



# **First Year Curriculum**

**Admission Year 2026-27**

**Diploma Engineering  
Civil Engineering**

**Faculty of Engineering & Technology**

**Parul University**

**Vadodara, Gujarat, India**

## Semester 1

- a. **Course Name:** Building Design and Drafting
- b. **Course Code:** 03061501PC01
- c. **Prerequisite:** Student must be passed class 10th examination from a UGC-recognized board of education. Also, student has interest in technical drawings, building drawings, etc.
- d. **Rationale:** Engineering drawing is considered as a language of engineering communication. For a Diploma holder of civil engineering, it became essential to interpret the civil engineering drawing and also to prepare the working drawing and/ or submission drawing as and when required. Therefore, this course has been designed in such a way that a diploma holder can easily produce detailed civil engineering drawing related to construction of single storey, double storey residential/ public/ any other simple civil engineering structures giving due respect to building regulation and bye-laws as per local authorities. So, that plan gets approval by local civil authorities.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To Interpret the symbols, signs and conventions from the given drawing.
<b>CLOBJ 2</b>	To Prepare line plans of residential and public buildings using principles of planning.
<b>CLOBJ 3</b>	To Prepare submission and working drawing for the given requirement of Load Bearing Structure.
<b>CLOBJ 4</b>	To Prepare submission and working drawing using CAD for the given requirement of Framed Structure.
<b>CLOBJ 5</b>	Draw two-point perspective drawing for given small objects.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Interpret given Civil engineering drawing - symbols, conventions, abbreviations and scale.
<b>CLO 2</b>	Plan buildings as per principles of planning, building bye-laws and regulation considering green building aspects.
<b>CLO 3</b>	Prepare working drawings for the given requirements of Load bearing and Framed structures.
<b>CLO 4</b>	Draw two-point perspective drawing for given small objects.
<b>CLO 5</b>	Propose appropriate building component as per its scope.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	4	4	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
1	<b>Introduction to Civil Engineering Drawing</b> Various types of drawings with their importance and uses. Types of projections adopted. First angle projection, Third angle projection Combinations of first and third angle projection, Advantages and dis-advantages of each type of projection, Situations where each of the above projection is used, Symbols, Conventions and Abbreviations Commonly used symbols and conventions for Material of construction, Electric fittings, Water supply and Sanitary, Furniture, Graphical symbols for doors and windows, etc. ,Abbreviations used for the above Types of lines- visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. , Scale, Definition, Scales used for various types of drawings, Sizes of various standard papers.	15%	4

<b>2</b>	<b>Planning of Building</b> Types of Residential Buildings, Site Selection for Residential Building. Principles of planning for Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Circulation, Furniture requirements, Sanitation, Economy Building bye-law of sanctioning authorities for residential buildings. Importance of Building bye-laws, Minimum dimensions for Plot area, built up area, super built- up area, plinth area, carpet area, floor area and FSI,FAR, size of rooms, margins, height, passages, ventilation, circulation and others Colour code in Civil Engineering drawing. Approval procedure with respect to bye-laws. Green Building, Concept and components of green building. Evaluation system of various authorities (GRIHA,IGBC) Line plans for Single storey Residential Building as per principles of planning.	25%	6
<b>3</b>	<b>Drawings for Residential Building Planning</b> Drawing of Load Bearing Structure, Drawing of Single storey Load Bearing residential building (2 BHK) with staircase, Data drawing –detailed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement, Planning and design of stair case- Rise and Tread for residential building, Foundation plan of Load bearing structure, Drawing of Framed Structure. Drawing of Two storey Framed Structure (G+1), residential building (2 BHK) with stair- case., Data drawing – detailed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. Planning and design of staircase Rise and Tread for residential and public building. Foundation plan of Framed Structure. Details of RCC footing, Column, Beam, Chajjas, Lintel, Staircase and slab.	35%	10
<b>4</b>	<b>Perspective Drawing</b> Introduction of perspective view and terms used in perspective drawing., Types of perspective, Two Point Perspective of small objects only such as steps, monuments, pedestals., Two Point Perspective view of single room residential building.	15%	6
<b>5</b>	<b>Building Components</b> Draw sketches different building components: Wall and column footing, floors and floorings, roofs and roof coverings, false ceiling, doors, windows, ventilators, beam and slab reinforcement, etc.	10%	4

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

1. Building Drawing By M. G. Shah, C. M. Kale and S. Y. Patki | Tata McGraw Hill, New Delhi
2. Civil Engineering Drawing By MalikR.S.,Meo,G.S
3. A Course in Civil Engineering Drawing By Sikka, V.B.
4. Civil Engineering Drawing By Subhash C Sharma & Gurucharan Singh

