



# **First Year Curriculum**

**Admission Year 2026-27**

**Diploma Engineering  
Aeronautical Engineering**

**Faculty of Engineering & Technology**

**Parul University**

**Vadodara, Gujarat, India**

### Semester-1

- a. **Course Name:** Introduction to Aeronautical Engineering
- b. **Course Code:** 03062301PC01
- c. **Prerequisite:** High School
- d. **Rationale:** The Introduction to Aeronautical Engineering in a diploma program provides students with foundational knowledge of key concepts like aerodynamics, propulsion, and aircraft design. It prepares them for careers in aviation and aerospace, fostering critical thinking, problem-solving, and an understanding of safety and industry standards.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Classify flight vehicles and their applications
<b>CLOBJ 2</b>	Apply aerodynamic principles to aircraft performance
<b>CLOBJ 3</b>	Explain aircraft structures and materials.
<b>CLOBJ 4</b>	Understand flight control mechanisms.
<b>CLOBJ 5</b>	Differentiate propulsion systems and their functions

- f. **Course Learning Outcomes:**

<b>CLO 1</b>	Classify flight vehicles and their applications
<b>CLO 2</b>	Apply aerodynamic principles to aircraft performance
<b>CLO 3</b>	Explain aircraft structures and materials.
<b>CLO 4</b>	Understand flight control mechanisms.
<b>CLO 5</b>	Differentiate propulsion systems and their functions

- 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	-	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	<b>History &amp; Background</b> History of Flight, Classification of flight vehicles, UAVs and Their Application	15	3
2	<b>Introduction to Aerodynamics</b> Structure of the Atmosphere, Airfoil, Airfoil Nomenclature, Types of Airfoil, NACA Series, Theories in the Production of Lift, Newton's Basic Laws of Motion, Forces Acting on the Aircraft, Axes of an Aircraft, Types of Drag, Wingtip Vortices, Speed Ranges, Stalls	22	6
3	<b>Introduction to Aircraft Structures</b> Introduction, Nomenclature of Aircraft, Fuselage and its types, Wings, Empennage, Landing Gear, Power plant.	24	8
4	<b>Flight Controls</b> Introduction, Flight Control Systems, Primary Flight Controls: Ailerons, Elevator, Rudder. Secondary Flight Controls—Flaps, Leading Edge Devices, Spoilers, Trim Tabs, fly-by-Wire (FBW) System.	24	8
5	<b>Introduction to Aircraft Propulsion</b> History, Classification of Power plant, Thrust, Reciprocating Engines, Propeller, Turbine Engines, Ramjet Engine, Rocket Engines (Solid, Liquid, and Hybrid Propellant)	15	3

#### 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 | 2<sup>nd</sup> edition
7. "Solid Waste Treatment and Disposal", By G. Tchabanoglous | McGraw Hill Pub.

- a. **Course Name:** Mathematics I
- b. **Course Code:** 03069101BS01
- c. **Prerequisite:** Student must have passed class 10th examination from 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	0	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> <b>Logarithms:</b> Definition, Logarithm as a transformation, Antilogarithm, Rules of Logarithms and examples, Use logarithmic functions for simplifying arithmetic computations. <b>Partial fractions:</b> 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
2	<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.	23	9
3	<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.	20	9
4	<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.	17	8
5	<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.	23	11

**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 (13)

**a. Course Name: Applied Physics**

**b. Course Code: 03069201BS01**

**c. Prerequisite:** Knowledge of Physics, Chemistry and Mathematics up to 12th science level and Biology up to 10th science level

**d. Rationale:** Applied Physics aims to give an understanding of this world both by observation and by prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principles to solve broad-based engineering problems and to understand different technology-based applications.

**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

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

**h. Course Contents:**

Sr. No.	Topic	Weightage	Teaching Hours
1.	<b>Physical world, Units and Measurements</b> 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.	15	8
2.	<b>Electrostatics Current Electricity</b> Coulombs law, unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference, Gauss law. Capacitor and its working, Types of capacitors, Capacitance and its units. Capacitance of a parallel plate capacitor, Series and parallel combination of capacitors (related numerical), dielectric and its effect on capacitance, dielectric break down. Electric Current and its units, Direct and alternating current, Resistance and its units, Specific resistance, Conductance, Specific conductance, Series and parallel combination of resistances. Factors affecting resistance of a wire, carbon resistances and color coding. Ohm's law and its verification, Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only), Concept of terminal potential difference and Electro motive force (EMF) Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy.	25	10
3.	<b>Electromagnetism and Magnetic materials</b> Types of magnetic materials; dia, para and ferromagnetic with their properties, Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and units, magnetization. Concept of electromagnetic induction, Faraday's Laws, Lorentz force (force on	20	8

	moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field. Moving coil galvanometer; principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter.		
4.	<b>Semiconductor Physics</b> Energy bands in solids, Types of materials (insulator, semiconductor, conductor), intrinsic and extrinsic semiconductors, p-n junction, junction diode and V-I characteristics, types of junction diodes. Diode as rectifier – half wave and full wave rectifier (center taped). Transistor; description and three terminals, Types- pnp and npn, some electronic applications (list only). Photocells, Solar cells; working principle and engineering applications	20	10
5.	<b>Modern Physics</b> Lasers: Energy levels, ionization and excitation potentials; spontaneous and stimulated emission; population inversion, pumping methods, optical feedback, Types of lasers; Ruby, He-Ne and semiconductor, laser characteristics, engineering and medical applications of lasers. Fiber Optics: Introduction to optical fibers, light propagation, acceptance angle and numerical aperture, fiber types, applications in; telecommunication, medical and sensors. Nanoscience and Nanotechnology: Introduction, nanoparticles and nanomaterials, properties at nanoscale, nanotechnology, and nanotechnology-based devices and applications.	20	9

