-world applications. It builds critical thinking for designing efficient and sustainable energy systems.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To understand the basic concepts, terminology, and principles of thermodynamics.
<b>CLOBJ 2</b>	To study and apply the laws of thermodynamics in engineering applications.
<b>CLOBJ 3</b>	To analyze properties of gases and different thermodynamic processes.
<b>CLOBJ 4</b>	To understand and evaluate various thermodynamic cycles used in engineering systems.
<b>CLOBJ 5</b>	To study the working and performance of different thermal power plants.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Compare, interpret, and describe the basic concepts of thermodynamics.
<b>CLO 2</b>	Express, integrate, assess, and simulate various laws of thermodynamics.
<b>CLO 3</b>	Calculate and associate properties of gases and thermodynamic processes.
<b>CLO 4</b>	Memorize, express, integrate, assess, and simulate various thermodynamic cycles.
<b>CLO 5</b>	Contrast, assess, and simulate the working of various thermal power plants.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				T	CE	P	Theory	P	
2	0	0	2	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

#### h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Basic Concepts of Thermodynamics</b> Introduction and applications of Engineering thermodynamics. Basic thermodynamic Concepts, State, System, Boundary and Surroundings, Types of Systems and boundaries, Energy, Heat, Work, Power and Exergy, Thermodynamic properties and their units, Simple numerical based on above, Thermodynamic equilibrium.	15	4
2	<b>Laws of Thermodynamics</b> Zeroth law of thermodynamics and its application, Joule's experiment-set up & significance, Law of conservation of energy. First law of thermodynamics with reference to: i. Closed system. ii. System undergoing a change of state. iii. Open system. Energy equation & its application to: i. Non flow process. ii. Open system. iii. Steady flow (Steady flow energy equation –SFEE), Limitations of first law of thermodynamics, Simple numerical examples based on above. Concept of Heat Engine, Heat Pump & Refrigerator, Efficiency/COP; Kelvin-Planck and Clausius Statements, Carnot Cycle, Carnot Efficiency, T-S and P-V Diagrams, Concept of Entropy (Definition only).	30	9
3	<b>Properties of Gases and Thermodynamic Processes</b> Definition of Gas and Vapor, Perfect gas, Various ideal gas laws, Characteristic gas equation and Universal gas constant, Specific heats & their relationship, Different thermodynamic processes, their representation on P-V (Pressure-Volume) and T-s (Temperature-Entropy) diagram.	15	4
4	<b>Thermodynamic Cycles</b> Classifications of Thermodynamic cycles, Carnot cycle and its representation on P-V and T-s diagram, Derivation of thermal efficiency of Carnot cycle and simple numerical based on it, Concept of air standard efficiency, Otto, Diesel, dual and Brayton: Representation on P-V & T-s diagram, Equation of air standard efficiency (Without derivations) and simple examples, Representation of Reversed Carnot cycle and Reversed Brayton cycle on P-V and T-s diagram respectively.	25	9
5	<b>Thermal Power Plant</b> Types of Thermal Power Plant, Thermal Power Plant Layout, Component of Power Plant, Rankine Cycle, Modified Rankine Cycle, Regenerative Cycle, Reheat Cycle, Binary Vapour Cycle.	15	4

#### i. Text Book and Reference Book:

- Basic and Applied Thermodynamics  
By P. K. Nag | Tata McGraw Hill (TMH) | 2005 Edition
- Thermal Engineering  
By R. S. Khurmi and J. K. Gupta | S. Chand & Company Ltd.
- Engineering Thermodynamics  
By P. K. Nag | Tata McGraw Hill (TMH)
- Power Plant Engineering  
By S. Domkundwar | Dhanpat Rai Publications