**j. Experiment List:**

<b>Exp. No.</b>	<b>Name of the Experiment</b>
<b>1</b>	Interpretation of building drawings approved under local Authority.
<b>2</b>	Draw symbols, conventions and Abbreviations in A3 sizes ketch book.
<b>3</b>	Study of building bye-laws act and national building code (NBC).
<b>4</b>	Draw Building Components in A3 size sketchbook: 1. 200mm and 300mm Thick wall foundation, 2. Components of Building, 3. Components of Staircase, 4. Draw different types of staircases, 5. RCC Lintel with chajja, 6. Column footing, 7. Types of Roof, 8. Types of doors, 9. Types of window, 10. RCC Beam with reinforcement details, 11. RCC slab with reinforcement details, 12. Types of flooring
<b>5</b>	Draw detail plan on drawing sheet–1 (A1 Size) Line plan, detailed plan, elevation and section of existing building (actual Measurement Drawing).
<b>6</b>	Draw detail of foundation plan of one room building/two Room building in sketchbook.
<b>7</b>	Draw working drawings sheet-2(A1-size) for single storied residential building (Tenement) on 120sq.m plot with scale and show following detail: GF plan with elevation, section and openings schedule.
<b>8</b>	Develop perspective view of steps by two-point perspective method. Drawingsheet-4 (A2-size)

- a. **Course Name:** Mathematics - I  
 b. **Course Code:** 03069101BS01  
 c. **Prerequisite:** Student must have passed the 10<sup>th</sup>-grade examination from recognized board of education. Also, students have 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	
2	1	-	3	20	20	-	60	-	100

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

h. **Contents:**

Sr.	Topic	Weightage	Teaching Hrs.
1.	<b>Unit I: Logarithms:</b> 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%	4
2.	<b>Unit II: Trigonometry:</b> Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Trigonometric identities, Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of all trigonometric functions	23%	7
3.	<b>Unit III: Permutations and Combinations:</b> Value of nPr and nCr with related examples, First principal of Mathematical Induction (without proof) Binomial theorem: Binomial theorem (without proof) for positive integral	9%	3

	index (expansion and general form); binomial theorem for rational index (expansion without proof) first and second binomial approximation with applications to engineering problems		
4.	<b>Unit IV:</b> <b>Complex Numbers:</b> Definition of a complex number, real and imaginary parts of a complex number, Polar and Cartesian representation 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.	17%	4
5.	<b>Unit V: Calculus:</b> Definition of function; Concept of limits and standard forms of limits and $\lim_{x \rightarrow a} (1+x)^{\frac{1}{x}}$ Definition of continuous function and examples. 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.	34%	10

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

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics (Diploma Stream), H.K. Dass, S. Chand Publishing
3. Mathematics for Polytechnic, S.P. Deshpande, Pune Vidyarthi Griha Prakashan. Polytechnic Mathematics (Made Easy) (Applied Mathematics), Manjeet Singh

- 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:**

a) Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-		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:**

Sr.	Topic	Weightage	teaching Hrs.
1.	<b>Unit 1: 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.	20 %	10
	<b>Unit 2: Force and Motion:</b> Scalar and Vector quantities – examples,	20%	9

2.	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.		
3	<b>Unit 3: Work, Power and Energy:</b> 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).	20%	8
4.	<b>Unit 5: Properties of Matter:</b> 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.	20%	10
5.	<b>Unit 6: Heat and Thermometry:</b> 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, surface and cubical expansions and relation amongst them, Co-efficient of thermal conductivity, engineering applications.	20%	9

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

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. Engineering Physics by DK Bhattacharya & PoonamTandan; Oxford University Press, New Delhi.
6. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
7. Practical Physics by C. L. Arora, S. Chand Publication. E-books/e-tools/ learning physics software/websites etc.

**j. Experiment List:**

Sr. No	Experiment List
1	To measure length, radius of a given cylinder, a test tube and a beaker using a Vernier calliper and find Volume of each object.
2	To determine diameter of a wire, a solid ball and thickness of cardboard using a 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 the co-efficient of friction between wood and glass using a horizontal board.
7	To find surface tension of a liquid using capillary rise method
8	To find frequency of given tuning fork with the help of a sonometer.
9	To determine radius of curvature of a convex and a concave mirror/surface using a spherometer.
10	To determine Force constant with the help of periodic time of oscillations of spring
11	To verify triangle and parallelogram law of forces.
12	To determine force constant of a spring using Hook's Law.

