LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(A UGC Autonomous Institution)

SCHEME OF INSTRUCTION & EXAMINATION
(With effect from the Academic Year 2026-27)

I-B.E. I-Semester (Group-B)
(Common to CSE, CSD, CIVIL & MECH)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/ D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1	U26MA101	BSC	Mathematics-I	3	1	-	4	40	60	3	4
2	U26PH101	BSC	Engineering Physics	3	-	-	3	40	60	3	3
3	U26CS101	ESC	Programming for Problem Solving	3	-	-	3	40	60	3	3
4	U26EE101/ U26CE101	ESC	Basic Electrical Engineering / Engineering Mechanics	3	-	-	3	40	60	3	3
5	U26CM101	ESC	Artificial Intelligence Foundations	1	-	-	1	40	60	3	1
6	U26EN102	MC	Indian Constitution	2	-	-	2	40	60	3	-
Practical/ Laboratory Course											
7	U26PH1L1	BSC	Engineering Physics Lab	-	-	3	3	25	50	3	1.5
8	U26CS1L1	ESC	Programming for Problem Solving Lab.	-	-	3	3	25	50	3	1.5
9	U26ME1L1	ESC	Engineering Graphics & Design Practice Lab	1	-	2	3	50	50	3	2
10	U26EE1L1/ U26CE1L3	ESC	Basic Electrical Engineering Lab/ Engineering Mechanics	-	-	2	3	25	50	3	1
Total				**16**	**1**	**10**	**28**	**365**	**560**	**30**	**20**

L: Lecture *(Hrs/Wk/Sem)* **T**: Tutorial *(Hrs/Wk/Sem)* **P**: Practical **D**: Drawing *(Hrs/Wk/Sem)*
CIE: Continuous Internal Evaluation **SEE**: Semester End Examination
MC: Mandatory Course **BS**: Basic Science **ES**: Engineering Science
HS: Humanities and Social Sciences **MT**: Mathematics **CH**: Chemistry
EN: English
CE: Civil Engineering **ME**: Mechanical Engineering. **EE:** Electrical Engineering
CS: Computer Science and Engineering

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U26MA101	MATHEMATICS-I (Matrices and Calculus)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
--	L	T	D	P			
	3	1	-	-	40	60	4

Course Objectives: To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

1. To study matrix algebra and its use in solving system of linear equations and in Solving Eigen value problems
2. To introduce the concepts of functions of single variables, mean value theorems and curvature.
3. To introduce the concepts of functions of several variables and multiple integrals

Essential Course Outcomes: On completion of this course, students will get the ability to

1. Solve system of linear equations with the help of Matrices and solving Eigen value problems.
2. Explain and calculate the function of single variable, curvature, radius of curvature.
3. Determine the limit, continuity, partial derivatives, Jacobian for the functions of two and three variables and also the maxima and minima of function of several variables
4. Calculate double and triple integrals.
5. Analyze special functions Beta and Gamma and its applications.

Desirable /Advanced Course Outcomes

1. **Differentiate and integrate** multivariable functions to solve real-world problems involving gradients, tangents, and optimization.
2. **Analyze and interpret** vector fields using line, surface, and volume integrals, applying Green's, Stokes', and Divergence theorems in physics and engineering applications

Unit-I

Matrices: Rank of a matrix, Echelon form, System of linear equations, linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors, Properties of eigen values, Diagonalization, Cayley - Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

Unit-II

Calculus of one Variable: Function of single variable, Continuous function, Differentiable function, Rolle's theorem, Lagrange's, Cauchy's mean value theorems, Taylor's series, Maclaurin's Series(without proof), Problems on Verification of theorems, Curvature, Radius of curvature, Circle of curvature in Cartesian, Polar and Parametric form.