- a. **Course Name: Mathematics - II**  
 b. **Course Code: 03069102BS01**  
 c. **Prerequisite:** Knowledge of Basic concept of mathematics studied till first semester.  
 d. **Rationale:** This course is an extension of the course Mathematics-I of first semester namely Mathematics II. Using the methods of differentiation, integration, differential equations, matrix theory, geometry, and differential equations, the course aims to instill its applications in pertinent engineering and technological fields.  
 e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the concept of determinant and matrix with examples
<b>CLOBJ 2</b>	Analyze engineering related problems based on concepts of vectors with examples
<b>CLOBJ 3</b>	Understand basic engineering problems under given conditions of straight lines and circle.
<b>CLOBJ 4</b>	Understand the concept of functions and limits with examples
<b>CLOBJ 5</b>	Understand differential equations to significant applied problems.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Solve engineering related problems based on matrices.
<b>CLO 2</b>	Analyze engineering related problems based on concepts of vectors.
<b>CLO 3</b>	Understand basic engineering problems under given conditions of straight lines and circle.
<b>CLO 4</b>	Apply integral calculus to engineering related problems.
<b>CLO 5</b>	Obtain solutions of differential equations to significant applied problems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	1	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Determinants and Matrices Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule. Algebra of matrices, Inverse of a matrix, matrix inversion method to solve a system of linear equations in 3 variables.	23	10
2	Vector Algebra Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.	20	9

<b>3</b>	Co-Ordinate Geometry Straight line Inclination and slope of a line, different forms of equations to a straight line, Slope-intercept form, Point slope form ,Two-point form , Intercept form. General equation of a Straight line, Family of lines. Conditions for concurrency of lines. Circle Definition, Equation of a circle with given center and radius, General form of equation of circle, Equation of a circle when intercepts are given, circle passing through three points, Equation of chord, Equations of tangents and normal at a point on a circle	<b>17</b>	<b>8</b>
<b>4</b>	Integral Calculus Integration as inverse operation of differentiation, Integration of simple functions, Integration by substitution, by parts and by partial fractions (for linear factors only). Definite integral: Definition, Properties of Definite integral, Odd and Even functions, Use of formulas, and for solving problems Where m and n are positive integers. Applications of integration for i. Simple problem on evaluation of area bounded by a curve and axes. ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems)	<b>23</b>	<b>10</b>
<b>5</b>	Differential Equations Solution of first order and first degree differential equations by variable separation method (simple problems), Exact differential equations (simple problems), Linear differential equations (simple problems), MATLAB – Simple Introduction.	<b>17</b>	<b>8</b>

**i. Text Book and Reference Book:**

1. Polytechnic Mathematics  
By S. P. Deshpande | Pune Vidyarthi Gruh Prakashan
2. Mathematics – I  
By Deepak Singh | Khanna Book Publishing Company
3. Mathematics – II  
By Garima Singh | Khanna Book Publishing Company
4. Elementary Engineering Mathematics  
By Dr. B. S. Grewal | Khanna Publishers | 15th Edition
5. Calculus and Analytic Geometry  
By G. B. Thomas and R. L. Finney | Addison Wesley | 9th Edition

- a. **Course Name:** Applied Chemistry
- b. **Course Code:** 03069501BS01
- c. **Prerequisite:** Understanding of Basic knowledge of Science for application.
- d. **Rationale:** Bridges the gap between theoretical chemistry and real-world industrial applications providing fundamental knowledge of chemical principles and their relevance in materials science, environmental sustainability, energy production, and various engineering processes.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To develop understanding of fundamental chemical principles including chemical bonding, catalysis, electrochemistry, corrosion, and water treatment relevant to engineering applications.
<b>CLOBJ 2</b>	To apply concepts of industrial chemistry in the study of fuels, lubricants, polymers, elastomers, and adhesives for solving practical engineering and environmental problems
<b>CLOBJ 3</b>	To enhance analytical and laboratory skills through experimentation, calculations, and interpretation of chemical processes used in industrial and technological fields.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Understand the concept of matter and existence of materials in nature.
<b>CLO 2</b>	Acquainted with various mechanisms of energy conversion and applications of electrochemistry.
<b>CLO 3</b>	Interpret corrosion concepts, types, mechanisms, and prevention methods.
<b>CLO 4</b>	Develop skills and understanding of water treatment methods.
<b>CLO 5</b>	Understand fundamentals of lubricants in industrial applications.
<b>CLO 6</b>	Explain different types of polymers, their properties, and applications in engineering fields.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	50	60	-	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weight age	Teaching Hours
1	Chemical Bonding and Catalysis Atomic structure and Orbital concept. Shapes of s,p and d orbitals, Pauli's exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration, Theory Of Valency, Electronic Configuration. Types of chemical bonds - Electrovalent bond, & its characteristics ,Covalent bond & its characteristics ,Co- ordinate bond , Hydrogen bond, its types and Significance , Metallic bond, Explanation of Metallic properties based on Electron Sea Model , Intermolecular force of attraction ,Vander Waals force of attraction, Structures of solids: Ionic solids, Molecular solids, Network solids, and Metallic solids Catalysis, Types of catalysis, Theory of Catalysis, Characteristics of Catalyst, Types of Catalyst, Positive Catalyst, Negative Catalyst, Auto-catalyst Catalytic Promoter and Catalytic inhibitor Industrial Application of Catalyst.	10	6