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

1. Comprehensive Practical Physics - Volume I and II  
By IN Jaiswal | Laxmi Publishers
2. Text Book of Physics for Class XI& XII (Part-I, Part-II)  
By N.C.E.R.T., Delhi

**j. Experiment List**

Sr. No.	Experiment List
1.	To measure length, radius of a given cylinder, a test tube and a beaker using Vernier calliper and find volume of each object
2.	To determine diameter of a wire, a solid ball and thickness of cardboard using screw gauge.
3.	To find the moment of inertia of a flywheel
4.	Measurement of Viscosity by Redwood Viscometer.
5.	To find the coefficient of linear expansion of the material of a rod.(Young's Modulus).
6.	To find surface tension of a liquid using capillary rise method.
7.	To find frequency of given tuning fork with the help of a sonometer
8.	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>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.	4	1
<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.	4	1
<b>3</b>	<b>Lines, Lettering And Dimensioning</b> Different Types Of Lines. Vertical Capital And Lower Case Letters. Inclined Capital And Lower Case Letters. Numerals And Greek Alphabets. Dimensioning Methods. Aligned Method. Unilateral With Chain, Parallel, Progressive And Combined Dimensioning.	4	1
<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.	7	2
<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).	22	3
<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	25	2

	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>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 Projection, Orthographic Projection, Planes Of Projection. Conversion Of Simple Pictorial Views Into Orthographic Views. Illustrative Problems On Orthographic Projection B.I.S. Code Of Practice	22	3
<b>8</b>	<b>Isometric Projections</b> Isometric Axis, Lines And Planes. Isometric Scales. Isometric View And Isometric Drawing. Difference Between Isometric Projection And Isometric Drawing. Illustrative Problems Limited To Objects Containing Lines, Circles And Arcs Shape Only.	12	2

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

1. A Text Book of Engineering Graphics (TextBook) By P.J.Shah | S.Chand & Company Ltd., New Delhi | 2021st 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. Experiment List**

<b>Sr. No.</b>	<b>Experiment List</b>
1	Practice Sheet Which Includes Dimensioning Methods, Different Types of Line, Construction of Different Polygon, Divide the Line and Angle in Parts, Use of Stencil.
2	Engineering curves Draw Different types of curves like Ellipse, Parabola, Hyperbola, Cycloid, Involute and Spiral
3	Projection of Points and line Draw at Least Four Problems of Projections of Lines and One problem of Projections of Points.
4	Projection of Plane Draw at least four Problems of Projections of Plane Like Rectangle, Hexagon, Circle and Triangle Plane.
5	Orthographic projection Draw at least two Problems of Orthographic Projection from Given 3D Object.
6	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	
0	-	4	2	-	-	100	-	-	100

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

**h. Experiment List:**

Sr. No.	Experiment List
1	Prepare workshop layout with general specifications of equipment's available in various shops.
2	Workshop Safety Practices
3	Fundamentals of unit Conversions, Mechanical Measurements, Materials and Engineering Specifications.
4	Demonstration of Hand Tools and Power Tools with general Specifications.
5	Fitting shop
6	Carpentry shop
7	Sheet metal working
8	Welding shop
9	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, 1682 Nai Darak, 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 studied till 10th 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>	Confidently participate in basic speaking tasks such as role-plays and peer introductions in social and academic contexts.
<b>CLO 2</b>	Apply key grammar rules such as correct tenses, voice, and parts of speech in both oral and written communication.
<b>CLO 3</b>	Demonstrate improved vocabulary through the use of synonyms, antonyms, and one-word substitutions in context.
<b>CLO 4</b>	Draft well-structured creative and formal content with clarity, coherence, and suitable tone.
<b>CLO 5</b>	Comprehend and analyze reading material using strategic reading techniques and apply goal-setting skills practically

