First Year Curriculum

Admission Year 2026-27

Diploma
Agricultural Engineering

Faculty of Engineering and Technology

Parul University

Vadodara, Gujarat, India

Semester 1

a. **Course Name:** Applied Mathematics
b. **Course Code:** 03601121
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** This subject equips engineering students with essential mathematical tools for solving problems in fields like mechanics, circuits, and data analysis.
e. **Course Learning Objective:**

CLOBJ 1	To understand and apply concepts of permutations, combinations, and binomial theorem in problem-solving.
CLOBJ 2	To learn trigonometric identities and their application in engineering problems.
CLOBJ 3	To grasp vector algebra, including vector operations, dot, and cross products, with real-world applications.
CLOBJ 4	To explore complex numbers, their representations, and operations, with an emphasis on engineering applications.

f. **Course Learning Outcomes:**

CLO 1	Apply algebraic methods like permutations, combinations, and binomial theorems to solve engineering problems.
CLO 2	Use trigonometric identities and transformations effectively in solving practical engineering tasks.
CLO 3	Perform vector operations and apply vector algebra in engineering contexts, including using dot and cross products.
CLO 4	Analyze complex numbers, statistics, and probability to handle engineering-related calculations and problems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**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.	Content	Weightage	Teaching Hours
1	Unit-I Algebra: Permutations and Combinations, Value of npr and nCr, its properties and simple problems. Binomial theorem (without proof) for positive integral index (expansion and general term); Binomial theorem for any index (expansion only) first and second binomial approximation with application to engineering problems. Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors). Logarithm: general properties of logarithms, calculations of engineering problems using log tables Unit-II Trigonometry: Addition and subtraction formulae, product formulae and their application in engineering problems. Transformation from product to sum or difference of two angles or vice versa, multiple and submultiple angles. Conditional identities, solution of triangles (excluding ambiguous cases). Unit-III Vector Algebra: Definition of vector and scalar quantities, Addition and subtraction of vectors, dot product and cross product of two vectors, Thumb rule, Angle between two vectors, Application of dot and cross product in engineering problems, scalar triple product and vector triple product. Unit-IV Complex Numbers: 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. Unit-V Statistics and Probability: Measures of central tendency (Mean, median and mode), evaluation mean deviation and standard deviation. Probability: definition and laws on probability.	**100%**	**45**
		100%	**16**

i. Text Book and Reference Book:

1. Applied Mathematics, Vol-2 By ss Sabharwal and others
2. Applied Mathematics by WR Neelkanth
3. Applied Mathematics, Vol-1 By Sabharwal and others

a. **Course Name:** Applied Physics
b. **Course Code:** 03601123
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** This course provides foundational knowledge of applied physics, focusing on key concepts which are essential for various engineering and technological applications.
e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamental principles of units, dimensions, and physical quantities.
CLOBJ 2	Apply Newton's laws of motion to solve basic problems related to force and momentum.
CLOBJ 3	Analyze work, power, energy, and their practical applications in mechanics.
CLOBJ 4	Explore the properties of matter, fluid dynamics, and heat transfer processes.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in using dimensional analysis for unit conversion and problem-solving.
CLO 2	Solve practical problems involving forces, work, energy, and motion using physics principles.
CLO 3	Analyze and interpret data related to fluid dynamics and properties of matter.
CLO 4	Apply heat transfer principles in real-world situations using appropriate methods and techniques.

g. **Teaching & Examination Scheme:**

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Units, Dimensions and Measurements: Physical quantities, Fundamental and derived units, Systems of units (FPS, CGS, MKS and SI units), Dimensions and dimensional formulae of physical quantities velocity, acceleration, momentum, force, impulse, work, power, energy, surface, tension, coefficient of viscosity and strain), Dimensional equations and their applications, conversion from one unit to another unit for density, force, pressure, work, power, energy, velocity, acceleration, Limitations of dimensional analysis. Force and Motion: Scalar and vector quantities - examples, addition and multiplication (scalar product and vector product) of vectors, Force, parallelogram law of forces (only statement) Newton's Laws of motion - concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion conversion of momentum, impulse and impulsive forces, simple numerical problems based on third law. Work, Power and Energy, Work: definitions and its SI units, Work done in moving an object on horizontal and inclined plane, (incorporating frictional forces), Power: definitions and its SI units, calculation of power in simple cases, Energy: Definitions and its SI units: Types: Kinetic energy and Potential energy, with examples and their derivation, Principle of conservation of mechanical energy (for freely falling bodies) Properties of Matter: Elasticity: definition of stress and strain, Different types of modulus of elasticity, Explanation of stress-strain diagram, Pressure:-its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon's pressure, manometers and barometer gauges, Surface tension: -its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension, Viscosity: Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law effect of temperature on viscosity, application in hydraulic systems. Hydrodynamics: Fluid motion, stream line and turbulent flow, Reynold's number. Gravitation and satellites: Kepler's law of planetary motion, Newton's law of gravitation, Escape velocity (derivation), Satellites, Geostationary satellite, Transfer of Heat:	**100%**	**32**

	Principles of measurement of temperature and different scales of temperature, Difference between heat and temperature Modes of transfer of heat (conduction, convection and radiation with examples), Coefficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method).		
		100%	**32**

i. Text Book and Reference Book:

1. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
2. Applied Physics Vol. I,; TTTI Publication Tata McGraw Hill, Delhi
3. Comprehensive Practical Physics - Volume I and II by IN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics (TextBook) by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy; Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday; Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi Engineering Hydrology (TextBook) K. Subramanya; Tata McGraw Hill Pub. Co. New Delhi

a. **Course Name:** Applied Physics Lab
b. **Course Code:** 03601124
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** This course provides foundational knowledge of applied physics, focusing on key concepts which are essential for various engineering and technological applications.
e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamental principles of units, dimensions, and physical quantities.
CLOBJ 2	Apply Newton's laws of motion to solve basic problems related to force and momentum.
CLOBJ 3	Analyze work, power, energy, and their practical applications in mechanics.
CLOBJ 4	Explore the properties of matter, fluid dynamics, and heat transfer processes.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in using dimensional analysis for unit conversion and problem-solving.
CLO 2	Solve practical problems involving forces, work, energy, and motion using physics principles.
CLO 3	Analyze and interpret data related to fluid dynamics and properties of matter.
CLO 4	Apply heat transfer principles in real-world situations using appropriate methods and techniques.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**50**	**-**	**-**	**50**

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

h. Text Book and Reference Book:

1. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
2. Applied Physics Vol. I,; TTTI Publication Tata McGraw Hill, Delhi
3. Comprehensive Practical Physics - Volume I and II by IN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics (TextBook) by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy; Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday; Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi Engineering Hydrology (TextBook) K. Subramanya; Tata McGraw Hill Pub. Co. New Delhi

i. Experiment List:

Sr. No.	Experiment
1	To find the thickness of wire using a screw gauge
2	To find volume of solid cylinder and hollow cylinder using a vernier caliper
3	To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer
4	To find the surface tension of a liquid by capillary rise method
5	To determine and verify the time period of cantilever by drawing graph between load (w) and depression (D)
6	To verify triangle and parallelogram law of forces
7	To determine force constant of a spring using Hook's Law
8	To find the moment of inertia of a flywheel

a. **Course Name:** Soil Science & Agriculture for Engineers
b. **Course Code:** 03601125
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** The subject "Soil Science & Agriculture for Engineers" is designed to equip engineering students with fundamental knowledge of soil properties, agricultural practices, and their applications in engineering projects.
e. **Course Learning Objective:**

CLOBJ 1	To provide students with an understanding of the fundamental properties and classification of soils, enabling them to apply this knowledge in the engineering and agricultural context.
CLOBJ 2	To introduce principles of agronomy, focusing on crop classifications, weather impacts, and effective crop management techniques for increased productivity.
CLOBJ 3	To develop an understanding of horticulture, including crop cultivation, propagation, and post-harvest techniques, aiming at efficient land use and sustainable agricultural practices.
CLOBJ 4	To familiarize students with essential plant nutrients, fertilizers, and soil amendments, guiding them to enhance soil health and agricultural output through informed engineering decisions.