2	<p>Concepts of Electrochemistry Introduction , Arrhenius theory of ionization., Degree of ionization, Factors affecting the degree of ionization , Definition of pH , pH of acid, base and neutral solution , pH calculations of acid, base and salt solution at different concentration , Importance of pH in various fields, Definition of buffer solution, Buffer Action &amp; Types of buffer Solution, Application of buffer solutions,. Electrolytes and Non-electrolytes, Types of electrolytes Definition the term ‘Electrode’ the Types of Electrodes Inert electrode, Working electrode &amp; Reference electrode; with suitable Illustrations. Construction and working of electrochemical cell , Standard conditions ,Standard hydrogen electrodes , Nernst theory of single electrode potential &amp; Nernst equation (No derivation), Electrochemical series, galvanic series ,Electrolysis, Faradays laws of electrolysis ,. Industrial application of Electrolysis , conductance of solution (a) Conductivity (b) Specific Conductivity (c) Equivalent conductivity (d) Molar conductivity.</p>	20	9
3	<p>Corrosion &amp; its Control Definition of corrosion, Types of corrosion, Dry corrosion: Oxidation corrosion mechanism corrosion-mechanism, Nature of oxide film, Wet corrosion-mechanism, Concentration cell corrosion, Pitting corrosion, Waterline corrosion, Crevice corrosion, Stress Corrosion, Erosion Corrosion. Factors affecting the rate of corrosion,- Nature of film, Nature of Environment, pH of Solution, Area of cathode anode and, Temperature, Moisture ,Purity of metal. Methods of prevention of corrosion, Modification of environment, Modification of the properties of metal, Use of protective coatings, Anodic and cathodic protection, Modification in design and choice of material.</p>	10	5
4	<p>Water Treatment Hard water and soft water. Types of hardness of water, Salts producing hardness of water, Method to express the hardness of water, Estimation of total hardness by EDTA Method, Examples to calculate the hardness, Effect of hard water in Boiler operation. Scale and sludge formation and it’s Prevention,. Priming, foaming, its prevention, Caustic embrittlement, and its prevention. Corrosion and its prevention. Softening of Water, Soda-Lime process, Permutit process, Ion Exchange process , Reverse Osmosis process , Treatment of Drinking water ,Sedimentation , Coagulation , Filtration , Sterilization of water by chlorination Break-point chlorination- Graph. Enlist Indian standard specification of drinking water.</p>	20	8
5	<p>Lubricants and Fuels Introduction and definition of lubricants and lubrication ,function of lubricants Types of lubrication, Fluid film lubrication, Boundary lubrication, Classification of lubricants, Solid lubricants, Semi-solid lubricants, Liquid lubricants, Synthetic oils, Physical Properties of lubricants and their significance like. Viscosity and viscosity index, Flash point and fire point, Pour point and cloud point, oiliness Chemical Properties of lubricants: Saponification value, Neutralization number, Emulsification number, Selection Criteria of lubricants for Gears, Cutting tools and Steam turbine applications. Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), Bomb Calorimeter, calculation of HCV and LCV, Ultimate and Proximate analysis of coal, Liquid fuels (Octane and Cetane number) Biofuels and Gaseous Fuels.</p>	20	10
6	<p>Polymer, Elastomers &amp; Adhesives Introduction and Definition of Polymer and Monomer , Classification of Polymer on basis of Molecular structure as Linear, Branch and Cross-linked polymers , Classification on basis of</p>	20	7

monomers (homo polymer and copolymer) Classification of Polymers on basis of Thermal behavior(Thermoplastics& Thermosetting) , Types polymerization Reaction , Addition Polymerization , Condensation Polymerization , Synthesis(only statement), properties and application of I. Polyethylene ,Polypropylene iii. Polyvinyl chloride iv. Teflon v. Polystyrene vi. Phenol formaldehyde vii. Acrylonitrile viii. Epoxy Resin. Elastomer- Natural rubber and its properties. Vulcanization of rubber, Synthetic rubber, Synthesis (only statement), properties and uses, Buna-S Rubber ii. Buna-N Rubber, Neoprene Rubber, Definition of adhesives and Examples, Characteristics of adhesives Classification of adhesives and their uses.		
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#### **h. Text Book and Reference Book:**