Unit-III

Multivariable Calculus (Differentiation): Functions of two variables, Limits and continuity, Partial derivatives, Total differential and properties , Euler's theorem, Jacobian, Functional Dependence and functionally independent, Taylor's series of functions of two variables, Maximum and minimum values of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-IV

Multivariable Calculus (Integration): Double integrals in Cartesian and Polar Coordinates, Change of order of integration, Change of Variables from Cartesian to plane polar coordinates, Triple integrals

Unit-V

Special Function: Beta Functions, forms and properties, Gamma Functions, Properties, Relation Between Beta and Gamma Function, Evaluation of Improper integrals by using Beta and Gamma functions.. Power Series solution of ODE in case of ordinary point, Classification of points.

Textbooks:

1. B.S.Grewal,"HigherEngineeringMathematics",Khannapublishers,45th edition,2026.
2. ErwinKreyszig,"AdvancedEngineeringMathematics,Wiley,10th edition,2023.
3. R.K.Jain & S.R.K.lyengar, Advanced Engineering Mathematics, Narosa Publications,5thEdition,2026.

Reference Books:

1. B.V.Ramana,"HigherEngineeringMathematics",TataMcGraw-Hill,2018
2. N.P.BaliandManishGoyal,"AtextbookofEngineeringMathematics",LaxmiPublications,latestedition.
3. H.K.Dass and Er. Rajnish Verma," Higher Engineering Mathematics", S.Chand Publishing, 3rd edition, 2024

Course code	Course title						Core/Elective
U26PH101	**ENGINEERING PHYSICS** (Common to CSE, CSD, CIVIL & MECH)						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	3	0	-	-	40	60	3

Course Objectives:

1. To understand the fundamental principles of lasers and optical fibers and their technological applications.
2. To understand the fundamental principles of quantum mechanics and their application in quantum computing.
3. To understand the fundamental properties and classifications of magnetic materials and superconductors along with their underlying principles and applications.
4. To understand crystal structures and semiconductor physics concepts, including lattice systems, diffraction, and electronic properties of materials.
5. To understand the fundamentals of nanomaterials and digital electronics, including synthesis methods, properties, and basic digital logic systems.

Course Outcomes:

After completion of this course, the student will be able to:

1. Analyze laser operation and optical fiber behavior and apply these concepts in modern communication and optical systems.
2. Apply quantum mechanical concepts to analyze and design basic quantum computing systems and algorithms.
3. Understand the fundamental properties and classifications of magnetic materials and superconductors along with their underlying principles and applications.
4. Analyze crystal structures and semiconductor behavior and apply these concepts to electronic devices and material characterization.
5. Analyze nanomaterial properties and apply digital electronics concepts to design and interpret basic logic circuits.

Advanced Course Outcomes:

1. Illustrates the basic concepts of quantum superposition and entanglement, and describe their importance in emerging technologies like quantum computing and quantum communication.
2. Analyze the properties of modern semiconductor materials and propose their use in designing next- generation electronic and optoelectronic devices.

UNIT-I

Lasers: Characteristics of Lasers, Absorption, Spontaneous and stimulated emissions, Pumping process, Population inversion, Einstein's A and B Coefficients, Ruby Laser, He-Ne Laser, Semiconductor Laser, Applications of Lasers, Barcode Scanner.

Fiber Optics: Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Attenuation Losses in optical fibers, Applications of optical fibers, fiber sensors.

UNIT-II

Wave Mechanics: Introduction to matter wave, de-Broglie's hypothesis, properties of wave function and its physical significance, Davisson and Germer Experiment, Time independent wave equation, Particle in a one-dimensional box.

Quantum Computing: Introduction to Quantum Computing, Moore's law and its end, Differences between Classical and Quantum computing. Gates - Hadamard and CNOT (Qualitative) Concept of qubit and its properties, Challenges and application of Quantum Computing.

UNIT-III

Magnetic Materials: Classification of magnetic materials – dia, para, ferro, antiferro and ferri magnetic materials. Domain Theory, Hysteresis curve, Soft and hard magnetic materials and their applications, Magnets in Electric Vehicles (EVs)

Superconductors: Properties of superconductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), High Tc superconductors, Applications of superconductors, Superconducting qubits.