f. **Course Learning Outcomes:**

CLO 1	Understand the nature, origin, and classification of soils and their impact on engineering applications.
CLO 2	Identify and apply soil physical properties for practical problem-solving in agriculture and land management.
CLO 3	Analyze soil-water-plant relationships and their significance in irrigation and water conservation.
CLO 4	Evaluate the role of soil fertility and nutrient management for sustainable agricultural practices.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**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.	Content	Weightage	Teaching Hours
1	**Soils**: Nature and origin of soil; soil forming rocks and minerals, their classification and composition, soil forming processes, classification of soils – soil taxonomy orders; important soil physical properties; and their importance; soil particle distribution; soil texture, soil structure, soil as a 3-phase system, bulk density, particle density, moisture content, porosity, degree of saturation, moisture holding capacity, soil water movement, saturated and unsaturated flow. Soil organic matter – its composition and decomposition, effect on soil fertility; soil reaction – acid, saline and sodicsoils; quality or irrigation water; essential plants nutrients – their functions and deficiency symptoms in plants; important inorganic fertilizers and their reactions in soils. **Agronomy:** Definition and scope of agronomy. Classification of crops, Effect of different weather parameters on crop growth and development. Principles of tillage, tilth and its characteristics. Soil water plant relationship and water requirement of crops, weeds and their control, crop rotation, cropping systems, Relay cropping and mixed cropping. **Horticulture**: Scope of horticultural and vegetable crops. Soil and climatic requirements for fruits, vegetables and floriculture crops, improved varieties, Criteria for site selection, layout and planting methods, nursery raising, macro and micro propagation methods, plant growing structures, pruning and training, fertilizer application, fertigation, irrigation methods, harvesting, grading and packaging, post-harvest practices, Garden tools, management of orchard, Extraction and storage of vegetables seeds.	**100%**	**45**
		100%	**45**

i. Text Book and Reference Book:

1. Nature and properties of soils by Brady Nyle C and Ray R Well; Pearson Education Inc., New Delhi.
2. Fundamentals of Soil Science Indian Society of Soil Science; IARI, New Delhi
3. A. Textbook of Pedology Concepts and Applications by Sehgal J; Kalyani Publishers, New Delhi
4. Introduction to Soil Physics by Hillel D; Academic Press, London
5. Chemistry of Soil E.E. Bear
6. Principles of Agronomy T. Y. Reddy and G. H. Shankara Reddy; Kalyani Publishers
7. Fundamentals of Agronomy Rajat D; Kalyani Publishers
8. Principles and Practices of Agronomy S. S. Singh; Kalyani Publishers
9. Introductuion of Agronomy V. W. Vaidya and K. R. Shahastrabudher
10. Principles of Horticulture Prasad and Kumar; Agrobios, Jodhpur

a. **Course Name:** Soil Science & Agriculture for Engineers Lab
b. **Course Code:** 03601126
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** The subject "Soil Science & Agriculture for Engineers" is designed to equip engineering students with fundamental knowledge of soil properties, agricultural practices, and their applications in engineering projects.
e. **Course Learning Objective:**

CLOBJ 1	To provide students with an understanding of the fundamental properties and classification of soils, enabling them to apply this knowledge in the engineering and agricultural context.
CLOBJ 2	To introduce principles of agronomy, focusing on crop classifications, weather impacts, and effective crop management techniques for increased productivity.
CLOBJ 3	To develop an understanding of horticulture, including crop cultivation, propagation, and post-harvest techniques, aiming at efficient land use and sustainable agricultural practices.
CLOBJ 4	To familiarize students with essential plant nutrients, fertilizers, and soil amendments, guiding them to enhance soil health and agricultural output through informed engineering decisions.

f. **Course Learning Outcomes:**

CLO 1	Understand the nature, origin, and classification of soils and their impact on engineering applications.
CLO 2	Identify and apply soil physical properties for practical problem-solving in agriculture and land management.
CLO 3	Analyze soil-water-plant relationships and their significance in irrigation and water conservation.
CLO 4	Evaluate the role of soil fertility and nutrient management for sustainable agricultural practices.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**50**	**-**	**-**	**50**

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

h. Text Book and Reference Book:

1. Nature and properties of soils by Brady Nyle C and Ray R Well; Pearson Education Inc., New Delhi.
2. Fundamentals of Soil Science Indian Society of Soil Science; IARI, New Delhi
3. A. Textbook of Pedology Concepts and Applications by Sehgal J; Kalyani Publishers, New Delhi
4. Introduction to Soil Physics by Hillel D; Academic Press, London
5. Chemistry of Soil E.E. Bear
6. Principles of Agronomy T. Y. Reddy and G. H. Shankara Reddy; Kalyani Publishers
7. Fundamentals of Agronomy Rajat D; Kalyani Publishers
8. Principles and Practices of Agronomy S. S. Singh; Kalyani Publishers
9. Introductuion of Agronomy V. W. Vaidya and K. R. Shahastrabudher
10. Principles of Horticulture Prasad and Kumar; Agrobios, Jodhpur
11. Principles of Horticulture Denison
12. Horticultural Science J Janick; W.H.Freeman & Co Ltd
13. Plant Propogation : Principles and Practices Hartmen and KesterDelhi

i. Experiment List:

Sr. No.	Experiment
1	Identification of rocks and minerals and Examination of soil profile in the field.
2	Collection of Soil Sample and Determination of moisture content, bulk density, Particle density, porosity of soil, Soil texture and particle size distribution.
3	Determination of organic carbon of soil, Nitrogen, Phosphorus and Potassium.
4	Determination of EC, pH, ESP, SAR, RSC.
5	Identification of nutrient deficiency symptoms of crops in the field and their varieties seeds and weeds.
6	Fertilizer application and weed control methods.
7	Judging maturity time for harvesting of crop.
8	Study of seed viability and germination test.
9	Identification and description of important fruit, Flowers and vegetables crops.
10	Study of different garden tools.
11	Preparation of nursery bed.
12	Practices of pruning and training in some important fruit crops.

a. **Course Name:** Environmental Science
b. **Course Code:** 03605101
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** The course fosters awareness and equips learners with practical skills to address pressing environmental issues such as global warming, pollution control, and resource management.
e. **Course Learning Objective:**

CLOBJ 1	To understand the structure of ecosystems and their biotic and abiotic components, including material cycles and energy flow.
CLOBJ 2	To examine various types of pollution, their sources, and control methods for air, water, soil, and noise pollution.
CLOBJ 3	To explore renewable energy sources, their mechanisms, and their role in mitigating environmental impacts.
CLOBJ 4	To comprehend solid waste management practices and strategies for dealing with hazardous waste.

f. **Course Learning Outcomes:**

CLO 1	Explain the components and functioning of ecosystems.
CLO 2	Analyze the causes and effects of different types of pollution.
CLO 3	Demonstrate knowledge of renewable energy technologies and their environmental benefits.
CLO 4	Apply principles of solid waste management in real-world scenarios.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
2	**-**	**-**	**0**	**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	**Ecosystem** Structure of ecosystem, Biotic & Abiotic components, Food chain and food web Carbon, Nitrogen, Sulphur, Phosphorus cycle. Global warming -Causes, effects, process, Green House Effect, Ozone depletion.	15%	4
2	**Air and Noise Pollution** 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, 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.	22%	8
3	**Water and Soil Pollution** 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.	24%	8
4	**Renewable Sources of energy** 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.	24%	8
5	**Solid Waste management** 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.	15%	4
		100%	32

i. Text Book and Reference Book:

1. Principles of Solar Engineering Yogi Goswami D., Frank Kreith, Jan F. Kreider; Taylor & Francis, 2003; Second
2. Environmental Studies M.P. Poonia, S.C. Sharma; Khanna Publishing House, NewDelhi; 2017
3. Renewable Energy Sources Twidell J.W. and Weir. A; EFN Spon Ltd
4. Environmental Sciences Daniel B Botkin & Edward A Keller,; John Wiley & Sons
5. Air Pollution M. N. Rao and H. V. N. Rao; Tata McGraw-Hill Publishing Company
6. Environmental Pollution Control Engineering Rao C.S; 2nd edition
7. Solid Waste Treatment and Disposal G. Tchabanoglous; McGraw Hill Pub.