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

**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>Ice Breaker + Introducing your Friend Ice Breaker + Introducing your Friend</b> 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	<b>Parts of Speech Parts of Speech</b> Identifying and Using Nouns, Pronouns, and Adjectives Verbs and Adverbs in Sentence Construction Prepositions and Conjunctions: Linking Ideas Interjections and Their Usage in Conversations	12	6
3	<b>UNIT 2 Story Mason Story Mason</b> Elements of a Story (Character, Setting, Plot, Conflict, Resolution) Sequencing Events (Beginning, Middle, End) Using Tenses Appropriately in Narratives	10	4
4	<b>Tenses Tenses</b> Simple Tenses (Present, Past, Future) Continuous Tenses (Present, Past) Perfect Tenses (Present, Past) Perfect Continuous Tense (Present)	10	2
5	<b>Active -Passive Voice Active -Passive Voice</b> Rules of Active & Passive Voice Identifying Active vs Passive Constructions Converting Sentences from Active to Passive and Vice Versa Tense Changes in Passive Voice	10	2
6	<b>Vocabulary Building: One-word Substitution, Synonyms, and Antonyms Vocabulary Building: One-word Substitution, Synonyms, and Antonyms</b> List and Practice Common One-word Substitutions Synonym-Antonym Match-Up Games Use New Words in Sentences/Short Paragraphs	8	2
7	<b>Types of Application Types of Application</b> Formal vs Informal Applications Structure and Format of an Application (Salutation, Body, Closing) Writing Leave Applications	10	2
8	<b>Role Play Role Play</b> Generic Situation(Buying, Asking for Directions, At a Doctor etc) Customer Service and Complaint Handling	10	2
9	<b>Goal Setting Goal Setting</b> SMART Goals (Specific, Measurable, Achievable, Relevant, Time-bound) Short-term vs Long-term Goals Overcoming Obstacles to Goals	12	6
10	<b>Reading Skills- Basic level Reading Skills- Basic level</b> Types of reading	10	2

	Strategies of reading Reading comprehension		
<b>11</b>	<b>REVISION</b> REVISION OF ALL TOPICS	10	2

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

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

- 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:** The course is designed to give developers a general awareness of these and related issues so that every student will start acting as a responsible citizen to make the country and the world a better place to live in.  
 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	-	-	-	40

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>	<b>Ecosystem</b> Structure of ecosystem, Biotic & Abiotic components, Food chain and food web Carbon, Nitrogen, Sulphur, Phosphorus cycle.	10	2
<b>2</b>	<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
<b>3</b>	<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
<b>4</b>	<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
<b>5</b>	<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: Internet of Things: Concepts and Application**
- b. **Course Code: 03061601UE02**
- c. **Prerequisite:** Basic knowledge of computer networks, embedded systems, and wireless communication
- d. **Rationale:** The explosive growth of the Internet of Things (IoT) is transforming various sectors, from agriculture and healthcare to industrial automation. This course aims to equip students with fundamental IoT concepts, including hardware, software, networking, and security aspects. Students will gain practical exposure to IoT platforms and devices, enabling them to design and implement IoT- based solutions.

**e. Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the fundamental concepts, evolution, architecture, and applications of the Internet of Things (IoT).
<b>CLOBJ 2</b>	Explain various IoT communication models, protocols, and networking technologies used in IoT systems
<b>CLOBJ 3</b>	Identify and analyze IoT hardware components such as sensors, actuators, microcontrollers, Arduino, and Raspberry Pi.
<b>CLOBJ 4</b>	Demonstrate knowledge of IoT software platforms including cloud, fog, and edge computing for IoT applications.
<b>CLOBJ 5</b>	Evaluate IoT security challenges, privacy concerns, and ethical issues related to IoT-enabled systems.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Understand the fundamental concepts and importance of IoT.
<b>CLO 2</b>	Analyze different communication protocols and networking components in IoT.
<b>CLO 3</b>	Apply IoT techniques for hardware and software integration.
<b>CLO 4</b>	Evaluate emerging IoT technologies and trends.
<b>CLO 5</b>	Develop IoT-based applications using Arduino and Raspberry Pi.

**g. Teaching & 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>Introduction to IoT</b> Define IoT, Evolution of IoT, Impact of IoT on society and industries, IoT communication models and protocols, Benefits and Challenges of IoT	17	5
2.	<b>IoT Architecture and Protocols</b> IoT Architecture: 1-Tier, 3-Tier, 5-Tier, Perception Layer, Network Layer and Application Layer, Communication Technologies in IoT: Wired Technology and Wireless Technology, IoT Protocols: MQTT , CoAP , HTTP , AMQP	33	10
3	<b>IoT Software and Hardware</b> Components of an embedded IoT system, Types of Sensors and actuators, IoT hardware: Arduino, Raspberry Pi, and Microcontrollers, IoT platforms: Cloud computing, Fog computing, Edge computing	33	10
4.	<b>IoT Security and Ethics</b> IoT security challenges and solutions, Privacy concerns and ethical implications, Case studies on IoT security breaches	17	5

#### i. Text Book and References Book:-

1. "Internet of Things: A Hands-on Approach" By Arshdeep Bahga, Vijay Madiseti | Universities Press
2. Designing the Internet of Things By Adrian McEwen, Hakim Cassimall | Wiley | 1st
3. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things By David Hanes | Cisco Press

#### j. Experiment List

Sr. No.	Experiment List
1	Explain the architecture of IoT (1-Tier, 3-Tier, and 5-Tier architecture) using block diagrams.
2	Study of IoT protocols (MQTT, CoAP, HTTP, AMQP) and their use cases.
3	Understand the basics of Arduino, including architecture, pin configuration.
4	Install and configure the ESP32 board in Arduino IDE and upload a basic program.
5	Understand the basics of Raspberry Pi, including pin configurations and programming setup
6	Study of various IoT sensors and actuators with their applications.
7	Connect a temperature sensor (e.g., LM35 or DHT11) to Arduino and display output on Serial Monitor.
8	LED blinking using Arduino on Proteus using Flowchart.
9	LED blinking without push button using Arduino on Proteus using Flowchart.
10	Design a Flowchart Weather Station with Arduino.
11	Study of IoT privacy concerns and ethical implications.
12	Send sensor data along with the current date and time via email.