UNIT-I

Crystallography: Types of crystal systems, Bravais lattices, Lattice planes and Miller indices, Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.

Semiconductor Physics: Introduction, Intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, formation of p-n junction diode and its V-I characteristics, Thermistor, Hall effect and its applications, Solar cell, LED and QLED.

UNIT-V

Nano Materials: Introduction, Properties of materials at reduced size, Surface to volume ratio at nano scale, Classification of nano materials, Preparation of nano materials – Bottom-up methods (sol-gel & CVD) and Top-down method (ball milling), Applications of nano materials.

Digital Electronics: Introduction of Digital Electronics, Number Systems and their conversions (Decimal. Binary) Logic Gates (AND, OR, NOT, NAND, NOR, XOR) NAND and NOR as Universal gates, Truth tables, Basic circuit symbols, De-Morgan's Theorem and Karnaugh Map.

Text Books:

T1. S.L. Gupta and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai publications, 2011Edition, Reprint 2025. (Unit 1-4)
T2. B. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Publications, 2025, 1st Edition. (Unit 1-5)
T3. M.N. Avadhanulu, P.G. Kshirsagar and TVS Arun Murthy, A Text Book Advance Engineering Physics, 11th Edition, S. Chand, 2025. (Unit 1**References/ Suggested Reading:**

R1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition Paperback – 1 January 2019
R2. V. Raghavan, Materials Science and Engineering, Prentice Hall India Learning Private Limited; 6th Revised Edition, 2015.

Weblinks:

- Lasers (NPTEL) – *Optoelectronics* - *https://nptel.ac.in/courses/117102061*
- Fiber Optics - NPTEL – *Optical Communication* - *https://nptel.ac.in/courses/117101054*
- **Wave Mechanics – Course** NPTEL – *Quantum Mechanics*- https://nptel.ac.in/courses/122106034
- Quantum Computing - Quantum Computation - https://nptel.ac.in/courses/106106168
- Magnetic Materials - Magnetic Materials and Devices - https://nptel.ac.in/courses/113104096
- Superconductors - NPTEL – *Introduction to Superconductivity* - *https://nptel.ac.in/courses/115102024*

Course Code	Course Title						Core / Elective
U26CS101	Programming for Problem Solving (Common to All Branches)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	40	60	3

Course Objectives:

1. To introduce the basic concepts of Computing environment, Algorithm and Flowchart
2. To familiarize the basic concepts of C language such as data types, operators and expressions.
3. To understand modular and structured programming concepts in C
4. To learn the usage of structured data types and memory management using pointers
5. To learn the concepts of data handling using pointers

Course outcomes:

Student will be able to:

1. Formulate simple algorithms and translate the algorithms to programs using c language.
2. Implement conditional branching & iteration and arrays
3. Apply the function concepts to implement searching and sorting algorithms.
4. Analyze the usage of structures and pointer variable.
5. Design and implement programs to store data in structures and files.

Unit-I

Representation of Numbers (Fixed and Floating Point). Signed and Unsigned Numbers.
Introduction to C Language: Background, C Programs, Identifiers, Types, Variables, Constants, Input/Output, Expressions, Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion, Statements, Bitwise Operators.

Unit-II

Selection: Logical Data and Operators, if… else, switch Statements, Standard Functions.
Repetition: Loops, while, for, do-while Statements, Loop Examples, break, continue, goto.
Functions: Designing Structured Programs, Functions Basics, User Defined Functions, Inter-Function Communication, Standard Functions, Scope, Storage Classes-Auto, Register, Static, Extern, Scope Rules and Type Qualifiers.

Unit-III

Recursion: Recursive Functions, Preprocessor Commands.
Arrays: Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two-Dimensional Arrays, Matrix Operations, Spare Matrix, Multidimensional Arrays, Linear Search and Binary Search.

Unit-IV

Pointers: Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, LValue and RValue, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing on Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command Line Arguments.

.

Unit-V

Type Definition (typedef), Enumerated Types.
Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions.
Input and Output: Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.