a. **Course Name:** Fundamentals of Electrical and Electronics Engineering
b. **Course Code:** 03607151
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** The subject introduces key concepts such as passive and active components, digital electronics, and machines, forming the basis for more advanced studies in electrical and electronics engineering.
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to essential electrical and electronic components, such as resistors, capacitors, and transistors, and their functional roles in circuits.
CLOBJ 2	To familiarize students with semiconductor components and digital electronics concepts, including logic gates and number systems, for building basic digital circuits.
CLOBJ 3	To enable students to analyze electric circuits, applying fundamental laws such as Ohm's law and Faraday's law for problem-solving in AC and DC systems.
CLOBJ 4	To provide a basic understanding of electrical machines, transformers, and motors, explaining their construction, operation, and key equations.

f. **Course Learning Outcomes:**

CLO 1	Understand the working principles of passive and active electronic components and their real-world applications.
CLO 2	Perform basic operations with different number systems and logic gates used in digital electronics.
CLO 3	Analyze and solve problems related to AC/DC circuits and electrical power generation.
CLO 4	Demonstrate knowledge of magnetic circuits, transformers, and electrical machines, along with their principles and operations.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
2	**1**	**-**	**3**	**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	**Overview of Electronic Components & Signals** Passive Active Components: Resistances, Capacitors, Inductors, Diodes, Transistors, FET, MOS and CMOS and their Applications. Signals: DC/AC, voltage/current, periodic/non-periodic signals, average, rms, peak values, different types of signal waveforms, Ideal/non-ideal voltage/current source, independent/dependent voltage current sources.	**15%**	**6**
2	**Introduction of Semiconductor Components** P-N junction diode, V-I Characteristics of P-N junction Diode, Zener Diode, Classification of Transistor, Transistor construction, Types of transistors (NPN & PNP)	**10%**	**5**
3	**Overview of Digital Electronics** Number systems, Base Conversion -BINARY -DECIMAL -HEX -OCTAL, Complements - 2' and 10's Complement -1's and 9's Complement, Binary addition, subtraction, multiplication and division Logic Gates -Basic Gates (AND, OR, Not), Universal Gates (NAND and NOR Gate), Complementary Gates-(EX-OR, EX-NOR), De-Morgan's Theorems, Adder and Subtractor, Multiplexer and De-multiplexer.	**25%**	**10**
4	**Electric Circuit** Generation of electricity, Different terms related to electric circuit, Concept of AC and DC, Concept of 1-phase and 3-phase supply, Electrical circuit elements – Resistor Inductor and Capacitor, Resistor in series and parallel, Ohm's law and its limitations, Factors affecting the value of resistance	**20%**	**8**
5	**Magnetic Circuit** Terms Related to magnetic circuit, Terms Related to AC circuit, Faraday's Law, Fleming's law, Lenz's Law, Hysteresis loop (B/H Curve), Types of Induced EMF, Comparison between Electric and Magnetic Circuit	**20%**	**8**
6	**Transformer and Machines** General construction and principle of different type of transformers; Emf equation and transformation ratio of transformers; Auto transformers; Construction and Working principle of motors; Basic equations of motors.	**10%**	**5**
		100%	**42**

i. Text Book and Reference Book:

1. Basic Electrical Engineering Ritu Sahdev; Khanna Publishing House
2. Basic Electrical Engineering Mittle and Mittal; McGraw Education
3. Fundamentals of Electrical Engineering Saxena, S. B. Lal; Cambridge University Press
4. Electrical Technology Vol-1 Theraja, B. L.; S. Chand, New Delhi
5. Principles of Electronics V.K. Mehta; S. Chand and Company

a. **Course Name:** Fundamentals of Electrical and Electronics Engineering Lab
b. **Course Code:** 03607152
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** The subject introduces key concepts such as passive and active components, digital electronics, and machines, forming the basis for more advanced studies in electrical and electronics engineering.
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to essential electrical and electronic components, such as resistors, capacitors, and transistors, and their functional roles in circuits.
CLOBJ 2	To familiarize students with semiconductor components and digital electronics concepts, including logic gates and number systems, for building basic digital circuits.
CLOBJ 3	To enable students to analyze electric circuits, applying fundamental laws such as Ohm's law and Faraday's law for problem-solving in AC and DC systems.
CLOBJ 4	To provide a basic understanding of electrical machines, transformers, and motors, explaining their construction, operation, and key equations.

f. **Course Learning Outcomes:**

CLO 1	Understand the working principles of passive and active electronic components and their real-world applications.
CLO 2	Perform basic operations with different number systems and logic gates used in digital electronics.
CLO 3	Analyze and solve problems related to AC/DC circuits and electrical power generation.
CLO 4	Demonstrate knowledge of magnetic circuits, transformers, and electrical machines, along with their principles and operations.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**50**	**-**	**-**	**50**

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

h. Text Book and Reference Book:

1. Basic Electrical Engineering Ritu Sahdev; Khanna Publishing House
2. Basic Electrical Engineering Mittle and Mittal; McGraw Education
3. Fundamentals of Electrical Engineering Saxena, S. B. Lal; Cambridge University Press
4. Electrical Technology Vol-1 Theraja, B. L.; S. Chand, New Delhi
5. Principles of Electronics V.K. Mehta; S. Chand and Company

i. Experiment List:

Sr. No.	Experiment
1	Determine the permeability of magnetic material by plotting its B-H curve.
2	Measure voltage, current and power in 1-phase circuit with resistive load.
3	Measure voltage, current and power in R-L series circuit.
4	Determine the transformation ratio (K) of 1-phase transformer.
5	Connect single phase transformer and measure input and output quantities.
6	Identify various active and passive electronic components.
7	Connect resistors in series and parallel combination on bread board and measure its value using digital multimeter.
8	Use multimeter to measure the value of given resistor. Determine the value of given resistor using digital multimeter to confirm with colour code.
9	Test the performance of PN-junction diode.
10	Test the half wave rectifier using CRO.
11	Test the Bridge rectifier and capacitor filter using CRO.
12	Test the performance of Zener diode.
13	Identify the pins of IC 741.
14	Test the performance of CE NPN transistor.
15	Test the performance of transistor amplifier circuit.

a. **Course Name:** Engineering Graphics
b. **Course Code:** 03609101
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** It equips students with the ability to visualize, communicate, and interpret technical designs, essential for creating and understanding engineering drawings, which are a universal language in the industry.
e. **Course Learning Objective:**

CLOBJ 1	To develop students' competency in using drawing equipment, understanding types, and applying them effectively in technical drawing tasks.
CLOBJ 2	To guide students in following standard practices for drawing layouts, ensuring accurate scaling and proper dimensional representation according to given engineering scenarios.
CLOBJ 3	To enable students to grasp various types of projections, including orthographic and isometric, and apply these methods to translate 3D objects into 2D drawings.
CLOBJ 4	To teach students the step-by-step process of geometric constructions and the drawing of engineering curves such as conics and cycloids, which are critical in machine design and manufacturing processes.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in selecting and using various drawing equipment, instruments, and materials effectively.
CLO 2	Develop and implement standard practices for planning, layout, and scaling in technical drawings.
CLO 3	Accurately construct geometric figures, including angles, polygons, and curves, using appropriate methods.
CLO 4	Apply principles of orthographic and isometric projections to convert pictorial views into accurate technical representations.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
1	**-**	**-**	**1**	**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	Drawing equipments, instruments and materials. 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**
2	Planning, Layout And Scalling Of Drawing 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%**	**0**
3	Lines, Lettering and dimensioning 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%**	**0**
4	Geometric Construction 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	**7%**	**2**
5	Construct polygon. Triangle, Square / Rectangle, Pentagon with special method. d: Hexagon with special method. To draw tangents. Geometric construction related with circle & arc.	**22%**	**3**
6	Engineering Curves 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%**	**2**
7	Projection Of Points, Lines And Planes 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.	**22%**	**3**
8	Orthographic Projections Types of projections-orthographic, perspective, isometric and oblique: concept and applications. Various term associated	**12%**	**3**
		100%	**16**

i. Text Book and Reference Book:

1. ENGINEERING GRAPHICS P. J. Shah; S. Chand & Co., New Delhi Publications.
2. A Text Book of Engineering Graphics P.J.Shah; S.Chand & Company Ltd., New Delhi
3. Engineering Drawing P.J.Shah.; S.Chand, New Delhi

a. **Course Name:** Engineering Graphics Lab
b. **Course Code:** 03609102
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** It equips students with the ability to visualize, communicate, and interpret technical designs, essential for creating and understanding engineering drawings, which are a universal language in the industry.
e. **Course Learning Objective:**

CLOBJ 1	To develop students' competency in using drawing equipment, understanding types, and applying them effectively in technical drawing tasks.
CLOBJ 2	To guide students in following standard practices for drawing layouts, ensuring accurate scaling and proper dimensional representation according to given engineering scenarios.
CLOBJ 3	To enable students to grasp various types of projections, including orthographic and isometric, and apply these methods to translate 3D objects into 2D drawings.
CLOBJ 4	To teach students the step-by-step process of geometric constructions and the drawing of engineering curves such as conics and cycloids, which are critical in machine design and manufacturing processes.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in selecting and using various drawing equipment, instruments, and materials effectively.
CLO 2	Develop and implement standard practices for planning, layout, and scaling in technical drawings.
CLO 3	Accurately construct geometric figures, including angles, polygons, and curves, using appropriate methods.
CLO 4	Apply principles of orthographic and isometric projections to convert pictorial views into accurate technical representations.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**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. Text Book and Reference Book:

1. ENGINEERING GRAPHICS P. J. Shah; S. Chand & Co., New Delhi Publications.
2. A Text Book of Engineering Graphics P.J.Shah; S.Chand & Company Ltd., New Delhi
3. Engineering Drawing P.J.Shah.; S.Chand, New Delhi

i. Experiment List:

Sr. No.	Experiment
1	**USE OF DRAWING INSTRUMENTS** Teacher will demonstrate: Use of drawing instruments, Planning and layout as per IS, Scaling technique. Draw following: - Drawing horizontal, vertical, 30 degree, 45 degree, 60 & 75 degrees lines using Tee and Set squares/ drafter, Types of lines, Types of dimensioning. Alphabets & numerical (Vertical & inclined as Per I.S.).
2	**GEOMETRIC CONSTRUCTION** Drawing of set of lines with different conditions (Two problems). Drawing Polygons (Three Problems). Drawing circles and arcs with different geometric. Conditions and with line constraints (Three problems).
3	**ENGINEERING CURVES – I** Construction of ellipse using any two methods from arc of circle method, four centre method, rectangular method, eccentricity method and concentric circle method. Construction of parabola with any one method from rectangular method, tangent method and eccentricity method. Construction of hyperbola with any one method from eccentricity method and rectangular method. Construction of spiral.
4	**ENGINEERING CURVES – II** Construction of cycloid. Construction of hypocycloid & epicycloids. Construction of involute (circle). Construction of involute (polygon).
5	**PROJECTIONS OF POINTS AND LINE** Draw projection of points-For 10 various conditions (One problem). Draw projection of lines with different conditions (Four problems).
6	**PROJECTIONS OF PLANE** Draw projection of different planes with different conditions (triangle, square / rectangular, pentagonal / hexagonal, and circular -one for each) (Four problems).
7	**ORTHOGRAPHIC PROJECTIONS** Draw Orthographic projections of different objects (Two problems) (Draw four views of each object).
8	**ISOMETRIC DRAWINGS** Draw isometric drawings from given orthographic views (Three problems).

a. **Course Name:** Communication Skills - I
b. **Course Code:** 03693103
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** The "Communication Skills" course is designed to equip students with essential skills for effective communication in both personal and professional contexts.
e. **Course Learning Objective:**

CLOBJ 1	Develop the ability to communicate effectively in diverse scenarios, fostering teamwork and collaboration among peers.
CLOBJ 2	Encourage logical reasoning and creativity through activities like debates and role plays that require quick thinking and adaptability.
CLOBJ 3	Equip students with the skills to write various types of letters and comprehend texts, ensuring clarity and appropriateness in their written communication.
CLOBJ 4	Provide a foundational understanding of communication principles, barriers, and effective strategies for diverse communication contexts.

f. **Course Learning Outcomes:**

CLO 1	Explain the key concepts of communication and identify barriers to effective interaction.
CLO 2	Demonstrate the use of soft skills in professional scenarios through role-play and group discussions.
CLO 3	Critically assess different types of letters and their purposes in real-world contexts.
CLO 4	Develop and deliver impromptu speeches that effectively engage an audience on diverse topics.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
1	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**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	**Ice Breaker + Introducing your Friend** This is one activity which will build the bond between the students i the class and work as a team in the task given to them. The students will be asked to introduce their new best friend in the class. This will ensure that the bond being created here will stay strong and also breaks the ice between them.	**5%**	**1**
2	**Picture Connector** In this class the students will be trained to form a logical connection between a set of pictures which will be shared with This geared towards building creativity and presentation skills.	**5%**	**1**
3	**Crazy Scientist** The students will be taught the importance of invention and innovation using some examples that changed the world the way it worked.	**5%**	**1**
4	**Shopping Role Play** This activity topic gears towards making students do role play based on shopping scenarios. It involves giving them a scenario and asking them to further develop the idea in a very interesting manner, then going on to enact it.	**5%**	**1**
5	**Grammar** Parts of speech, Active and Passive voice, Tenses.	**20%**	**10**
6	**Communication: Theory & Practice** Basics of communication: Introduction, meaning, definition, Process of communication. Types of communication: Formal, Informal, Verbal/Non verbal and Written barriers to effective communication. 7 Cs of effective communication: (considerate, concrete concise, clear, complete, correct and courteous). Technical Communication	**12%**	**5**
7	**Soft Skills for Professional Excellence** Introduction : Soft skills and hard skills, Importance of soft skills.	**12%**	**2**
8	**Debate** Students are trained to let go of inhibitions and come forward and speak openly on passionate topics. The students will be divided into teams and made to share their ideas and views on the topics.	**5%**	**1**
9	**Extempore** To change the average speakers in the class to some of the best Orator. This will be done by making the students give variety of impromptu speeches in front of the class.	**5%**	**1**
10	**Letter Writing** Types of letters-Inquiry letter, Order letter, Complaint letter, Adjustment, Request letter, Recommendation letter. Format of letters.	**12%**	**2**
11	**Reading Comprehension** Dabbawalahs, A Snake in the grass, Internet – Dr. Jagdish Joshi	**14%**	**5**
		100%	**32**

i. Text Book and Reference Book:

1. Technical Communication: Principles And Practice Sangeetha Sharma, Meenakshi Raman; Oxford University Press
2. An An English grammar : comprehending the principles and rules of the language, illustrated by appropriate Englis grammar: comprehending the principles and rules of the language, illustrated by appropriate exercises, and a key to the exercises (v.1) Murray, Lindley; York England : Printed by Thomas Wilson & Sons, for Longman, Hurst, Rees, Orme, and Brown ; and Dart; Fourth edition
3. Active English Juneja & Qureshi; Macmillan

Semester 2

a. **Course Name:** Engineering Mathematics - I
b. **Course Code:** 03601171
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** Engineering Mathematics-I equips students with foundational mathematical tools essential for solving complex engineering problems.
e. **Course Learning Objective:**

CLOBJ 1	To provide students with a strong understanding of matrix theory, including determinants, rank, and eigenvalues, to solve linear equations and systems efficiently.
CLOBJ 2	To teach students the principles of differential calculus, enabling them to differentiate functions and solve problems involving maxima, minima, and expansion series.
CLOBJ 3	To introduce students to integral calculus and develop their ability to compute integrals using substitution, by parts, and partial fractions, along with solving double and triple integrals.
CLOBJ 4	To familiarize students with vector calculus and key vector operations, fostering a deeper comprehension of theorems like Stoke's and Green's, applicable to engineering problems.