13	To understand and differentiate Cloud, Edge, and Fog Computing through diagrams and real-life IoT examples like a smart home or smart farm, highlighting where data processing takes place in each model.
14	Sending dummy sensor data to an IoT cloud platform (Firebase, ThingsBoard).
15	Research and proposal of a future IoT-based innovation.

## Semester 2

- a. **Course Name:** Aircraft Manufacturing Techniques
- b. **Course Code:** 03062302PC01
- c. **Prerequisite:** High School
- d. **Rationale:** Aircraft Manufacturing Techniques equips students with essential knowledge and practical skills in advanced manufacturing techniques, including composite materials, casting, welding, and unconventional machining methods. By the end of the course, students will be prepared to apply these techniques in real-world engineering and manufacturing scenarios, ensuring high-quality production and innovation.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand composite materials and their manufacturing methods.
<b>CLOBJ 2</b>	Learn casting processes such as sand casting, die-casting and investment casting.
<b>CLOBJ 3</b>	Study welding techniques including arc welding, MIG, TIG and laser welding.
<b>CLOBJ 4</b>	Explore machine tools and sheet metal operations like lathes, milling, shearing and bending.
<b>CLOBJ 5</b>	Understand unconventional machining methods like EDM, ultrasonic machining and plasma arc

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Students will be able to select appropriate composite materials and manufacturing methods for various engineering applications
<b>CLO 2</b>	Students will be able to choose and apply different casting processes for producing complex metal parts.
<b>CLO 3</b>	Students will be able to utilize various welding techniques to join different materials with precision and efficiency
<b>CLO 4</b>	Students will be able to operate machine tools and perform sheet metal operations for manufacturing purposes
<b>CLO 5</b>	Students will be able to apply unconventional machining methods for handling complex or hard-to-machine materials

**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	-	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>Weightage</b>	<b>Teaching Hours</b>
<b>1</b>	<b>Manufacturing of Advanced Composites</b> Introduction to Composite materials, Advantages of Composite Materials; Manufacturing methods - Contact moulding: Mould preparation, Spray-up, Hand lay-up, Compression moulding methods: Matched die moulding, forming methods employing gas pressure, Pultrusion, Filament Winding	18	8
<b>2</b>	<b>Casting</b> General principles of various Casting Processes: Sand casting, die-casting, centrifugal casting, Investment casting	18	8
<b>3</b>	<b>Welding</b> Welding Techniques: Arc welding, Gas welding, Friction welding, Laser welding, Electron Beam welding, TIG welding, MIG welding, Soldering and brazing techniques.	20	9
<b>4</b>	<b>Machines, Sheet Metal, Grinding and Riveting Operations</b> General Principle, working and types of Lathes, Shaper, Milling machines, Grinding, Drilling machines, Sheet metal operations: Shearing, Punching, Bending, Forming, Spinning, Drawing etc. Types of rivets & its operations, Grinding Operations	22	10
<b>5</b>	<b>Unconventional Machining</b> Principles of working and applications of EDM, Abrasive jet machining, Ultrasonic machining, Electron beam and Plasma arc machining.	22	10

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

1. Manufacturing Technology By P.N.Rao | Tata McGraw Hill publication
2. Production Technology By R.K. Jain | Khanna Publication
3. Mechanics of Composite Materials and Structures By Madhujit Mukhopadhyay | University Press, 04

**j. List of Practical**

<b>Sr. No.</b>	<b>Practical / Demonstration Title</b>
1	Demonstration of Metal Melting, Metal Pouring, Metal Casting, and Casting Finishing
2	Prepare at least one job using Arc Welding Processes
3	Prepare Jobs: One using Soldering and Another using Brazing
4	Demonstration of Lathe Machine Operations
5	Demonstration of Shaper Machine Operations
6	Demonstration of Drilling Machine Operations
7	Demonstration of Milling Machine Operations
8	Demonstration of Grinding Machine Operations
9	Demonstration and Performance of Riveting Operations
10	Demonstration of EDM (Electrical Discharge Machining) Operations

- a. **Course Name:** Mathematics II  
 b. **Course Code:** 03069102BS01  
 c. **Prerequisite:** 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.

d. **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.

e. **Course Learning Outcomes:**

<b>CLO 1</b>	Solve engineering related problems based on determinant and matrices.
<b>CLO 2</b>	Solve engineering related problems based on concepts of vectors with examples
<b>CLO 3</b>	Analyze 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 solution of differential equations to significant applied problems

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	1	0	4	20	20	-	60	-	100

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

g. **Course Content:**

Sr. No	Content	Weightage	Teaching Hours
1	<b>Determinants and Matrices</b> Elementary properties of determinants up to 3rd order, consistency of equations, Cramer'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	<b>Vector Algebra</b>	20	9

	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.		
<b>3</b>	<b>Co-Ordinate Geometry</b> 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	17	8
<b>4</b>	<b>Integral Calculus</b> 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)	23	10
<b>5</b>	<b>Differential Equations</b> Solution of first order and first degree differential equation by variable separation method (simple problems), Exact differential equations (simple problems), Linear differential equations (simple problems), MATLAB – Simple Introduction.	17	8

#### **h. 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 (13)

- 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 material in nature.
<b>CLO 2</b>	Acquainted with the various Mechanism energy conversion and application of electrochemistry.
<b>CLO 3</b>	Interpret corrosion concept types and mechanism with prevention methods.
<b>CLO 4</b>	Develop skills and understand water treatment methods.