Suggested Reading:

Balagurusamy E, Programming in ANSI C, 4th Edition (2024), TMG.
Forouzan B.A & Richard F. Gilberg, A Structured Programming Approach using C,3rd Edition (2023), Cengage Learning.
Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition (2015), Prentice-Hall.
A.K. Sharma ―"Computer Fundamentals and Programming in C", UniversitiesPress,2ndEdition, 2018.
Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5thEdition (2015), Pearson Education

The list of projects, for PPS are listed below.

1. **File-Based Student Management System**. The project has the features Add student record, View all records,
   Search by ID, Update/delete record.Store multiple subjects marks, Calculate grades, Sort records etc.
2. **Library Management System** having Features such as Add books, Issue/return books, Search by title/author. The expected outcome of the project Handling multiple records, File persistence.
3. **Employee Payroll System** Features such as Store employee details, Calculate salary, Generate payslip, Tax calculation, Bonus logic.
4. **Contact Management System** Features such as Add contact, Search contact, Delete contact, Sort alphabetically, Group contacts.
5. **Banking System** Features Create account, Deposit/withdraw, Balance inquiry, Persistent data across runs
6. **File Copy & Merge Utility** Features Copy one file to another, Merge two files, Count lines/words, Remove duplicate lines.
7. **Log File Analyzer** Features Read log file, Count errors and warnings, Filter specific entries
8. **Hospital Patient Record System** features such as Add patient details, Store diagnosis & treatment, Search by patient ID, Discharge summary generation
9. **Exam Registration System** features Register students for exams, Store subject choices, Generate hall tickets
   , Prevent duplicate registrations
10. **Bus Reservation System** features Seat booking, Display available seats, Cancel booking , Different bus routes,Seat numbering logic
11. **Product Billing System** features Add items to bill, Calculate total cost, Save bill to file, Tax calculation, Print formatted invoice
12. **Voting System Simulator** features Candidates list, Cast vote, Count votes, Prevent duplicate voting, Display winner
13. **Student Attendance Tracker** features Mark attendance, Store per day, Generate report ,Calculate attendance percentage

Course Code	Course Title						Core/Elective
U26EE101	**BASIC ELECTRICAL ENGINEERING** (Common to CSE, CSD)						**Core**
Pre-requisites	Contact Hours Per Week						
	L	T	D	P	CIE	SEE	Credits
....	3	-	-	-	40	60	3

Course Objectives

1. To analyze the behavior of different circuit elements R, L and C and the basic concepts of circuit analysis.
2. To analyze the concepts of AC circuits, RMS value, average value phasor analysis etc.
3. To understand the concepts of electromagnetism.
4. To understand the basic principle of operation and construction of DC machines, Transformers and A.C Machines.
5. To provide knowledge on electrical safety precautions, causes and first aid for electric shock, basic energy consumption calculations, and the types and applications of UPS systems.

Course Outcomes

On the completion of this course students will be able to

1. **Analyze** DC electrical circuits and measure the parameters of electrical energy.
2. **Analyze** AC Electrical circuits and measures the parameters of electrical energy.
3. **Illustrate** the key laws and concepts of electromagnetism through suitable examples
4. **Describe** and **interpret** the working principles and construction of DC machines, Transformers and A.C Machines.
5. **Calculate** electrical energy consumption and practice electrical safety measures, and apply suitable UPS systems.

Desirable/Advanced Outcomes

1. Understand how motors, transformers, and other electrical machines are used in everyday life and industry.
2. Design and build simple electrical circuits or small working models for real-life use or competitions.

UNIT-I

D.C Circuits: Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits excited by independent voltage sources; Power and energy. Superposition, Thevenin's and Norton's theorem.

UNIT-II

A.C Circuits: Generation of sinusoidal voltage - Average value, Root mean square value, Form factor and peak factor of sinusoidal voltage and current of alternating quantities; Real power, Reactive power, Apparent power and power factor. Analysis of pure R, L, C circuits, RL, RC and RLC circuits series circuits. Advantages of three phase systems, Relationship between line and phase values of balanced star and delta connections

UNIT-III

Electromagnetism: Faraday's Laws, Lenz's Law, Fleming's rules, Statically and dynamically induced EMF; Concepts of self-inductance, Mutual inductance, Coefficient of coupling and Energy stored in the magnetic field.