f. **Course Learning Outcomes:**

CLO 1	Apply matrix operations and theorems to solve linear systems and compute determinants.
CLO 2	Differentiate various algebraic, trigonometric, and logarithmic functions and apply them to real-world engineering problems.
CLO 3	Integrate functions using standard techniques and solve definite integrals in complex engineering scenarios.
CLO 4	Analyze and compute vector operations like gradient, divergence, and curl in engineering contexts.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
2	**1**	**-**	**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.	Content	Weightage	Teaching Hours
1	Unit-I Matrices: Determinants and Matrices - expansion of determinants (up to third order) using sarrus rule, Properties of determinants, solution of equations (up to 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction, and multiplication of matrices (up to third order). Elementary transformations, rank of a matrix, reduction to normal form, Gauss-Jordon method to find inverse of a matrix, Eigen values and Eigen vectors, Cayley-Hamilton theorem, diagonalization of matrices, Echelon form, Solution of linear equations, using Cayley-Hamilton theorem to find inverse of A. Unit-II Differential calculus: Definition of derivative, differentiation of standard function by first principle, Rule of Differentiation, Differentiation of algebraic, trigonometric, Exponential, Logarithmic, Taylor's and Maclaurin's expansions; indeterminate form; partial differentiation, maxima, and minima. Unit-III Integral calculus: Integration as inverse operation of differentiation, Integration of simple functions, Integration by substitution, by parts and by partial fractions (for linear factors only), Definite integral: Definition, Properties of Definite integral, Odd and Even functions, double and triple integrals, Beta and Gama functions. Unit-IV Vector calculus: Differentiation of vectors, scalar and vector point functions, vector differential operator Del, Gradient of a scalar point function, Divergence and Curl of a vector point function, Stoke's, divergence and green's theorems (without proofs).	**100%**	**32**
		100%	**32**

i. Text Book and Reference Book:

1. Differential Calculus By Shantinarayan | S.Chand Publication
2. Higher Engineering Mathematics By B. S. Grewal | Khanna Publications
3. A Text Book of Vector by Narayan Shanti | S. Chand and Co. Ltd. New Delhi

a. **Course Name:** Surveying and Levelling
b. **Course Code:** 03601173
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** This subject equips students with the skills to measure land, determine boundaries, and produce accurate topographical maps.
e. **Course Learning Objective:**

CLOBJ 1	Understand the basic principles and classification of surveying techniques, including chain surveying, compass survey, and cross staff survey.
CLOBJ 2	Develop the ability to perform precise measurements and eliminate errors in both linear and angular surveys.
CLOBJ 3	Gain practical experience in using surveying instruments such as theodolites, total stations, and electronic devices for advanced surveying tasks.
CLOBJ 4	Acquire knowledge of contouring, computation of areas, and volumes, as well as the setting of curves, necessary for large-scale civil engineering projects.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in fundamental surveying and levelling techniques.
CLO 2	Apply principles of error elimination and correction in linear and angular measurements.
CLO 3	Utilize modern surveying instruments like Total Station and GPS effectively.
CLO 4	Interpret and produce contour maps and calculate areas and volumes from surveyed data.

g. **Teaching & Examination Scheme:**

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Surveying**: Introduction, classification and basic principles, Linear measurements. Chain surveying. Cross staff survey, Compass survey. Planimeter, Errors in measurements, their elimination and correction. Plane table surveying. Levelling, leveling difficulties and error in leveling, Contouring, Computation of area and volume. Theodolite traversing. Introduction to setting of curves. Total station, Electronic Theodolite. Introduction to GPS surve	**100%**	**32**
		100%	**32**

i. Text Book and Reference Book:

1. Surveying Vol. I By Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain | Laxmi Publication | 16th Edition
2. Surveying and Levelling Vol. I By Arora K. R | Standard Publications, Delhi
3. Surveying and levelling Vol-I By T. P. Kanetkar & S. V. Kulkarni | Puna Vidyarthi Griha Prakashan

a. **Course Name:** Surveying and Levelling Lab
b. **Course Code:** 03601174
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** This subject equips students with the skills to measure land, determine boundaries, and produce accurate topographical maps.
e. **Course Learning Objective:**

CLOBJ 1	Understand the basic principles and classification of surveying techniques, including chain surveying, compass survey, and cross staff survey.
CLOBJ 2	Develop the ability to perform precise measurements and eliminate errors in both linear and angular surveys.
CLOBJ 3	Gain practical experience in using surveying instruments such as theodolites, total stations, and electronic devices for advanced surveying tasks.
CLOBJ 4	Acquire knowledge of contouring, computation of areas, and volumes, as well as the setting of curves, necessary for large-scale civil engineering projects.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in fundamental surveying and levelling techniques.
CLO 2	Apply principles of error elimination and correction in linear and angular measurements.
CLO 3	Utilize modern surveying instruments like Total Station and GPS effectively.
CLO 4	Interpret and produce contour maps and calculate areas and volumes from surveyed data.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**50**	**-**	**-**	**50**

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

h. Text Book and Reference Book:

1. Surveying Vol. I By Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain | Laxmi Publication | 16th Edition
2. Surveying and Levelling Vol. I By Arora K. R | Standard Publications, Delhi
3. Surveying and levelling Vol-I By T. P. Kanetkar & S. V. Kulkarni | Puna Vidyarthi Griha Prakashan

i. Experiment List:

Sr. No.	Experiment
1	Chain survey of an area and preparation of map
2	Compass survey of an area and plotting of compass survey
3	Plane table surveying
4	Levelling L section and X sections and its plotting
5	Contour survey of an area and preparation of contour map
6	Introduction of software in drawing contour
7	Theodolite surveying; Ranging by Theodolite, Height of object by using Theodolite; Setting out curves by Theodolite
8	Minor instruments
9	Use of total station

a. **Course Name:** Engineering Physics
b. **Course Code:** 03601175
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** By grasping these principles, students will be better equipped to solve practical engineering problems and innovate in areas such as telecommunications, electronics, and material sciences.
e. **Course Learning Objective:**

CLOBJ 1	To provide students with a comprehensive understanding of magnetic materials and electromagnetic induction, enabling them to apply these concepts in designing electric motors and transformers.
CLOBJ 2	To enhance students' knowledge of optical phenomena, enabling them to analyze and apply the principles of reflection, refraction, and diffraction in lenses and fiber optics systems.
CLOBJ 3	To introduce students to the fundamental principles of semiconductor physics, including the energy band theory and doping mechanisms, and their application in electronic components like diodes and transistors.
CLOBJ 4	To equip students with the foundational concepts of wave motion, laser operation, and optical fibers, fostering their ability to solve complex engineering challenges in telecommunications and medical equipment.

f. **Course Learning Outcomes:**

CLO 1	Understand the behaviour of magnetic materials and their applications in electrical devices.
CLO 2	Analyze light properties and optical phenomena such as reflection, refraction, and interference.
CLO 3	Explain the working principles of semiconductors and their role in modern electronics.
CLO 4	Apply the fundamentals of wave motion, sound, and lasers to practical engineering systems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**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.	Content	Weightage	Teaching Hours
1	Unit – 1 Magnetic Materials: Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units. Dia, Para, Ferro magnetic materials. Electromagnetic Induction, Lenz's law and its Applications, Alternating current and its waveform Unit-2 Optics Properties of Light, Electromagnetic spectrum, Reflection, refraction, snell's law, diffraction, polarization, interference of light, constructive and destructive interference (Only definitions), Physical significance of refractive index, dispersion of light. Total internal reflection Reflection from spherical mirror, idea of real and virtual image, lens formula. Unit 3 Semiconductor Physics: Energy band in solids (Idea only). Introduction to semiconductor in terms of energy band diagram, its properties, intrinsic and extrinsic semiconductor, Doping material (impurity) trivalent and pentavalent. P-type and N-type semiconductor. P-N junction. Unit– 4 Waves and sound: Wave motion, amplitude, period, frequency and wavelength, relation between velocity, frequency and wavelength. Transverse and longitudinal wave. Propagation of sound, Expression for velocity of sound, Newton's Formula for velocity. Unit– 5 Laser and Fiber Optics: Spontaneous and Stimulated emission Einstein A and B coefficients Population inversion He – Ne and Ruby Lasers. Optical fiber – Physical structure and basic theory Optical fiber mode types Input and output characteristics of optical fiber and applications. Unit– 6 Luminescence: Illumination laws of illumination Luminous flux Luminous Intensity Candle Power	**100%**	**45**
		100%	**45**

i. Text Book and Reference Book:

1. X-Ray Structure Determination: A Practical Guide By Stout, G.H. and Jensen, L.H., | John Wiley and Sons, New York | 2nd Ed
2. A text book of Engg. Physics, By M. N. Avadhanulu | S. CHAND & COMPANY LTD-NEW DELHI | 8
3. Concept of modern physics By Arthur Beiser | McGraw-Hill | 6th Edition

a. **Course Name:** Engineering Physics Lab
b. **Course Code:** 03601176
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** By grasping these principles, students will be better equipped to solve practical engineering problems and innovate in areas such as telecommunications, electronics, and material sciences.
e. **Course Learning Objective:**

CLOBJ 1	To provide students with a comprehensive understanding of magnetic materials and electromagnetic induction, enabling them to apply these concepts in designing electric motors and transformers.
CLOBJ 2	To enhance students' knowledge of optical phenomena, enabling them to analyze and apply the principles of reflection, refraction, and diffraction in lenses and fiber optics systems.
CLOBJ 3	To introduce students to the fundamental principles of semiconductor physics, including the energy band theory and doping mechanisms, and their application in electronic components like diodes and transistors.
CLOBJ 4	To equip students with the foundational concepts of wave motion, laser operation, and optical fibers, fostering their ability to solve complex engineering challenges in telecommunications and medical equipment.

f. **Course Learning Outcomes:**

CLO 1	Understand the behaviour of magnetic materials and their applications in electrical devices.
CLO 2	Analyze light properties and optical phenomena such as reflection, refraction, and interference.
CLO 3	Explain the working principles of semiconductors and their role in modern electronics.
CLO 4	Apply the fundamentals of wave motion, sound, and lasers to practical engineering systems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**50**	**-**	**-**	**50**

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

h. Text Book and Reference Book:

1. X-Ray Structure Determination: A Practical Guide By Stout, G.H. and Jensen, L.H., | John Wiley and Sons, New York | 2nd Ed
2. A text book of Engg. Physics, By M. N. Avadhanulu | S. CHAND & COMPANY LTD-NEW DELHI
3. Concept of modern physics By Arthur Beiser | McGraw-Hill | 6th Edition

i. Experiment List:

Sr. No.	Experiment
1	To study P-N junction in forward bias.
2	To find the Wavelength of Laser.
3	To Find Numerical aperture of given optical fiber.
4	To determine material constant and band gap of the given semiconductor material.
5	To measure dielectric constant of given samples of dielectric material.
6	To determine the frequency of the A.C. with the help of a Sonometer.
7	To verify Ohm's law by plotting graph between current and potential difference.
8	To verify laws of resistances in series and parallel combination.

a. **Course Name:** Engineering Chemistry
b. **Course Code:** 03601177
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** Engineering Chemistry is a vital subject that bridges the gap between theoretical chemistry and practical engineering.
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to the fundamentals of the phase rule, phase diagrams, and their application to engineering problems, such as material stability and selection.
CLOBJ 2	To provide comprehensive knowledge on fuels, including their classification, properties, calorific value, and significance in energy generation and conservation.
CLOBJ 3	To familiarize students with the properties of colloids and enzymes, focusing on their industrial applications, particularly in fermentation and catalysis processes.
CLOBJ 4	To develop an understanding of corrosion mechanisms, water hardness, and their prevention methods, with an emphasis on maintaining the integrity of industrial equipment and enhancing sustainability.

f. **Course Learning Outcomes:**

CLO 1	Apply the phase rule and interpret phase diagrams for one and two-component systems.
CLO 2	Understand fuel characteristics and calculate the calorific value using Dulong's formula.
CLO 3	Classify colloids and describe the role of enzymes in catalysis and fermentation processes.
CLO 4	Identify methods to prevent corrosion and explain the impact of water hardness on industrial systems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**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.	Content	Weightage	Teaching Hours
1	Unit I Phase Rule1.1 Introduction ׳phase rule 1.2 Explanation of terms: Phase, Component, Degree of Freedom 1.3 Mathematical statement of Phase rule (Gibbs Phase rule) 1.4 Construction of Phase diagram. 1.5 One component system- Water system 1.6 Two component system classification 1.6.1 Lead-silver system 1.6.2 Phase rule Application	**10%**	**6**
2	Unit-II Fuels and Calorific value:2.1 Introduction-Fuel 2.2 Characteristics of Good fuel 2.3 Classification of Fuels 2.4 Calorific Value 2.4.1 Units of Calorific Value 2.4.2 Dulong Formula for Calorific Value and example 2.4.2 Higher Calorific Value and Lower Calorific Value	**10%**	**4**
3	Unit-III Colloids and Enzymes:3.1Colloids-Definition 3.2 Classification of colloids-lyophilic and lyophobic sols 3.3 Properties of colloidal systems 3.4 Enzymes Definition 3.4.1 Characteristics of Enzymes 3.4.2 Some example of Enzyme Catalyze reaction 3.5 Manufacturing of Ethanol and acetic acid by fermentation method (definition of fermentation, Factors affecting process of fermentation).	**10%**	**4**
4	Unit-IV Corrosion and its prevention:4.1 Corrosion ׳Definition 4.2 Causes of Corrosion-factors affecting rate of corrosion. 4.3 Types of Corrosion 4.3.1 Pitting Corrosion 4.3.2 Water line Corrosion 4.3.3 Crevice corrosion 4.3.4 Soil Corrosion 4.3.5 Erosion corrosion 4.3.6 Microbiological corrosion 4.4 Method to Prevent corrosion 4.4.1 Modification of environment, Modification of the properties of metal, Use of prot ective coatings. Anodic and cathodic protection, Modification in design and choice of material	**10%**	**5**
5	Unit-V Water Hardness:5.1 Water Types and types of hardness 5.2 Units of Hardness 5.3 Effect of hard water 5.3.1 Scale and sludge formation and itś Prevention 5.3.2 Priming and foaming and itś prevention. 5.3.3 Caustic embrittlement and itś prevention. 5.4 Boiler corrosion and its prevention	**10%**	**4**
6	Unit-VI Analytical Methods:6.1 Thermal Methods of analysis 6.2 Thermo gravimetric methods 6.3 Polarographic methods	**10%**	**4**
7	Unit-VII Nuclear Chemistry:7.1 Introduction-Radioactivity 7.2 Types of Radioactive decay 7.3 Nuclear radiation detectors 7.4 Analytical application of nuclear radiation	**10%**	**5**
8	Unit- VIII Food Chemistry:8.1 Principles of food chemistry 8.2 Introduction to lipids, proteins, carbohydrates, vitamins, food preservators, colouring and flavouring reagents of food	**10%**	**7**
9	Unit-IX Lubricants:9.1 Introduction-Lubricants 9.2 Classification of lubricants - Solid lubricants Semi-solid lubricants, Liquid lubricants, Synthetic oils 9.2 Mechanism of lubrication- Fluid film Lubrication And Boundary lubrication 9.3 Properties of Lubricants and their test 9.3.1 Viscosity and viscosity index 9.3.2 Flash point and fire point 9.3. 3 Pour point and cloud point 9.3.4 oiliness 9.3.5 Chemical Properties of lubricants like 9.3.6 Saponification value 9.3.7 Neutralization	**10%**	**3**

	number 9.3.8 Emulsification number		
10	Unit- X Polymers:10.1 Introduction ′Polymer and Polymerisation 10.2 Types of Polymerization ′ Addition and Condensation Polymerization 10.3 Properties and uses of Polymers 10.4 Methods to determine the molecular weight of polymer 10.4.1 Number Average molecular mass 10.4.2 Weight average molecular mass 10.4.3 Viscosity average molecular mass	**10%**	**4**
		100%	**46**

i. Text Book and Reference Book:

1. ENGINEERING CHEMISTRY By JAIN & JAIN | DHANPAT RAI
2. A Text Book of Polytechnic Chemistry By V.P. Mehta | Jain Brothers

a. **Course Name:** Engineering Chemistry Lab
b. **Course Code:** 03601178
c. **Prerequisite:** Zeal to Learn Subject
d. **Rationale:** Engineering Chemistry is a vital subject that bridges the gap between theoretical chemistry and practical engineering.
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to the fundamentals of the phase rule, phase diagrams, and their application to engineering problems, such as material stability and selection.
CLOBJ 2	To provide comprehensive knowledge on fuels, including their classification, properties, calorific value, and significance in energy generation and conservation.
CLOBJ 3	To familiarize students with the properties of colloids and enzymes, focusing on their industrial applications, particularly in fermentation and catalysis processes.
CLOBJ 4	To develop an understanding of corrosion mechanisms, water hardness, and their prevention methods, with an emphasis on maintaining the integrity of industrial equipment and enhancing sustainability.