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	<b>Chemical Bonding and Catalysis</b> 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	10	6

	<p>bond, &amp; its characteristics ,Covalent bond &amp; 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.</p>		
<b>2</b>	<p><b>Concepts of Electrochemistry</b>  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(a) Conductivity (b)Specific Conductivity (c) Equivalent conductivity, (d) Molar conductivity.</p>	20	8
<b>3</b>	<p><b>Corrosion &amp; its Control</b>  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
<b>4</b>	<p><b>Water Treatment</b>  Hard water and soft water. Types of hardness of water, Salts</p>	20	7

	<p>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 its 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>		
5	<p><b>Lubricants and Fuels</b>  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><b>Polymer, Elastomers &amp; Adhesives</b>  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 monomers (homo polymer and copolymer) Classification of Polymers on basis of Thermal behavior (Thermoplastics &amp; 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</p>	20	6

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

1. ENGINEERING CHEMISTRY By Jain and Jain
2. A Text Book of Polytechnic Chemistry By V. P. Mehta, Jain Brothers
3. Engineering Chemistry By S. S. Dara
4. Applied Chemistry N Krishnamurthy(New Edition) Edition, Tata McGraw-Hill
5. Textbook Environmental Chemistry and Pollution Control By S. S. Dara

**j. Experiment List**

Sr. No.	Experiment List
1	Determine the strength of given acidic solution using standard solution of base
2	Standardize $KMnO_4$ solution by preparing standard oxalic acid and to estimate ferrous ions.
3	Standardize $Na_2S_2O_3$ solution by preparing standard potassium dichromate and to estimate percentage of copper from brass.
4	Determination of viscosity of given lubricating oil by using Red-wood Viscometer
5	Determination of pH-Values of given samples of Solution by using Universal Indicator and pH-meter.
6	To determine Acid Value of given lubricating Oil.
7	To determine % of moisture content in given coal sample by proximate analysis
8	To determine of saponification value of lubricating oil
9	Determine Flash & Fire point of given lubricating oil.
10	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 (Resistor, Inductor, Capacitor), and factors affecting resistance
<b>CLO 2</b>	Explain the principles of magnetic circuits, electromagnetic induction, and the working of 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	-	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.	Content	Weightage	Teaching Hours
<b>1</b>	<b>Electric Circuit</b> 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	30	8
<b>2</b>	<b>Magnetic Circuit</b> 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	30	8
<b>3</b>	<b>Transformer and Machines</b> 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	20	8
<b>4</b>	<b>Electrical Safety and Protection</b> 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	20	6

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

1. Basic Electrical Engineering By V. K. Mehta | S., Chand & Company (PVT) LTD
2. Electrical Technology Vol-1 By Theraja, B. L. | S. Chand, New Delhi
3. Principles of Electrical Machines By V.K. Mehta and Rohit Mehta, | S. Chand
4. Electrical Technology Vol-II By Theraja, B.L. | S. Chand, New Delhi
5. Electrical Power systems By C. L .Wadhwa | New Age InternationalPublishers. | 5th

**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	
-	-	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 Practical:**

Sr. NO.	Experiment List
1	Describe below components with its working: 1. CPU 2. GPU 3. Motherboard

2	<p>Explain the different types of computer storage devices:</p> <ol style="list-style-type: none"> <li>1. Hard Disk Drive</li> <li>2. Floppy Disk</li> <li>3. HDD</li> <li>4. USB Flash Drive</li> <li>5. Compact Disc</li> <li>6. DVD</li> <li>7. RAM</li> <li>8. ROM</li> </ol>
3	<p>Perform the following email-related tasks:</p> <ol style="list-style-type: none"> <li>1. Create an email account and compose a formal email.</li> <li>2. Draft an invitation email for an event or gathering.</li> <li>3. Design a custom email signature and include it in the message.</li> <li>4. Send the email to at least four recipients.</li> <li>5. Add your teacher's email ID in the CC field and your mentor's email ID in the BCC field.</li> </ol>
4	<p>Explain basics of UNIX OS.</p> <ol style="list-style-type: none"> <li>1. Structure of UNIX OS</li> <li>2. UNIX Kernal</li> <li>3. Shell</li> </ol>
5	<p>Explain following commands for LINUX OS: cd, ls, cat, touch, mkdir, pwd, echo, rmdir, mv, rm, chmod, wc</p>
6	<p>Develop an excel sheet which has record of 50 students result of 5 subjects and marks following analysis:</p> <ol style="list-style-type: none"> <li>1. Fetch the data of the students who has distinction.</li> <li>2. Fetch the data of students with minimum mark in each subject.</li> <li>3. Sort the data based on percentage.</li> </ol>
7	<p>Prepare a table for the student mark sheet using MS Excel. Containing Student Name, 5 Subject name, Total and performing following operation :</p> <ol style="list-style-type: none"> <li>1. Percentage</li> <li>2. Sorting</li> <li>3. Result with grading</li> <li>4. Pass/fail</li> </ol>
8	<p>Create an MS Excel sheet with the following columns: Product Name, Quantity Sold, Price per Unit, Total Price and perform the following tasks:</p> <ol style="list-style-type: none"> <li>1. Calculate Total Price (Quantity Sold × Price per Unit)</li> <li>2. Sort Data (Arrange products in descending order based on Total Price)</li> <li>3. Categorize Products (Label products as "Low Sales" or "High Sales" based on quantity sold)</li> <li>4. Highlight Expensive Products (Use conditional formatting to highlight products with a high price per unit)</li> </ol>
9	<p>Create an MS Excel sheet containing the following columns: Employee Name, Basic Salary, HRA, DA, Deductions, Net Salary and perform the following operations:</p> <ol style="list-style-type: none"> <li>1. Calculate Net Salary (Basic Salary + HRA + DA - Deductions)</li> <li>2. Apply Sorting (Sort employees based on Net Salary in descending order)</li> <li>3. Assign Tax Slab (Based on Net Salary, categorize employees into tax slabs)</li> <li>4. Highlight High Earners (Use conditional formatting to highlight employees with a</li> </ol>