- a. **Course Name:** Basic Engineering Drawing  
 b. **Course Code:** 03061901ES01  
 c. **Prerequisite:** Drawing basic knowledge  
 d. **Rationale:** Engineering Drawing is a fundamental language of engineers and an essential communication tool in all fields of engineering. This subject Builds the foundation for interpreting and preparing technical drawings.  
 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
1	<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.	5	1
2	<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.	5	2
3	<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.	5	2
4	<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	10	2
5	<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).	25	3
6	<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.	25	2
7	<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.	25	3

**i. 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

### Experiment List

<b>Sr. 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:** 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>	1. 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					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
-	-	4	-	2	-	-	100	-	-	100

**SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

**h. List of Experiments**

Sr. No.	List of Experiments
1	Describe below components with its working: 1. CPU 2. GPU 3. Motherboard
2	Explain the different types of computer storage devices: 1. Hard Disk Drive 2. Floppy Disk

	<ul style="list-style-type: none"> <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> </ul>
3	<p>Perform the following email-related tasks:</p> <ul 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> </ul>
4	<p>Explain basics of UNIX OS.</p> <ul style="list-style-type: none"> <li>1. Structure of UNIX OS</li> <li>2. UNIX Kernal</li> <li>3. Shell</li> </ul>
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> <ul 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> </ul>
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> <ul style="list-style-type: none"> <li>1. Percentage</li> <li>2. Sorting</li> <li>3. Result with grading</li> <li>4. Pass/fail</li> </ul>
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> <ul 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> </ul>
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> <ul 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 Net Salary above a certain threshold)</li> </ul>
10	<p>Prepare PowerPoint Presentation of your favourite movie using animation.</p>
11	<p>Create a PowerPoint presentation on your dream travel destination, including images, key attractions, and animations to enhance the visual appeal.</p>
12	<p>Design a PowerPoint presentation on a famous personality, highlighting their achievements, life journey, and contributions, using transitions and animations.</p>
13	<p>Create a word file for your resume, containing</p> <ul 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> </ul>

14	<p>Create and apply a Macro in MS Word to automate formatting tasks:</p> <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	<p>Create a formal letter using Mail Merge for sending invitations:</p> <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>

**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:** 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	-	-	-	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>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.,	25%	3

	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.		
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:** 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 course aims to develop proficiency in writing efficient Python code for problem-solving and real-world applications. It also covers core concepts like data structures, functions, and OOP principles.  
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
				T	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
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 Reference Book:**

- “Basic Computer Course Made Simple”, by Satish Jain | BPB Publication
- “Basic Computer Engineering” By Sanjay Silakari and Rajesh K Shukla | Wiley India Pvt. Limited, Pub. Year 2011
- “Computer Fundamentals”, By P.K. Sinha | BPB Publications.
- “HTML & CSS: The Complete Reference”, By Thomas A. Powell | McGraw Hill

## j. Experiment List

Sr. No.	Experiment List
1	Study of IoT applications in different industries.
2	Study various IoT protocols – 6LowPAN, IPv4/IPv6, Wifi, Bluetooth, MQTT.
3	Analysis of IoT's impact on society and industries.
4	Study of different IoT architectures (1-Tier, 3-Tier, 5-Tier).
5	Comparison of wired and wireless communication technologies in IoT.
6	Study of IoT protocols (MQTT, CoAP, HTTP, AMQP) and their use cases.
7	Study of IoT hardware components: Arduino, Raspberry Pi, and Microcontrollers.
8	Study of IoT hardware components: Arduino, Raspberry Pi, and Microcontrollers.
9	Study of various IoT sensors and actuators with their applications.
10	Study of IoT security challenges and threats.
11	Case study on major IoT security breaches (e.g., Mirai botnet).
12	Study of IoT security solutions (encryption, authentication, secure architectures).
13	Research and proposal of a future IoT-based innovation.
14	Study of IoT privacy concerns and ethical implications.
15	Interfacing a DHT11 sensor to check temperature.
16	Sending dummy sensor data to an IoT cloud platform (Firebase, ThingsBoard).

## Semester 2

- a. **Course Name:** Construction Materials and Technology
- b. **Course Code:** 03061502PC01
- c. **Prerequisite:** Student must be passed class 10th examination from a UGC-recognized board of education. Also, student has a curiosity about modern construction techniques, materials, and technologies to explore advancements in the field.
- d. **Rationale:** "Construction Material and Technology" is a core subject in civil engineering that focuses on the properties, applications, and advancements in construction materials and techniques. It provides students with essential knowledge of materials like concrete, steel, and composites, enabling the design of safe and durable structures. The subject integrates modern construction technologies, fostering innovation and efficiency to meet evolving industry standards. Emphasis is placed on sustainability through the study of eco-friendly materials and energy-efficient technologies, aligning with global environmental goals. It also develops critical thinking and problem-solving skills, allowing students to analyze material behavior and tackle real world construction challenges. Practical considerations, such as material costs and availability, prepare students for informed decision-making in professional roles.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Describe the manufacturing, properties, and applications of artificial materials like cement, bricks, steel, and paints.
<b>CLOBJ 2</b>	Select suitable natural materials (stones, aggregates, bamboo, wood) based on criteria for specific engineering applications.
<b>CLOBJ 3</b>	Perform and interpret laboratory tests on aggregates and bricks to verify their quality against standard specifications.
<b>CLOBJ 4</b>	Identify the sequence and methods of construction for foundations, masonry, damp-proofing, and roofing systems.
<b>CLOBJ 5</b>	Determine the appropriate use of construction machinery, including earth-moving, hauling, and concreting equipment.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Explain the properties and applications of construction materials.
<b>CLO 2</b>	Select Natural Construction Materials for intended applications.
<b>CLO 3</b>	Examine the quality of construction materials in the laboratory.
<b>CLO 4</b>	Identify construction methods of sub-structure & super-structure of buildings.
<b>CLO 5</b>	Make use of appropriate construction tools, plants and equipment.