D.C Machines: Principal of operation and construction of D.C Generator and Motor, EMF equation and applications.

UNIT IV

A.C Machines:

Transformers: Principle of operation and construction of single-phase transformers, EMF equation, Losses, OC and SC tests and Efficiency.

Three Phase Induction Motors: Principle of operation and construction of 3-phase Induction motors, Types and applications. Synchronous Generators: Principle of operation and constructional features, Types and applications.

UNIT V

Electrical Safety & UPS:

Electric shock, Electrical hazards and safety precautions, First-aid for electric shock. Elementary calculations for energy consumption. Uninterrupted power supplies (UPS) - Types of UPS and Applications.

Text books:

1. U.A Bakshi & V.U Bakshi. "Basic Electrical Engineering", Technical Publications,2020.
2. J.B Gupta "Fundamentals of Electrical Engineering and Electronics" S.K Kataria & sons,10th edition, 2018.
3. B L Theraja, A K Theraja "A Textbook of Electrical Technology Volume II AC And DC Machines",5th edition, 2020.
4. D.P Kothari and I.J Nagarath "Electrical Machines", Tata McGraw hill Publications, 4th edition, 2019.

Course Code	Course Title						Core / Elective
U26CE101	**ENGINEERING MECHANICS** (Common to CIVIL & MECH)						**Core**
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
	3	0	0	0	40	60	3

Course Objectives

The objectives of this course is to impart knowledge of

1. Resolution of forces, equilibrium of force systems consisting of static loads
2. Obtaining centroids and moments of inertia for various regular and irregular areas.
3. Various forces in the axial force members, and to analyze the trusses using various methods,
4. Basic concepts of dynamics, their behavior, analysis and motion of bodies
5. Work energy principles and impulse momentum theory and applications to problem solving

Course Outcomes

After completing this course, the student will be able to:

1. Apply the fundamental concepts of forces, equilibrium conditions for static loads.
2. Determine the centroid and moment of inertia for various sections.
3. Determine the mass moment of inertia for solid bodies.
4. Analyze forces in members of a truss using method of joints and method of sections, analyze friction for single and connected bodies.
6. Apply the basic concepts of dynamics, their behavior, analysis and motion of bodies.

UNIT-I

Basic concepts: Introduction to Engineering Mechanics, Classifications, Scalar and Vector Quantities, Definition of Force and its Classification, Characteristics of force, Determination of Resultant Force (Analytical Methods), Moment of a force and couple with its Classifications.

Equilibrium of Systems of Forces: Definations, Equations of Equilibrium, Concepts of Free Body Diagrams, Lami's theorem and its applications to Coplanar System.

UNIT-II

Centroid & Centre*s* of Gravity: Introduction to Centroid and Centers of gravity, Centroid of Plane Unsymmetrical figures (L, T, C, Z, I-Section), Composite Figures, Figures with cut out portions, Centre of gravity of simple and composite bodies.

Area Moment of Inertia: Definition, Moment of inertia of simple areas, (L, T, C, Z, I-Section), Composite Figures, Figures with cut out portions.

UNIT-III

Mass moment of Inertia: Mass moment of inertia of simple and Composite bodies.

Friction: Definition of Friction and its Classification, Limiting Force of Friction, Angle of Friction, Coefficient of Friction, Angle of Repose, Ladder Friction, Wedge friction, Simple and Differential Screw Jack.

UNIT-IV

Analysis of Perfect Frames: Introduction, Types of Frames, Stress, Tensile and Compressive Stress, Assumptions, Analysis of Simply Supported, Cantilever Trusses by using Method of Joints, Method of Moments, Tension Coefficient Methods.