	Net Salary above a certain threshold)
10	Prepare PowerPoint Presentation of your favourite movie using animation
11.	Create a PowerPoint presentation on your dream travel destination, including images, key attractions, and animations to enhance the visual appeal.
12	Design a PowerPoint presentation on a famous personality, highlighting their achievements, life journey, and contributions, using transitions and animations.
13	Create a word file for your resume, containing <ol style="list-style-type: none"> <li>1. Personal details</li> <li>2. Education details</li> <li>3. Experience</li> <li>4. Achievement</li> <li>5. Objective</li> <li>6. Internship</li> <li>7. Key skills</li> </ol>
14	Create and apply a Macro in MS Word to automate formatting tasks: <ol style="list-style-type: none"> <li>1. Record a Macro to apply the following formatting: <ul style="list-style-type: none"> <li>• Change font to Times New Roman, size 12.</li> <li>• Set 1.5 line spacing.</li> <li>• Apply Bold and Underline to headings.</li> <li>• Justify paragraph text.</li> </ul> </li> <li>2. Save the Macro and apply it to a sample document.</li> </ol>
15	Create a formal letter using Mail Merge for sending invitations: <ol style="list-style-type: none"> <li>1. Write an invitation letter for an annual college event.</li> <li>2. Use Mail Merge to insert recipient names and addresses from an Excel sheet.</li> <li>3. Format the letter with: <ul style="list-style-type: none"> <li>• Bold and Center-aligned title.</li> <li>• Left-aligned body text.</li> <li>• 1.5 line spacing.</li> </ul> </li> <li>4. Preview and generate multiple letters with recipient details</li> </ol>
16	Write html code to display : Write html code to display “Hello World” using <H1> to <H6> tags. Set color Red and set alignment Center.
17	Write HTML code to create a table for student marksheet. Apply - center alignment, height: 60%, width :70%, background color: Light sky blue, border color: pink and give the caption “STUDENT MARKSEET”
18	Write HTML code to create a simple registration form.
19	Write HTML code for creating Restaurant menu using List (OL, UL, DL)
20	Write HTML code to print following.
21	Display your family information detail with background color and other formatting using CSS. Background color: light green Text: blue Title: family information
22	Design the web page to display your collage with hyperlink.
23	Create a web page which shows the use of all types of borders in a single page using CSS. <ol style="list-style-type: none"> <li>1. No top border</li> <li>2. Dotted top border</li> <li>3. Dashed top border</li> <li>4. Solid top border</li> </ol>

	5. Double top border
24	Create a sticky social media bar using HTML and CSS.
25	Create a Food Ordering Menu with Checkboxes. Select Your Favorite Food <input type="checkbox"/> Pizza <input type="checkbox"/> Burger <input type="checkbox"/> Pasta <input type="checkbox"/> Ice Cream
26	Design a Contact Information Page with CSS and Hyperlinks. 1. Background Color: Yellow 2. Text Color: Black 3. Title: "My Contact Details" 4. Font Style: Bold 5. Alignment: Center the text 6. Add a Hyperlink: Link to a personal social media profile or portfolio
27	Create an Online Shopping Preference Form. Task: Choose your preferred online shopping categories: Clothing Electronics Home Decor Books Select your preferred shopping platform: Amazon Flipkart eBay Other Select Your Payment Method (Dropdown List): (Dropdown List) Credit Card / Debit Card / PayPal / Cash on Delivery Additional Preferences: (Enter text in a box) Submit Button
28	Create a Technology Review Page with a YouTube Video Tasks to Perform: 1. Add an image of the latest tech gadget (e.g., smartphone, laptop, smartwatch). 2. Write a short review about the gadget (features, pros & cons, pricing). 3. Embed a YouTube video demonstrating the gadget's features. 4. Use CSS to style the page: • Background color: Light Gray (#f0f0f0) • Font style: Arial or Sans-serif • Font color: Dark Blue (#003366) • Text alignment: Justified for the review, Centered for the title • Image alignment: Center with a border and shadow effect • Video alignment: Centered with responsive scaling 5. Add hyperlinks to official product websites and social media pages.
29	Create a Student Report Card Using HTML Table Expected Output: CSS Features: • Border: Solid black border for table and cells • Background Color: Light blue for table header
30	Create a Profile Page with an Image and Styling Tasks to Perform: 1. Add a Profile Picture using the tag.