g. **Teaching and 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	Topic	Weight age	Teaching Hrs.
1	<b>Artificial Construction Material Cement</b> , Manufacturing process of Cement, Hydration of cement, Types of Cement, Tests on Cement, Mortar and Plaster, Types of Mortar and Plaster, Properties of Good quality Mortar and plaster, Bricks and Blocks, classification of Brick and Blocks, manufacturing of brick and Blocks, types brick and blocks, applications of brick and blocks, tests on brick and blocks, Clay and Ceramic Products (any Two), manufacturing of Clay and Ceramic Products, Classification of Clay and Ceramic Products , Properties of Clay and Ceramic Products, tests on Clay and Ceramic Products, Steel, classification of Steel, types of steel, applications of steel and other metals, Paints and Varnishes , classification of Paints and varnishes, types of Paints and varnishes, applications of Paints	30%	15

	and Varnishes, Bitumen and bituminous mixes, Source and manufacturing of Bitumen, composite.		
2	<b>Natural Construction Materials</b> Stones: classification of Stones, applications of Stones Aggregates, Criteria to select aggregate, Classification of aggregate, Properties of aggregate, Tests on aggregate, Bamboo: Properties of bamboo as Construction material applications of Bamboo in construction industry Wood: classification of Woods, applications of Woods Lime: Classification of Lime, Properties of lime as construction material, Use of Lime as Construction Material.	20%	10
3	<b>Introduction to Civil Engineering Structures</b> Types and Components of various Civil Engineering Structures like Buildings, bridges, roads, hydraulic structures, and tunnels.	10%	4
4	<b>Elements of Sub-structure and Super-structure of Buildings</b> Foundations, Classification of Foundation, construction procedure of foundation. Anti-termite, Objectives of anti termite treatment, Chemicals used in Anti termite treatment, Application procedure and Precaution taken during application. Damp-proofing, Objectives of Damp-proofing, Material used in Damp-proofing, Application procedure and Precaution taken during application. Introduction to masonry construction, Types of masonry (brick, stone, concrete block), Materials used in masonry, Bonding patterns, Construction techniques, Load-bearing and non load-bearing masonry, Advantages and limitations of masonry structures. Introduction to RC construction, Types of RC elements (beams, columns, slabs, footings, walls), Properties of reinforced concrete. Definition and importance of openings, Types of openings (doors, windows, ventilators, skylights), Materials used for openings, Functions and significance of openings in buildings. Types of roofing (flat, pitched, shell, domes, trusses), Roofing materials (tiles, metal sheets, RCC, asphalt shingles), Construction techniques, Waterproofing and insulation in roofing. Introduction to building transportation systems, Staircases (types, design, materials), Elevators (types, components, installation, safety features), Escalators and ramps.	30%	12
5	<b>Construction Tools, Plants and Equipment</b> Earth moving, hauling & hoisting Machines, compacting machines, concreting Machines, pumping and dewatering System, asphalt laying & piling machine, tunnelling machine.	10%	4

**i. Reference Books:**

1. Building construction By B.C. punmia | Laxmi Publication, New Delhi
2. Building construction By S.C. Rangwala | Charotar Publishing House Pvt. Ltd. Anand
3. Building materials By S. K. Duggal | New Age International
4. 'Building Construction' Metric – Volume 1 By W.B McKay, Pearson | Orient Longman Pvt. Ltd.
5. Concrete Technology By M.L.Gambhir | Tata McGraw-Hill Education

**j. Experiment List:**

Exp. No.	Name of the Experiment
1	Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report.
2	Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties.
3	Measure dimensions of 10 bricks and find average dimension and weight. Perform field tests dropping, striking and scratching by nail and correlate the results obtained.
4	Prepare the cement mortar of proportion 1:3 or 1:6 using cement and sand.
5	Tests on Bricks: Compressive strength of bricks.
6	Tests on Bricks: Water absorption of bricks.

7	Tests on Bricks: Efflorescence in Bricks.
8	Preparation of report/poster/chart for Planning and execution of construction activities of a building.
9	Preparation of report/poster/chart for Equipment and Machine Used in Construction industry.
10	Preparation of report/poster/chart for Modern Construction Materials.