1. Engineering Chemistry  
By Jain & Jain | Dhanpat Rai Publications
2. A Text Book of Polytechnic Chemistry  
By V. P. Mehta | Jain Brothers
3. Engineering Chemistry  
By S. S. Dara
4. Applied Chemistry  
By N. Krishnamurthy | Tata McGraw-Hill | New Edition
5. Textbook of Environmental Chemistry and Pollution Control  
By S. S. Dara

#### **i. List of Experiment**

<b>Exp . No.</b>	<b>Name of the Experiment</b>
<b>1</b>	Determine the strength of a given acidic solution using standard solution of base.
<b>2</b>	Standardize $\text{KMnO}_4$ solution by preparing standard oxalic acid and to estimate ferrous ions.
<b>3</b>	Standardize $\text{Na}_2\text{S}_2\text{O}_3$ solution by preparing standard potassium dichromate and to estimate percentage of copper from brass.
<b>4</b>	Determination of viscosity of given lubricating oil by using Red-wood Viscometer.
<b>5</b>	Determination of pH-values of given samples of solution by using Universal Indicator and pH-meter.
<b>6</b>	To determine Acid Value of given lubricating Oil.
<b>7</b>	To determine % of moisture content in given coal sample by proximate analysis.
<b>8</b>	To determine saponification value of lubricating oil.
<b>9</b>	Determine Flash & Fire point of given lubricating oil.
<b>10</b>	Study of Corrosion of Metals in the Acidic and Alkali Mediums.

- a. **Course Name: Fundamentals of Electrical Engineering**  
 b. **Course Code: 03061702ES01**  
 c. **Prerequisite:** Knowledge of Basic science and physics.  
 d. **Rationale:** This syllabus provides foundational knowledge of electrical circuits, magnetic circuits, transformers, and electrical safety, essential for understanding electrical engineering concepts. It equips students with the ability to analyze and design electrical networks, understand electromagnetic principles, and apply them in practical applications like transformers and machines. The inclusion of safety and protection ensures awareness of industry standards and hazard prevention. By combining theoretical and practical learning, this course prepares students for further studies and real-world electrical applications.

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Covers magnetic circuits, related magnetic terms, comparison between electrical and magnetic circuits, Faraday's laws, Lenz's law, Fleming's rules, B-H curve, and concepts of induced emf, self-inductance, and mutual inductance.
<b>CLOBJ 2</b>	Covers magnetic circuits, related magnetic terms, comparison between electrical and magnetic circuits, Faraday's laws, Lenz's law, Fleming's rules, B-H curve, and concepts of induced emf, self-inductance, and mutual inductance.
<b>CLOBJ 3</b>	Introduces the basic working principle and classification of transformers, constructional types of transformers, and the construction, working, and applications of DC and AC machines.
<b>CLOBJ 4</b>	Explains the importance of earthing, types of earthing systems, and the working and applications of protective devices such as fuses, MCBs, and ELCBs used for electrical safety and protection.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Identify the fundamental concepts of electrical circuits, including AC & DC supply, circuit elements, and factors affecting resistance.
<b>CLO 2</b>	Explain the principles of magnetic circuits, electromagnetic induction, and laws such as Faraday's law, Lenz's law, and Fleming's rules.
<b>CLO 3</b>	Demonstrate the working principles, classification, and applications of transformers and electrical machines (DC & AC).
<b>CLO 4</b>	Compare different types of earthing systems and analyze their role in electrical safety and protection.
<b>CLO 5</b>	Analyze the performance and applications of protective devices such as fuses, MCBs, and ELCBs in electrical installations.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	0	2	3	20	20	50	60	-	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