2. Resize the Image using CSS (width: 150px, height: 150px).
  3. Apply a Border and Shadow to the image.
  4. Set Font Color: Dark Blue (#003366).
  5. Choose Font Type: Arial or Sans-serif.
  6. Set Background Color: Light Gray (#f0f0f0).
  7. Make the Image Circular using CSS (border-radius: 50%).
  8. Align Image Left or Right using CSS float property.
  9. Center the Profile Title using text-align: center.
  10. Add a Short Bio Section with paragraph styling (line-height: 1.5, text-align: justify).
- Expected Output (Visual Representation):
- [Profile Picture (Circular, Shadow)] (Aligned Left/Right)
- Profile Title (Bold, Centered, Dark Blue Font)
- Short Bio (Justified, Clean Layout)

a. **Course Name:** Verbal Ability

b. **Course Code:** 03060002HM01

c. **Prerequisite:** Basic knowledge of Grammar and Communication.

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

e. **Course Learning Objective:**

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

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Identify and explain the fundamentals of listening skills, vocabulary elements, and basic grammar concepts used in English communication.
<b>CLO 2</b>	Demonstrate effective listening and speaking skills in academic and everyday communication situations
<b>CLO 3</b>	Apply appropriate vocabulary (homonyms, idioms, phrasal verbs) and grammar rules (subject–verb agreement, direct–indirect speech) in spoken and written communication.
<b>CLO 4</b>	Analyze situations using logical reasoning and SWOT analysis for personal and professional decision-making.
<b>CLO5</b>	Create structured written and spoken content such as letters, emails, stories, presentations, and short speeches with clarity and appropriate tone.

h. **Teaching & Examination Scheme:**

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

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

**i. Course Content:**

<b>Sr. No.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hours</b>
<b>1</b>	<b>Listening Skills- Basic level</b> Introduction and importance of good Listening, Difference between listening and hearing, Types of listening, Barriers to effective Listening, Traits of a good listener.	10	1
<b>2</b>	<b>Crazy Scientist</b> Invent a product, Presentation of a product.	8	1
<b>3</b>	<b>Advanced Building Vocabulary: Homophones, Homonyms, Homographs, Phrasal verbs &amp; Idioms</b> Homophones and Their Confusing Pairs, Homographs and Contextual Meaning, Homonyms: Words with Multiple Meaning, Common Phrasal Verbs in Conversation, Popular Idioms and Their Real-Life Application	10	2
<b>4</b>	<b>Subject Verb Agreement</b> Basic Rules and Exceptions, Spot the Error & Correction Exercises	8	2
<b>5</b>	<b>SWOT Analysis</b> Introduction to SWOT, Creating a Personal SWOT Chart, Applying SWOT for Goal Setting.	10	1
<b>6</b>	<b>Letter Writing &amp; E-mail Writing</b> Formal vs Informal Letter Format, Structure of a Professional Email (Subject, Greeting, Body, Sign-off), Tone and Language Appropriateness, Common Mistakes in Letters/Emails.	13	2
<b>7</b>	<b>Direct-Indirect Speech</b> Rules for Changing Tenses, Pronouns, and Time Expressions, Reporting Statements, Questions, Commands, and Requests, Reporting Modal Verbs (can & rarr; could, will & rarr; would), Conversion Exercises.	8	2
<b>8</b>	<b>Blood Relation &amp; Alphabetical series</b> Introduction to Family Tree Terms, Types of Blood Relation Questions, Introduction to Alphabetical Series, Common Patterns in Alphabetical Series.	8	1
<b>9</b>	<b>Story Writing by using hints</b> Elements of a Story (Characters, Setting, Plot, Conflict, Resolution, Types of Stories (Narrative, descriptive, imaginative, moral-based, fables).	10	1
<b>10</b>	<b>Speaking Skill Building Introduction</b> Overcoming Stage Fear and Speaking Anxiety, Voice Modulation and Pronunciation Tips, Organizing Thoughts Before Speaking, Basic Public Speaking Formats (Self-Intro, Small Speeches).	15	2

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

1. English Grammar in Use By Raymond Murphy | Cambridge University Press, Pub. Year 2019

2. Word Power Made Easy By Norman Lewis | Goyal Publishers, Pub. Year 2014
3. A Modern Approach to Logical Reasoning By R.S. Aggarwal | S. Chand Publishing, Pub. Year 2018
4. Developing the Leader Within You By John C. Maxwell | Thomas Nelson, Pub. Year 2013
5. Cambridge Listening and Speaking Skills Series By Cambridge University Press | Cambridge University Press, Pub. Year 2017
6. The 7 Habits of Highly Effective People By Stephen R. Covey | Simon & Schuster, Pub. Year 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