- 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 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

g. **Teaching and Examination Scheme :**

Teaching Scheme				Examination Scheme					Total
L	T	L	C	Internal Evaluation			ESE		
				MSE	CE	P	T	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.	Topics	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> 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
3	<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
4	<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
----------	---	------	---

**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 Chemistry  
 b. **Course Code:** 03069501BS01  
 c. **Prerequisite:** Understanding of basic knowledge of science for the 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 and 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- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. **Course Content:**

Sr No	Topic	Weight age	Teaching Hrs.
1	<b>Chemical Bonding and Catalysis</b> Atomic structure and orbital concepts. 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 Catalysis.	10%	6
2	<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 &	20%	8

	<p>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</p> <p>(a) Conductivity (b) Specific Conductivity (c) Equivalent conductivity (d) Molar conductivity.</p>		
3	<p><b>Corrosion &amp; its Control</b></p> <p>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><b>Water Treatment</b></p> <p>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,</p> <p>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</p> <p>,Sedimentation , Coagulation , Filtration, Sterilization of water by chlorination Break-point chlorination- Graph. Enlist Indian standard specification of drinking water.</p>	20%	7
5	<p><b>Lubricants and Fuels</b></p> <p>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.</p> <p>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></p> <p>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</p>	20%	6

	<p>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>		
--	---	--	--

**i. Reference Books:**

1. ENGINEERING CHEMISTRY by JAIN & JAIN; DHANPAT RAI
2. A Text Book of Polytechnic Chemistry V.P. Mehta; Jain Brothers
3. A Text Book of Applied Chemistry. J. Raja ram
4. Engineering Chemistry S S. Dara

**j. Experiments List**

Sr. No	List of Experiments
1	Determine the strength of given acidic solution using standard solution of base
2	Standardize KMnO <sub>4</sub> solution by preparing standard oxalic acid and to estimate ferrous ions.
3	Standardize Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> 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:** Applied Mechanics  
 b. **Course Code:** 03061502ES01  
 c. **Prerequisite:** Basic knowledge of Laws and Principles of Mathematics and Physics.  
 d. **Rationale:** The primary purpose of the study of Engineering Mechanics is to develop the capacity to predict the effects of force while carrying out the creative design functions of engineering. The course addresses the modeling and analysis of static equilibrium problems with an emphasis on real world engineering applications and problem solving. It bridges the gap between physical theory and its application to technology.  
 e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Apply the principles of mechanics and vector resolution to identify force systems and determine unknown forces in concurrent systems.
<b>CLOBJ 2</b>	Calculate the Centroid of 2D plane figures and the Centre of Gravity of 3D simple/composite solids using the principle of moments.
<b>CLOBJ 3</b>	Analyze coplanar concurrent force systems using analytical and graphical laws (Parallelogram, Triangle, Polygon) and Lami's Theorem.
<b>CLOBJ 4</b>	Analyze coplanar non-concurrent force systems to determine resultants, equilibrium positions, and support reactions for various beams.
<b>CLOBJ 5</b>	Apply the laws of static friction to solve equilibrium problems for bodies on level and inclined surfaces.
<b>CLOBJ 6</b>	Evaluate the performance of simple lifting machines by calculating Mechanical Advantage, Velocity Ratio, and Efficiency.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Apply basics of mechanics to identify the force systems and determine unknown force for coplanar concurrent force system.
<b>CLO 2</b>	Find the centroid and center of gravity of various components in engineering systems.
<b>CLO 3</b>	Apply principle of moment to analyses coplanar concurrent force system.
<b>CLO 4</b>	Apply principle of moment to analyses coplanar non-concurrent force system.
<b>CLO 5</b>	Apply principle of friction to analyses static equilibrium of coplanar concurrent force system.
<b>CLO 6</b>	Select relevant simple lifting machine(s) for given purpose.

g. **Teaching and 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	Topic	Weight age	Teaching Hrs.
1	<b>Basics of Mechanics</b> Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a Force. Newton's Laws of Motion. Principle of transmissibility of force, Principle of Superposition. Force system and its classification.	10%	4
2	<b>Centroid &amp; Centre of Gravity</b> Concept of Centroid, Centre of Gravity. Axis of reference and Axis of Symmetry. Centroid of One Dimensional geometrical figures using principle of moment. Centroid of Two Dimensional geometrical Plane figures (Square, Rectangle, Triangle, Circle, Semi-circle, Quarter circle) & Composite figures (not more than three figures) using first moment of area. Centre of Gravity of Simple solids (Cube, Cuboid, Cone, Cylinder, Sphere, and Hemisphere) & Composite solids (not more than two solids) using first moment of mass.	15%	7