<b>Sr. No.</b>	<b>Content</b>	<b>Weight age</b>	<b>Teaching Hours</b>
<b>1</b>	Electric Circuit Generation of electricity. Different terms related to electric circuit. Concept of AC and DC. Concept of 1-phase and 3-phase supply. Electrical circuit elements: Resistor Inductor and Capacitor. Factors affecting the value of resistance. Resistor in series and parallel. Ohm's law and its limitations.	<b>30</b>	<b>8</b>
<b>2</b>	Magnetic Circuit Magnetic circuits: overview, terms regarding to magnetic Circuit and comparison with electrical circuits. Faraday's laws of electromagnetic induction. Lenz's law, Fleming's right-hand rule and Fleming's left-hand rule. B-H curve. Types of Induced emf, self-inductance and Mutual Inductance.	<b>30</b>	<b>8</b>
<b>3</b>	Transformer and Machines Basic principle of transformer. Classification of transformer based on different parameter. Transformer types according to construction: Core and shell type, auto transformers. DC & AC machines: construction, working and applications.	<b>20</b>	<b>8</b>
<b>4</b>	Electrical Safety and Protection Definition and Need for Earthing, Importance of Earthing in Electrical Safety, Types of Earthing Systems. Safety and Protection specification, working and applications of protective devices such as fuses, MCBs and ELCBs.	<b>20</b>	<b>6</b>

**i. Text Book and Reference Book:**

1. Basic Electrical Engineering  
By V. K. Mehta | S. Chand & Company Pvt. Ltd.
2. Electrical Technology – Volume I  
By B. L. Theraja | S. Chand, New Delhi
3. Principles of Electrical Machines  
By V. K. Mehta and Rohit Mehta | S. Chand
4. Electrical Technology – Volume II  
By B. L. Theraja | S. Chand, New Delhi
5. Electrical Power Systems  
By C. L. Wadhwa | New Age International Publishers | 5th Edition

**j. List of Experiments.**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	To verify Ohm's Law by measuring voltage and current in an electric circuit
<b>2</b>	To compare the theoretical and measured values of different resistors using a Digital Multimeter
<b>3</b>	To determine the equivalent resistance of resistors connected in series and measure the voltage and current across each resistor
<b>4</b>	To determine the equivalent resistance of resistors connected in parallel and measure the voltage and current across each resistor
<b>5</b>	To Determine the B-H curve of a magnetic material
<b>6</b>	Measure Voltage, Current and Power of pure Resistive circuit
<b>7</b>	Determine the transformation ratio of single phase transformer
<b>8</b>	Connect a single phase transformer and measure input and output quantities
<b>9</b>	Study the different parts of DC machines
<b>10</b>	Demonstrate different types of earthing systems
<b>11</b>	To study the operation of protective devices

- a. **Course Name: Foundation of IT and Web Design Application**  
 b. **Course Code: 03061601ES02**  
 c. **Prerequisite** - Basic computer usage and internet familiarity.  
 d. **Rationale:** This course equips students with essential computing skills, including MS Office, HTML, and CSS, enhancing digital literacy, productivity, and web development proficiency for academic and professional success.  
 e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the basic concepts and working principles of computer hardware components, storage devices, operating systems, and application software.
<b>CLOBJ 2</b>	Develop practical skills in using operating system commands, email communication, and file management in UNIX/Linux environments.
<b>CLOBJ 3</b>	Apply MS Excel functionalities for data entry, analysis, sorting, calculations, conditional formatting, and report generation.
<b>CLOBJ 4</b>	Design professional documents, presentations, resumes, macros, and mail merge applications using MS Word and PowerPoint tools.
<b>CLOBJ 5</b>	Enhance problem-solving, communication, and presentation skills through hands-on computer applications and office automation tasks.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand the Fundamentals of Computers & MS Excel.
<b>CLO 2</b>	Develop Presentations and Documents Using MS PowerPoint & MS Word.
<b>CLO 3</b>	Build Basic Web Pages Using HTML
<b>CLO 4</b>	Enhance Web Pages with Advanced HTML & HTML5 Features.
<b>CLO 5</b>	Create Web Pages Using CSS.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	0	4	2	0	0	100	-	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Experiment List:**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
1	Describe CPU, GPU and Motherboard with working
2	Explain different types of computer storage devices
3	Perform email-related tasks
4	Explain basics of UNIX OS
5	Explain commands for LINUX OS
6	Develop Excel sheet for student result analysis
7	Prepare student mark sheet using MS Excel
8	Create MS Excel sheet for product sales analysis
9	Create MS Excel sheet for employee salary analysis
10	Prepare PowerPoint presentation of favourite movie
11	Create PowerPoint presentation on dream travel destination
12	Design PowerPoint presentation on famous personality
13	Create resume in MS Word
14	Create and apply Macro in MS Word
15	Create formal letter using Mail Merge
16	Write HTML code to display "Hello World" using heading tags
17	Create HTML table for student marksheet
18	Create simple registration form using HTML
19	Create Restaurant menu using Lists in HTML
20	Write HTML code to print given format
21	Display family information using CSS formatting
22	Design college web page with hyperlink
23	Create web page showing border types using CSS
24	Create sticky social media bar using HTML and CSS
25	Create Food Ordering Menu with Checkboxes
26	Design Contact Information Page with CSS and Hyperlinks
27	Create Online Shopping Preference Form
28	Create Technology Review Page with YouTube Video
29	Create Student Report Card using HTML Table and CSS
30	Create Profile Page with Image and Styling