f. **Course Learning Outcomes:**

CLO 1	Apply the phase rule and interpret phase diagrams for one and two-component systems.
CLO 2	Understand fuel characteristics and calculate the calorific value using Dulong's formula.
CLO 3	Classify colloids and describe the role of enzymes in catalysis and fermentation processes.
CLO 4	Identify methods to prevent corrosion and explain the impact of water hardness on industrial systems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**50**	**-**	**-**	**50**

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

h. Text Book and Reference Book:

1. ENGINEERING CHEMISTRY By JAIN & JAIN | DHANPAT RAI
2. A Text Book of Polytechnic Chemistry By V.P. Mehta | Jain Brothers

i. Experiment List:

Sr. No.	Experiment
1	Find out concentration of given acidic solution using standard solution of Base.
2	Standardize KMnO4 solution by preparing standard oxalic acid and to estimate ferrous ions.
3	Standardize Na2S2O3 solution by preparing standard potassium dichromate and to estimate percentage of copper from brass.
4	Determine the viscosity of given substance by using Oswald's Viscometer.
5	Purification of organic compound by recrystallization method.
6	Determine PH-Values of given samples of Solution by using Universal Indicator and PH paper.
7	To determine melting point of given substance by Thiele's tube.
8	Prepare (any one) polystyrene, urea formaldehyde, phenol formaldehyde and its Characterization.
9	To determine the hardness of water in a given unknown water sample by EDTA method.
10	Determine percentage of moisture in given sample of coal by proximate analysis.

a. **Course Name:** Engineering Mechanics
b. **Course Code:** 03605151
c. **Prerequisite:** Knowledge of Applied science.
d. **Rationale:** Engineering mechanics is the main subject of mechanical engineering which gives a basic base to other subjects like strength of materials, manufacturing process. The goal of this Engineering Mechanics course is to expose students to problems in mechanics as applied to plausibly real-world scenarios.

e. **Course Learning Objective:**

CLOBJ 1	To introduce students to the fundamental concepts of mechanics, including statics and dynamics, and their significance in engineering applications.
CLOBJ 2	To develop the ability to analyze forces, resolve forces into components, and apply laws such as Lami's Theorem for force systems.
CLOBJ 3	To equip students with skills to determine the centroid and center of gravity of simple geometric figures and composite solids.
CLOBJ 4	To provide practical understanding of friction, lifting machines, and energy concepts in engineering, focusing on equilibrium and mechanical advantage analysis.

f. **Course Learning Outcomes:**

CLO 1	Understand the basic principles of mechanics and their applications in engineering problems.
CLO 2	Analyze forces and equilibrium in structures, including beams and solids.
CLO 3	Calculate the centroid and center of gravity of geometric shapes and composite bodies.
CLO 4	Apply the principles of friction, motion, and energy in solving engineering mechanics problems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**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.	Content	Weightage	Teaching Hours
1	**Basics of Mechanics** 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.	10%	2
2	**Centroid and Centre of Gravity** Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures. Centre of Gravity of simple solids (Cube, cuboids, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids.	10%	6
3	**Coplanar Concurrent Forces** Force – Unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Newton's first,second and third Law of motion Principle of transmissibility of force, Principle of superposition of force, Force system and its classification. Lami's Theorem – statement and explanation, Application for various engineering problems. Resolution of a force .Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon offorces.	25%	10
4	**Equilibrium and Coplanar Non Concurrent Forces** Types of Equilibrium, Equilibrant, Free body and Free body diagram, Analytical and graphical methods of analysing equilibrium. Moment and couple, Varignon's Theorem. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load. Beam reaction graphically for simply supported beam subjected to vertical point loadsonly	25%	10
5	**Friction** Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient 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. Ladder Friction, Engineering Problems.	10%	6
6	**Simple Lifting Machine** Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of	20%	8

	machines, Work – work done , force displacement diagram, Power , Engineering Problems Energy – Kinetic & Potential energy and Engineering Problems. Law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines.		
		100%	**42**

i. Text Book and Reference Book:

1. Applied Mechanics by H. J. Shah and S. B. Junarkar | Charotar publication
2. A Text Book of Engineering Mechanics by Bansal R K | Laxmi Publishers, New Delhi.
3. Engineering Mechanics by J.L. Meriam, and L.G.Kraige | John Wiley and sons, New York.
4. Engineering Mechanics by S.S. Bhavikatti and K. G. Rajashekarappa | Wiley 'Eastern Ltd

a. **Course Name:** Engineering Mechanics Lab
b. **Course Code:** 03605152
c. **Prerequisite:** Knowledge of Applied science.
d. **Rationale:** Engineering mechanics is the main subject of mechanical engineering which gives a basic base to other subjects like strength of materials, manufacturing process. The goal of this Engineering Mechanics course is to expose students to problems in mechanics as applied to plausibly real-world scenarios.

e. **Course Learning Objective:**

CLOBJ 1	To introduce students to the fundamental concepts of mechanics, including statics and dynamics, and their significance in engineering applications.
CLOBJ 2	To develop the ability to analyze forces, resolve forces into components, and apply laws such as Lami's Theorem for force systems.
CLOBJ 3	To equip students with skills to determine the centroid and center of gravity of simple geometric figures and composite solids.
CLOBJ 4	To provide practical understanding of friction, lifting machines, and energy concepts in engineering, focusing on equilibrium and mechanical advantage analysis.

f. **Course Learning Outcomes:**

CLO 1	Understand the basic principles of mechanics and their applications in engineering problems.
CLO 2	Analyze forces and equilibrium in structures, including beams and solids.
CLO 3	Calculate the centroid and center of gravity of geometric shapes and composite bodies.
CLO 4	Apply the principles of friction, motion, and energy in solving engineering mechanics problems.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**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. Text Book and Reference Book:

1. Applied Mechanics by H. J. Shah and S. B. Junarkar | Charotar publication
2. A Text Book of Engineering Mechanics by Bansal R K | Laxmi Publishers, New Delhi.
3. Engineering Mechanics by J.L. Meriam, and L.G.Kraige | John Wiley and sons, New York.
4. Engineering Mechanics by S.S. Bhavikatti and K. G. Rajashekarappa | Wiley 'Eastern Ltd

i. Experiment List:

Sr. No.	Experiment
1	**Law of Parallelogram.** Verify and calculate resultant force through Law of Parallelogram.
2	**Triangle Law of Forces.** Verify and calculate resultant force through triangle Law of Forces.
3	**Lami's Theorem** Verify and calculate resultant force through Lami's Theorem.
4	**Polygon Law of Forces** Verify and calculate resultant force through Polygon Law of Forces.
5	**Reactions in beam through Graphical & analytical method** Verify reactions in beam through Graphical & analytical method
6	**Co efficient of Sliding Friction and angle of repose** Calculate Co efficient of Sliding Friction and angle of repose for different surfaces – Wood, Glass
7	**Simple machines** To find out efficiency, velocity ratio and M.A for differential wheel and axle
8	**Simple screw jack.** To find out efficiency, velocity ratio and M.A for simple lifting machine using simple screw jack.
9	**Centroid and Centre of Gravity** Solve numerical problems on Centroid and Centre of Gravity.

a. **Course Name:** Engineering Workshop Practice
b. **Course Code:** 03609154
c. **Prerequisite:** Learn about fundamental of mechanical and electrical engineering.
d. **Rationale:** Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.
e. **Course Learning Objective:**

CLOBJ 1	To familiarize students with different hand tools, materials, and techniques used in carpentry, smithy, and fitting jobs, enabling them to create simple joints and components.
CLOBJ 2	To provide hands-on experience in performing welding, soldering, and plumbing operations, focusing on safety and accuracy during construction and repair tasks.
CLOBJ 3	To develop competency in using electrical tools, cables, switches, and protective devices through practical demonstration and application in real-world wiring setups.
CLOBJ 4	To equip students with the knowledge to interpret electrical symbols and diagrams, allowing them to effectively plan and execute various domestic and industrial wiring projects.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proficiency in basic carpentry, smithy, and fitting techniques.
CLO 2	Utilize various welding, soldering, and plumbing tools effectively and safely.
CLO 3	Identify and operate electrical installation tools and measuring instruments.
CLO 4	Apply knowledge of domestic wiring systems and protective devices in practical scenarios.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**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. Text Book and Reference Book:

1. Mechanical workshop practice By K.C. John
2. A Textbook of Electrical Workshop Practices By Dr. Umesh Rathore | S.K. Kataria & Sons
3. A Course in Workshop Technology By Raghuwamsi B S | Dhanpat Rai and Sons, 1682 Nai Darak, New Delhi., Pub. Year 1982
4. Workshop Practice Manual By K. Venkat Reddy | BS Publications
5. Elements of Workshop Technology Vol. I By Hajra Chaudhary S.K. | Asia Publishing House
6. Comprehensive Workshop Technology By S.K. Garg | Laxmi publications

i. Experiment List:

Sr. No.	Experiment
1	**To A Perform a Job in Carpentry Shop.** Types, sketch, specification, material, applications and methods of using of carpentry tools-saws, planner, chisels, hammers, pallet, marking gauge, vice, try square, rule, etc., Types of woods and their applications., Types of carpentry hardware 's and their uses., Demonstration of carpentry operations such as marking, sawing, planning, chiselling, grooving, boring, joining, etc., Preparation of wooden joints., Safety precautions.
2	**To A Perform a Job in Tim Smithy.** Concept and conversions of SWG and other gauges in use., Use of wire gauge., Types of sheet metal joints and applications., Types, sketch, specification, material, applications and methods of using tin smithy tools-hammers, stakes, scissors/snips, etc., Demonstration of various tin smithy tools and sheet metal operations such as shearing, bending and joining., Preparation of tin smithy job., Safety precautions
3	**To Perform a Job on Fitting Practice.** Sketch, specification and applications of fitting work holding tools-bench vise, V-block with clamp and C-clamp., Sketch, specification , material ,applications and methods of using fitting marking and measuring tools-marking table, surface plate, angle plate, universal cribbing block, try-square, scriber, divider, centre punch, letter punch, callipers, Vernier calliper, etc., Types, sketch, specification , material , applications and methods of using of fitting cutting tools hacksaw, chisels, twist drill, taps, files, dies., Types, sketch, specification, material, applications and methods of using of fitting finishing tools-files, reamers., Sketch, specification and applications of miscellaneous tools-hammer, spanners, screw drivers sliding screw wrench., Demonstration of various fitting operations such as chipping, filing, scraping, grinding, sawing, marking, drilling, tapping., Preparation of simple and male- female joints., Safety precautions.
4	**To Perform a Job on Soldering**
5	**To Perform a Job on Welding.** Demonstration of different welding tools / machines., Demonstration on Arc Welding, Gas Welding, MIG, MAG welding, gas cutting and rebuilding of broken parts with welding., One simple job involving butt and lap joint., Safety precautions.

6	**To Perform a Job on plumbing.** Types, specification, material and applications of pipes., Types, specification, material and applications of pipe fittings., Types, specifications, material, applications and demonstration of pipe fitting tools., Demonstration of pipe fitting operationssuch as marking, cutting, bending, threading, assembling, dismantling, etc., Types and application of various spanners such as flat, fix, ring, box, adjustable, etc., Preparation of pipe fitting jobs., Safety precautions.
7	**To Perform a Job on Sheet Metal Practice.**
8	**Identify Different symbol used in electrical installation and prepare sheet.** Demonstration of electrical symbol used in domestic or industrial wiring., Demonstration of electrical wiring tools and accessories., Demonstration of electrical measuring instruments like voltmeter, Ammeter, Wattmeter., Demonstration of advanced tools used in testing of electrical installation like Multi meter, Clip-on meter, Megger, Techometer, Tester etc.
9	**Identify the different tools used in electrical installation.** Demonstration of electrical wiring tools and accessories.
10	**Demonstration of measuring instrument Voltmeter, Ammeter, Wattmeter.** Demonstration of electrical measuring instruments like voltmeter, Ammeter, Wattmeter
11	**Demonstration of testing instruments: Multi meter, Clip-on meter, Megger, Line tester.** Demonstration of advanced tools used in testing of electrical installation like Multi meter, Clip-on meter, Megger, Techometer, Tester etc.
12	**Demonstration of different cables used in electrical installation.** Single core cable, multicore cable, single strand wire, multi strand wire, shielded wire.
13	**Demonstration of different switches used in electrical installation.** Demonstration of different switches like Toggle switch, Rotary switches, Push button switch etc.
14	**Demonstration of protective devices: fuse, MCB, ELCB.** Demonstration of protective devices like fuse, MCB, ELCB.
15	**Identify different types of domestic wirings.** Demonstration on one lamp controlled by one Switch., Demonstration on Staircase wiring., Demonstration on connection of Tube light Wiring., Demonstration on different earthing used in electrical installation.

a. **Course Name:** Communication Skills - II
b. **Course Code:** 03693153
c. **Prerequisite:** Knowledge of English Language.
d. **Rationale:** Basic Communication skills are essential for all Diploma Engineers.
e. **Course Learning Objective:**

CLOBJ 1	To enhance students' ability to engage in effective listening by recognizing different types of listening and overcoming barriers to comprehension.
CLOBJ 2	To expand students' vocabulary and introduce them to the nuances of language usage through various linguistic tools such as idioms, phrasal verbs, and homographs.
CLOBJ 3	To familiarize students with phonetic symbols and sound patterns, enabling accurate word transcription and improved pronunciation.
CLOBJ 4	To build students' speaking skills through classroom activities that promote effective communication, public speaking, and participation in formal events like debates and extempore.

f. **Course Learning Outcomes:**

CLO 1	Students will differentiate between hearing and listening, applying effective listening techniques.
CLO 2	Students will identify and use appropriate vocabulary, including synonyms, antonyms, and homophones.
CLO 3	Students will understand the basics of phonetics, including word transcription and pronunciation.
CLO 4	Students will develop confidence in public speaking and formal communication.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
1	**-**	**-**	**1**	**100**	**-**	**-**	**-**	**-**	**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	**Listening Skills** Listening Process and Practice - Introduction, importance of good Listening Skills, difference between listening andhearing, types of listening, Barriers to effective Listening, traits of a good listener.	15%	6
2	**Listening Skills – Questions** With audio aids, Students will be able to listen to dialogues, improve in gathering information and to summarize the content. To listen and understand day-to-day conversations and to solve questions based on audio files.	10%	1
3	**Building Vocabulary** Synonyms, Antonyms, Homophones, Homonyms, Homographs, Phrasal verbs, idioms & phrases, One word substitution.	15%	1
4	**Introduction to Phonetics** Sounds: Consonant, Vowel, Diphthongs, transcription of words(IPA) weak forms, syllable division, word stress, intonation and voice.	15%	6
5	**Speaking Skill Building Introduction** To enable students to eliminate stage fright and engage in conversation with others.	5%	2
6	**Speaking Skill Building Activity** Enables students to engage in formal communication as well as to participate in events like debate, extempore etc, and to introduce them to various international Language testing systems.	5%	3
7	**Tourism Pitch** Classroom activity which helps students to express their feelings and experiences in English. Encouraging students to overcome stage fear.	5%	1
8	**Lifeboat** Classroom Activity to encourage Communication and Convincing Skills.	5%	1
9	**Reporter** Classroom activity to encourage Communication and Convincing Skills.	5%	1
10	**Paragraph Jumble** Enhance the skill of writing by completing the paragraph in appropriate and sensible form.	5%	4
11	**Life Skills** Self Awareness, Sympathy, Empathy, Emotional Intelligence.	5%	4
12	**Reading Comprehension** A Day's Wait- Ernest Hemingway, My Lost Dollar - Stephen Leacock.	10%	2
		100%	32

i. Text Book and Reference Book:

1. Technical Communication: Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press
2. Effective Technical Communication By Dr. Bharti Kukreja, Dr. Anupama Jain | S.K. Kataria & Sons | 1st
3. Active English By Juneja & Qureshi | Macmillan