3	<p><b>Coplanar Concurrent Forces</b>  Resolution of a force - Orthogonal components of a force. Equilibrium and Equilibrant, Free body and Free body diagram, conditions of equilibrium. Resultant of forces using analytical methods for the forces acting at a point: 1. Law of Parallelogram, 2. Law of triangle, and 3. Law of Polygon. Lami's Theorem – statement and explanation, Application for various engineering problems using analytical methods.</p>	25%	12
4	<p><b>Coplanar Non-Concurrent Forces</b>  Moment of a force, Varignon's Theorem, Couple, application, properties of couple, conditions of equilibrium. Resultant of force, Equilibrium forces and its position using analytical methods for the coplanar non - concurrent force system. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical point load, uniformly distributed load, uniformly varying load). Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load.</p>	25%	12
5	<p><b>Friction Friction,</b>  Types of Friction and laws of friction, limiting equilibrium, limiting friction. Coefficient of friction, angle of friction, angle of repose, relation between coefficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.</p>	15%	06
6	<p><b>Simple Lifting Machines</b>  Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines. Application of law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency. Reversible and non-reversible machines, conditions for reversibility. Velocity ratios of Simple wheel and axle, Differential axle and Wheel and, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack.</p>	10%	4

**i. Reference Books:**

1. ENGINEERING CHEMISTRY by JAIN & JAIN; DHANPAT RAI
2. A Text Book of Polytechnic Chemistry V.P. Mehta; Jain Brothers
3. A Text Book of Applied Chemistry. J. Raja ram
4. Engineering Chemistry S S. Dara

- a. **Course Name:** Computer Aided Drafting  
b. **Course Code:** 03061502ES02  
c. **Prerequisite:** Students must be proficient in drawing of simple civil engineering structures  
d. **Rationale:** Civil engineering drawings and visual representations are often created using computer-aided drafting before construction. Advancements in civil engineering structures have led to new features in structures. Additionally, the structural design has been updated. This highlights the significance of drawing and drafting software for visualizing structures and enhancing comprehension. In addition, user-friendly sketching software has become essential due to technological advancements. Knowledge of Computer Aided Drafting is now more crucial than ever. Civil Engineers use drawing to efficiently represent engineering information such as plans, elevations, sections, foundations, and construction elements for client and authority. Computer-aided drafting (CA Drafting) simplifies and significantly reduces the time required for drawing preparation. The use of CAD technologies such as AutoCAD, have simplified civil engineering drawings and saved time.

e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Utilize primary drawing commands (Line, Circle, Polygon) and coordinate systems to create accurate 2D architectural layouts.
<b>CLOBJ 2</b>	Transform 2D profiles into 3D models using extrusion and boolean operations to visualize complex geometrical figures.
<b>CLOBJ 3</b>	Construct comprehensive engineering documentation, including floor plans, elevations, and sections, for residential structures.
<b>CLOBJ 4</b>	Perform advanced editing and modification of existing drawings using layer management, scaling, and printing tools.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Apply basic CAD command to develop 2D drawings of residential & commercial building using AutoCAD.
<b>CLO 2</b>	Apply basic CAD command to develop 3D drawings of residential & commercial building using AutoCAD.
<b>CLO 3</b>	Prepare detailed engineering and construction drawings and designs required for civil engineering activities.
<b>CLO 4</b>	Use advanced CAD commands for edit/modification of existing drawings as per needs and suggestions and print the same.

g. **Teaching and Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	-	4	2	0	0	100	100	0	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.	Topic
1	Draw Basic 2D objects such as line circle, polygon - (at least 04 objects).
2	Draw simple plan of a rectangular room or layout of given dimensions -- 02 drawings.
3	Draw a drawing of a plan of one BHK house.
4	Draw a drawing of a plan of two BHK house.
5	Draw Four 3D Geometrical Figures.
6	Develop Plan, Elevation and 3D Views of One Residential Building.

i. **Reference Links**

1. Auto CAD, Civil Architect.
2. [www.Autodesk.com](http://www.Autodesk.com)

- 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:**

<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>	Understand the use of vocabulary including homonyms, idioms, and phrasal verbs in spoken and written communication.
<b>CLO 2</b>	Apply grammatical structures related to subject–verb agreement, direct– indirect speech and active passive voice in sentences and short texts.
<b>CLO 3</b>	Apply formal and informal letters, professional emails, and simple product presentations using appropriate structure, tone, and language conventions.
<b>CLO 4</b>	Analyse personal SWOT charts, simple problem-solving responses, and guided stories by organizing ideas logically.
<b>CLO 5</b>	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	Tut	Lab	C	Internal Evaluation			ESE		Total
				T	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.	Lecture Content	Weightage	Teaching Hours
1	Active – Passive Voice <ul style="list-style-type: none"> <li>• Rules of Active and Passive</li> <li>• Structures of Passive Voice</li> <li>• Conversion from Active to Passive and Vice Versa</li> </ul>	10%	1
2	Crazy Scientist <ul style="list-style-type: none"> <li>• Invent a product</li> <li>• Presentation of a product</li> </ul>	10%	1
3	Vocabulary Building: Homophones, Homonyms, Homographs, Phrasal Verbs & Idioms <ul style="list-style-type: none"> <li>• Homophones and Their Confusing Pairs</li> <li>• Homographs and Contextual Meaning</li> <li>• Homonyms: Words with Multiple Meanings</li> </ul>	12%	2