**i. Text Book and Reference Book:**

1. Computer Fundamentals, By: P.K. Sinha & Priti Sinha | Publisher: BPB Publications
2. Microsoft Office PowerPoint 2019 Step by Step, By: Joan Lambert | Publisher: Microsoft Press
3. Microsoft Excel 2019 Bible, By: Michael Alexander, Richard Kusleika | Publisher: Wiley
4. Microsoft Word 2019 Step by Step, By: Joan Lambert | Publisher: Microsoft Press
5. HTML and CSS: Design and Build Websites, By: Jon Duckett | Publisher: Wiley

a. **Course Name:** Verbal Ability

b. **Course Code:** 03060002HM01

c. **Prerequisite:** Knowledge of Fundamentals of Communication Skills.

d. **Rationale:** Practical language proficiency and essential soft skills for academic and professional success.

e. **Course Learning Objectives:**

CLOBJ 1	Develop effective listening and speaking skills by understanding listening processes, overcoming barriers, and applying basic public speaking techniques.
CLOBJ 2	Strengthen grammatical accuracy by applying rules of subject–verb agreement, direct–indirect speech and active passive voice in spoken and written communication.
CLOBJ 3	Expand advanced vocabulary knowledge including homophones, homonyms, homographs, phrasal verbs, and idioms for contextual and practical usage.
CLOBJ 4	Enhance analytical and creative thinking skills through activities such as SWOT analysis, problem-solving exercises, and guided story writing.
CLOBJ 5	Apply professional written communication skills by producing well-structured letters, emails and presentations with appropriate tone and format.

f. **Course Learning Outcomes:**

CLO 1	Understand the use of vocabulary including homonyms, idioms, and phrasal verbs in spoken and written communication.
CLO 2	Apply grammatical structures related to subject–verb agreement, direct– indirect speech and active passive voice in sentences and short texts.
CLO 3	Apply formal and informal letters, professional emails, and simple product presentations using appropriate structure, tone, and language conventions.
CLO 4	Analyse personal SWOT charts, simple problem-solving responses, and guided stories by organizing ideas logically.
CLO 5	Create a logical and grammatically correct oral or written narrative based on a given picture, organizing ideas clearly and coherently.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	40	-	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. **Course Content**

Sr. No.	Content	Weightage	Teaching Hours
1	Active – Passive Voice: Rules of Active and Passive, Structures of Passive Voice, Conversion from Active to Passive and Vice Versa	10	1

2	Crazy Scientist: Invent a Product and Presentation of a Product	10	1
3	Vocabulary Building: Homophones, Homonyms, Homographs, Phrasal Verbs and Idioms	12	2
4	Homophones, Homographs and Homonyms: Confusing Pairs, Contextual Meaning and Multiple Meanings	10	2
5	Phrasal Verbs and Idioms: Common Phrasal Verbs in Conversation and Popular Idioms with Real-Life Applications	8	1
6	Subject–Verb Agreement: Basic Rules and Exceptions, Spot the Error and Correction Exercises	12	2
7	SWOT Analysis: Introduction to SWOT, Creating a Personal SWOT Chart and Applying SWOT for Goal Setting	8	2
8	Letter Writing and E-mail Writing: Formal and Informal Letter Format, Professional Email Structure, Tone and Common Mistakes	8	1
9	Direct–Indirect Speech: Rules for Changing Tenses, Pronouns and Time Expressions, Reporting Statements, Questions, Commands and Requests	10	1
10	Picture Perception, Story Writing and Self-Introduction: Sequencing Ideas, Description, Narrative Writing, Public Speaking, Voice Modulation and Speaking Confidence	12	2