**i. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
<b>1</b>	<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
<b>2</b>	<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
<b>3</b>	<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
<b>4</b>	<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	<p><b>Implications of the Holistic Understanding – a Look at Professional Ethics</b></p> <p>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</p>	20	03
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**j. 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
5. Rediscovering India By Dharampal

- a. Course Name:** Industrial Safety and Risk Management
- b. Course Code:** 03061902UE01
- c. Prerequisite:** Basic knowledge of Occupational Health & Safety, and Industrial Management and Risk Assessment, Fire & Explosion Safety. | 03061901PC01 - Elements of Mechanical Engineering
- d. Rationale:** The subject Industrial Safety and Risk Management is crucial for students as it provides fundamental knowledge of workplace hazards, accident prevention, and risk assessment in industries. Understanding safety regulations, emergency procedures, fire prevention, and personal protective equipment (PPE) ensures compliance with legal and ethical responsibilities. The subject also covers risk assessment techniques, accident investigation, and ergonomics, enabling students to identify potential dangers and implement preventive measures.
- e. Course Learning Objective:**

<b>CLOBJ 1</b>	To develop an understanding of industrial safety principles, workplace hazards, accident prevention methods, and safety regulations applicable in industries.
<b>CLOBJ 2</b>	To enable students to identify industrial hazards and perform risk assessment using standard techniques such as HAZOP, FMEA, and risk matrix methods.
<b>CLOBJ 3</b>	To provide knowledge of fire prevention, fire protection systems, firefighting techniques, and emergency response procedures in industrial environments.
<b>CLOBJ 4</b>	To familiarize students with mechanical safety practices, machine guarding, ergonomics, material handling safety, and Lockout/Tagout (LOTO) procedures.
<b>CLOBJ 5</b>	To train students in the selection and use of personal protective equipment (PPE), industrial hygiene practices, and basic first aid for workplace emergencies.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Explain the concepts, importance, and legal requirements of industrial safety, including major safety regulations and standards.
<b>CLO 2</b>	Identify industrial hazards and perform hazard identification and risk assessment using standard techniques such as HAZOP, FMEA, and risk matrices.
<b>CLO 3</b>	Analyze fire hazards and apply appropriate fire prevention, detection, and firefighting systems in industrial settings.
<b>CLO 4</b>	Apply mechanical and machine safety principles, including material handling, machine guarding, ergonomics, and Lockout/Tagout (LOTO) procedures.
<b>CLO 5</b>	Select and use appropriate personal protective equipment (PPE) and apply industrial hygiene practices to control occupational health hazards.

<b>CLO 6</b>	Demonstrate basic first aid and emergency response procedures for common industrial accidents and medical emergencies.
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**g. Teaching & Examination Scheme:**

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

L - Lecture, T - Tutorial, P - Lab, C-Credit T - Theory, P - Practical, CE – Continuous Evaluation, T - Theory, P – Practical, ESE-End Semester Exam

**h. Course Content:**

Sr.	Topic	Weightage	Teaching Hrs.
1.	<b>Introduction To Industrial Safety</b> Definition And Importance Of Industrial Safety, Types Of Industrial Hazards, Accidents - Its Preventions, Causes And Consequences Of Accidents, Safety Regulations And Standards (OSHA, ISO 45001, Factories Act)	15	6
2.	<b>Hazard Identification And Risk Assessment (HIRA)</b> Hazard Identification Techniques (HAZOP, FMEA, What-If Analysis), Risk Assessment And Management, Risk Matrix And Risk Control Measures Security Management Of Industrial Plants, Organization, Administration & Management -Responsibility In The Field Of Safety	15	6
3	<b>Fire Prevention</b> Fire- Fundamentals, Elements, Classification, Initiation & Causes Types, Extinguishing Techniques Agents & Application, Prevention; Electrical Fires & Its Prevention, Fire Detection, Fire Alarm And Firefighting Systems	20	9
4.	<b>Mechanical And Machine Safety</b> Safety In Material Handling (Manual And Mechanical) Machine Guarding Techniques. Safety In Welding, Cutting, And Press Operations, Ergonomics In Industrial Workstations, Lockout/Tagout (LOTO) Procedures	20	9
5.	<b>Personal Protective Equipment (PPE) And Industrial Hygiene</b> Types Of PPE And Their Applications. Respiratory Protection And Noise Control. Occupational Health And Hygiene. Safety Signages And Color Codes	20	9

6	<b>First Aid</b> Principal, Resuscitation, Training, General Rule, Electrical Shocks/Burns, Artificial Respiration- Methods, First Aid For- Open Wounds, Bleeding, Burns& Scalds, Fracture& Dislocations, .Heat Stroke, Eye Injuries, Fainting Etc.	10	6
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**i. Text Book And REFERNCE**

**BOOKS:**

1. Industrial Safety and Environment By Anupama Prashar & Bansal | S.K. Kataria & sons
2. Industrial Safety, Health & Environment management By Sunil S. Rao, R.K. Jain | Khanna Publishers, New Delhi, 2006
3. Industrial Safety Management By N.K. Tara Fdar, K.J Tara Fdar
4. Fundamental of Industrial Safety and Health By K.U. Mistry | Siddharth Prakashan