	<ul style="list-style-type: none"> <li>• Common Phrasal Verbs in Conversation</li> <li>• Popular Idioms and Their Real-Life Application</li> </ul>		
4	<b>Subject–Verb Agreement</b> <ul style="list-style-type: none"> <li>• Basic Rules and Exceptions</li> <li>• Spot the Error &amp; Correction Exercises</li> </ul>	10%	2
5	<b>SWOT Analysis</b> <ul style="list-style-type: none"> <li>• Introduction to SWOT</li> <li>• Creating a Personal SWOT Chart</li> <li>• Applying SWOT for Goal Setting</li> </ul>	8%	1
6	<b>Letter Writing &amp; E-mail Writing</b> <ul style="list-style-type: none"> <li>• Formal vs Informal Letter Format</li> <li>• Structure of a Professional Email</li> <li>• (Subject, Greeting, Body, Sign-off)</li> <li>• Tone and Language Appropriateness</li> <li>• Common Mistakes in Letters/Emails</li> </ul>	12%	2
7	<b>Direct-Indirect Speech</b> <ul style="list-style-type: none"> <li>• Rules for Changing Tenses,</li> <li>• Pronouns, and Time</li> <li>• Expressions</li> <li>• Reporting Statements, Questions, Commands, and Requests</li> <li>• Reporting Modal Verbs</li> </ul>	8%	2
8	<b>Picture Perception</b> <ul style="list-style-type: none"> <li>• Sequencing ideas – Beginning-Middle - End</li> <li>• Description</li> <li>• Creating short narratives based on Pictures</li> </ul>	8%	1
9	<b>Story Writing Using Hints</b> <ul style="list-style-type: none"> <li>• Elements of a Story (Characters, Setting, Plot, Conflict, Resolution)</li> <li>• Types of Stories (Narrative, descriptive, imaginative, moral-based, fables)</li> </ul>	10%	1
10	<b>Self-Introduction</b> <ul style="list-style-type: none"> <li>• Overcoming Stage Fear and Speaking Anxiety</li> <li>• Voice Modulation and Pronunciation Tips</li> <li>• Organizing Thoughts Before Speaking</li> <li>• Basic Public Speaking Formats (Self-Intro, Small Speeches)</li> </ul>	12%	2
		100%	15

**i. 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)*.
6. Cambridge University Press, various editions, 2017–2020.
7. Covey, Stephen R. *The 7 Habits of Highly Effective People*. Simon & Schuster, 2020.

**j. Experiment List:**

Sr.No.	List of Experiments
1	<b>Active – Passive Voice</b> <ul style="list-style-type: none"> <li>• Rules of Active and Passive</li> <li>• Structures of Passive Voice</li> <li>• Conversion from Active to Passive and Vice Versa</li> </ul>
2	<b>Crazy Scientist</b> <ul style="list-style-type: none"> <li>• Invent a product</li> </ul>

	<ul style="list-style-type: none"> <li>• Presentation of a product</li> </ul>
3	<p>Vocabulary Building: Homophones, Homonyms, Homographs, Phrasal Verbs &amp; Idioms</p> <ul style="list-style-type: none"> <li>• Homophones and Their Confusing Pairs</li> <li>• Homographs and Contextual Meaning</li> <li>• Homonyms: Words with Multiple Meanings</li> <li>• Common Phrasal Verbs in Conversation</li> <li>• Popular Idioms and Their Real-Life Application</li> </ul>
4	<p>Subject-Verb Agreement</p> <ul style="list-style-type: none"> <li>• Basic Rules and Exceptions</li> <li>• Spot the Error &amp; Correction Exercises</li> </ul>
5	<p>SWOT Analysis</p> <ul style="list-style-type: none"> <li>• Introduction to SWOT</li> <li>• Creating a Personal SWOT Chart</li> <li>• Applying SWOT for Goal Setting</li> </ul>
6	<p>Letter Writing &amp; E-mail Writing</p> <ul style="list-style-type: none"> <li>• Formal vs Informal Letter Format</li> <li>• Structure of a Professional Email (Subject, Greeting, Body, Sign-off)</li> <li>• Tone and Language Appropriateness</li> <li>• Common Mistakes in Letters/Emails</li> </ul>
7	<p>Direct-Indirect Speech</p> <ul style="list-style-type: none"> <li>• Rules for Changing Tenses, Pronouns, and Time</li> <li>• Expressions</li> <li>• Reporting Statements, Questions, Commands, and Requests</li> <li>• Reporting Modal Verbs</li> </ul>
8	<p>Picture Perception</p> <ul style="list-style-type: none"> <li>• Sequencing ideas – Beginning-Middle - End</li> <li>• Description</li> <li>• Creating short narratives based on Pictures</li> </ul>
9	<p>Story Writing Using Hints</p> <ul style="list-style-type: none"> <li>• Elements of a Story (Characters, Setting, Plot, Conflict, Resolution)</li> <li>• Types of Stories (Narrative, descriptive, imaginative, moral-based, fables)</li> </ul>
10	<p>Self-Introduction</p> <ul style="list-style-type: none"> <li>• Overcoming Stage Fear and Speaking Anxiety</li> <li>• Voice Modulation and Pronunciation Tips</li> <li>• Organizing Thoughts Before Speaking</li> <li>• Basic Public Speaking Formats (Self-Intro, Small Speeches)</li> </ul>