#### i. Experiment List:

Exp. No.	Name of the Practical
1	Active – Passive Voice
2	Crazy Scientist – Presentation of a Product
3	Vocabulary Building: Homophones, Homonyms, Homographs, Phrasal Verbs & Idioms
4	Subject–Verb Agreement
5	SWOT Analysis
6	Letter Writing & E-mail Writing
7	Direct–Indirect Speech
8	Picture Perception
9	Story Writing Using Hints
10	Self-Introduction – Practice

#### j. Reference Books

1. Murphy, Raymond. English Grammar in Use. Cambridge University Press, 2019.
2. Aggarwal, R. S. A Modern Approach to Logical Reasoning. S. Chand Publishing, 2018.
3. Lewis, Norman. Word Power Made Easy. Goyal Publishers, 2014.
4. Maxwell, John C. Developing the Leader within You. Thomas Nelson, 2013.
5. Cambridge Listening and Speaking Skills Series (B1–B2 Level). Cambridge University Press, various editions 2017–2020.
6. Covey, Stephen R. The 7 Habits of Highly Effective People. Simon & Schuster, 2020.

- a. **Course Name:** Universal Human Values
- b. **Course Code:** 03060002MC01
- c. **Prerequisite:** Zeal to Learn the Subject.
- d. **Rationale:** The Universal Human Values (UHV) course aims to develop a holistic understanding of life, fostering ethical behaviour, responsible decision-making, and harmonious living. It helps students align their personal and professional actions with core human values, ensuring happiness, well-being, and sustainable development in society.

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understanding of the concept and significance of value education in achieving holistic human development. It focuses on building clarity about right understanding, relationships, and physical facilities while introducing self-exploration as a key process for value education. It also enables learners to analyse the ideas of continuous happiness and prosperity as basic human aspirations and to identify appropriate methods for fulfilling these aspirations in the present scenario.
<b>CLOBJ 2</b>	the human being as a co-existence of the self and the body. It emphasizes distinguishing between the needs of the self and the body and recognizing the body as an instrument of the self. The chapter further develops an understanding of harmony within the self and between the self and the body, along with practices to ensure self-regulation and maintain good health.
<b>CLOBJ 3</b>	Harmony in the family and society, considering the family as the basic unit of human interaction. It develops clarity about foundational values such as trust and respect in relationships and explores the concept of justice in human-to-human interactions. It also helps learners understand harmony at the societal level while encouraging the development of a vision for a universal human order based on values.
<b>CLOBJ 4</b>	build an understanding of harmony in nature and existence by highlighting the interconnectedness and mutual fulfilment among the different orders of nature. It enables learners to realize existence as co-existence at all levels while developing a holistic perception of harmony in nature and the environment.
<b>CLOBJ 5</b>	Implications of holistic understanding in professional ethics. It helps learners understand the natural acceptance of human values and the definitiveness of ethical human conduct. The chapter also emphasizes the importance of humanistic education and constitution, analyzes professional ethics through case studies, and develops competence in value-based decision-making and ethical practices in professional life.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand the importance of value education and develop clarity about human aspirations, self-exploration, and holistic development.
<b>CLO 2</b>	Comprehend the co-existence of self and body while developing harmony, self-regulation, and health awareness.
<b>CLO 3</b>	Understand values in relationships and develop harmony within family and society with a vision of universal human order.
<b>CLO 4</b>	Analyse interconnectedness in nature and develop a holistic understanding of harmony at all levels of existence.
<b>CLO 5</b>	Apply holistic understanding to professional ethics and develop competence in value-based decision-making in profession.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	0	0	0	20	20	0	60	0	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

Sr. No.	Content	Weightage	Teaching Hours
1.	<b>Introduction to Value Education</b> Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.	20	03
2.	<b>Harmony in the Human Being</b> Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	20	03
3.	<b>Harmony in the Family and Society</b> Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	25	03
4.	<b>Harmony in the Nature/Existence</b> Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.	15	03