- a. **Course Name:** Plant Layout and Fire Safety  
b. **Course Code:** 03061902UE02  
c. **Prerequisite:** Knowledge of Plant Layout and Fire Safety.  
d. **Rationale:** Familiarity with risk assessment, hazard identification, and emergency response procedures is beneficial, as these form the basis for effective plant layout planning and fire safety management.  
e. **Course Learning Objectives:**

<b>CLOBJ 1</b>	Develop understanding of the basic concepts, objectives, principles, and types of plant layouts used in industrial environments.
<b>CLOBJ 2</b>	Apply systematic procedures, tools, and techniques for effective plant layout design and material flow planning.
<b>CLOBJ 3</b>	Understand the fundamentals of fire safety including fire behavior, fire classifications, industrial fire hazards, and causes of fires.
<b>CLOBJ 4</b>	Gain knowledge of fire prevention methods, fire protection systems, emergency evacuation procedures, and firefighting equipment used in industries.
<b>CLOBJ 5</b>	Apply safety regulations, fire safety standards, and layout considerations to ensure safe handling of hazardous and flammable materials in industries.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand the concepts, objectives, and different types of plant layouts used in industrial applications.
<b>CLO 2</b>	Apply layout design procedures, material handling methods, and layout planning tools for industrial plant design.
<b>CLO 3</b>	Classify different types of fires and identify fire hazards and causes of industrial fire accidents.
<b>CLO 4</b>	Analyse fire prevention systems, fire protection devices, emergency procedures, and safe firefighting practices used in industries.
<b>CLO 5</b>	Apply fire safety regulations, safety standards, and layout planning considerations for industrial safety and compliance.

g. **Teaching and Examination Scheme**

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

h. **Course Content**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Introduction to Plant Layout</b> Definition and importance of plant layout, Objectives and principles of good plant layout, Types of plant layout, Product layout, Process layout, Fixed position layout, Combination layout, Factors influencing plant layout, Difference between plant layout and plant location	19%	9
2	<b>Plant Layout Design Procedure</b> Steps in designing a plant layout, Flow patterns and materials handling in layout, Tools and techniques used in layout design, Flow process chart, String diagram, Travel chart, Block layout and relationship diagrams, Computer aided layout planning.	30%	12
3	<b>Fire Safety – Basics and Classification</b> Definition and significance of fire safety, The fire triangle and combustion process, Classes of fire (A, B, C, D, K), Fire hazards in industries, Types and causes of industrial fires.	18%	9
4	<b>Fire Prevention and Protection Systems</b> Fire prevention measures in plants, Fire detection and alarm systems, Types of fire extinguishers	18%	8

	and their use, Fire suppression systems (sprinkler systems, gas systems, etc.), Emergency evacuation and fire drills, Personal Protective Equipment (PPE) for fire safety.		
<b>5</b>	<b>Safety Regulations and Layout</b> Considerations for Fire Safety National Building Code (NBC) basics for fire safety, IS codes and OSHA guidelines related to fire and plant safety, Integration of fire safety in layout planning, Storage and handling of flammable materials, Safety signage and color coding, Case studies of fire incidents and lessons learned	15%	7

**i. Reference Books:**

1. Industrial Safety and Environment By Anupama Prashar & Bansal | S.K. Kataria & sons
2. Safety, Health and Environment Handbook By K. T. Narayanan | McGraw Hill Education | 1st, Pub. Year 2017
3. Industrial Engineering and Production Management Martand Telsang, S Chand & company
4. Electrical safety, fire safety Engineering and safety management (TextBook) By S. Rao, Prof. H.L. Saluja | Khanna Publishers | First, Pub. Year 1997