5.	<b>Implications of the Holistic</b> Understanding – a Look at Professional Ethics Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	20	03
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**h. Text Book and Reference Book:**

1. A. Nagraj, 1998, Jeevan Vidyaek Parichay, Divya Path Sansthan, Amarkantak.
2. A.N. Tripathy, 2003, Human Values, New Age International Publishers
3. The Story of My Experiments with Truth By M K Gandhi
4. Small is Beautiful By E. F Schumacher

- a. **Course Name:** Disaster Management
- b. **Course Code:** 03061502UE01
- c. **Prerequisite:** High School Science.
- d. **Rationale:** Disaster management is an essential subject for equipping students with the knowledge and skills needed to prevent, prepare for, respond to, and recover from disasters efficiently. It contributes to building safer communities and sustainable development.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To understand the fundamental concepts of disasters, hazards, vulnerabilities, risks, and disaster management frameworks.
<b>CLOBJ 2</b>	To study various types of natural, technological, and man-made disasters along with their causes, impacts, and control measures.
<b>CLOBJ 3</b>	To understand disaster management cycles including preparedness, mitigation, response, recovery, and risk assessment.
<b>CLOBJ 4</b>	To study legal and institutional disaster management frameworks in India and the role of various agencies.
<b>CLOBJ 5</b>	To apply GIS, remote sensing, early warning systems, and mitigation techniques for disaster preparedness and management.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Define and explain key concepts related to disasters, including hazards, vulnerabilities, risks, and disaster management frameworks.
<b>CLO 2</b>	Identify various types of natural, technological, and man-made disasters, their causes, impacts, and control measures.
<b>CLO 3</b>	Describe and implement disaster management cycles, including risk assessment, preparedness, response, and recovery.
<b>CLO 4</b>	Explain the legal and institutional frameworks in India, including the Disaster Management Act, policies, and the role of government and non-government agencies.
<b>CLO 5</b>	Apply GIS, remote sensing, early warning systems, and structural mitigation techniques to enhance disaster preparedness and response.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

#### **h. Course Content:**

<b>Sr. No.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hours</b>
<b>1</b>	Introduction and Basic Principle of Disaster Management: Understanding the concepts and definitions of Disaster, Hazard, Vulnerability, Risk, and Capacity. Disaster and Development, and Disaster Management.	<b>10</b>	<b>3</b>
<b>2</b>	Types, Trends, Causes, Consequences and Control of Disasters: Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunderstorms, hail storms, avalanches, droughts, cold and heat waves); Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemical and biological disasters). Global Disaster Trends, Emerging Risks of Disasters, Climate Change and Urban Disasters.	<b>20</b>	<b>10</b>
<b>3</b>	Disaster Management Cycle and Framework: Basics of Disaster Management Cycle, Paradigm Shift in Disaster Management, Understanding Risk, Prevention and Reduction of Disaster Impact, Early Warning Systems, Awareness and Capacity Building, Disaster Preparedness, Search and Rescue Operations, Relief and Rehabilitation, Damage Assessment, Infrastructure Restoration, Reconstruction and Redevelopment.	<b>30</b>	<b>12</b>
<b>4</b>	Disaster Management in India: Disaster Profile of India, Mega Disasters of India and Lessons Learnt, Disaster Management Act 2005, Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans, Role of Government (Local, State and National), Non-Governmental and Inter-Governmental Agencies.	<b>20</b>	<b>10</b>
<b>5</b>	Applications of Science and Technology for Disaster Management: Geo-informatics in Disaster Management (RS, GIS, GPS and Remote Sensing), Disaster Communication Systems, Early Warning Dissemination, Land Use Planning, Disaster Safe Design and Construction, Structural and Non-Structural Mitigation Measures, S&T Institutions for Disaster Management in India.	<b>20</b>	<b>10</b>

#### **i. Text Book and Reference Book:**

1. Disaster Management Guidelines  
By GOI–UNDP Disaster Risk Reduction Programme | 2009–2012
2. Environmental Engineering and Disaster Management  
By Sanjay K. Sharma | Laxmi Publications, New Delhi
3. Handbook of Disaster Management: Techniques and Guidelines  
By B. K. Singh
4. Disaster Management  
By G. K. Ghosh