UNIT-V

Transmission of Power By Belts and Ropes: Introduction, Types of Belts, Velocity Ratio of a Belt Drive, Slip of the Belt, Types of Belt drives, Length of the Belt, Power Transmitted by a Belt, Rope Drive, Advantages, Ratio of Tensions in Rope Drive.

Mechanical Vibrations: Introduction, definitions, Simple Harmonic Motion, Free Vibrations, pendulum Motion, Simple Pendulum, compound pendulum, and Torsional pendulum.

Text Book:

1. Engineering Mechanics, S.S Bhavakatti, New age International publishers.
2. A Textbook of Engineering Mechanics, R.S Khurmi, S. Chand Publications.
3. Engineering Mechanics , Dr. T.Vijaya Krishna, Dr. T.Madhu Mohan, Cengage Publications.

References:

1. Engineering Mechanics, Ferdinand L. Singer, Collins, Singapore, 1975.
2. A Textbook of Engineering Mechanics, R.K Bansal, Laxmi Publications.
3. Applied Mechanics, Junarkar, S.B. and H.J. Shah., Publishers, 2001.
4. Engineering Mechanics, Reddy Vijay Kumar K. and K. Suresh Kumar, Singer's 2010.

Course Code	Course Title						Core/Elective
U26CM101	**ARTIFICIAL INTELLIGENCE FOUNDATION** (Common to CSE, CSD, CIVIL & MECH)						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**1**	**-**	**-**	**-**	**40**	**60**	**01**

Course Objectives

The course will introduce the students to

- Understand the fundamental concepts, history, and applications of Artificial Intelligence.
- Learn the basic principles of intelligent agents and problem-solving approaches in AI.
- Understand the basic concepts of Machine Learning and its role in modern AI systems.
- Gain knowledge about major AI application areas such as Natural Language Processing, Computer Vision, and intelligent systems.
- Become familiar with modern AI productivity tools used by engineering students for learning, research, and project development.

Course Outcomes

After successful completion of the course the students will be able to

- Explain the fundamental concepts, evolution, and impact of Artificial Intelligence.
- Identify and describe different types of intelligent agents and problem-solving methods used in AI.
- Understand the basic working principles of Machine Learning and its applications.
- Describe major AI application domains such as Natural Language Processing and Computer Vision.
- Utilize modern AI tools such as ChatGPT, Gamma, and Napkin AI to improve productivity in academic and engineering tasks.

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Introduction – Definition of Artificial Intelligence – History and Evolution of Artificial Intelligence – Future of Artificial Intelligence – Characteristics of Intelligent Systems – Types of Artificial Intelligence – Applications of Artificial Intelligence in Engineering –Limitations and Challenges of AI – Ethical and Social Issues in AI

UNIT II INTELLIGENT AGENTS AND PROBLEM SOLVING

Intelligent Agents – Structure of Intelligent Agents – Types of Agents– Problem Solving in Artificial Intelligence – Problem Formulation – State Space Representation – Search Strategies (Uninformed & Informed Search)

UNIT III BASICS OF MACHINE LEARNING

Introduction to Machine Learning -Types of Machine Learning – Supervised Learning – Unsupervised Learning – Reinforcement Learning – Training Data and Testing Data – Basic Machine Learning Applications – Examples of Machine Learning in everyday systems.

UNIT IV AI APPLICATION AREAS

Introduction to Natural Language Processing – Text Processing – Chatbots and Virtual Assistants – Introduction to Computer Vision – Image Recognition – Speech Recognition – Recommendation Systems – Applications of AI.

UNIT V AI TOOLS FOR STUDENT PRODUCTIVITY

Introduction to Artificial Intelligence tools for student productivity – Importance of AI tools in learning and time management – AI tools for presentations and documentation such as Gamma – AI tools for visualization and diagram creation such as Napkin AI – AI tools for coding assistance such as GitHub Copilot – AI tools for note organization and documentation such as Notion AI – AI tools for design and presentation creation such as Canva – Applications of AI tools in report writing, presentations, coding assistance and academic productivity.

TEXT BOOKS:

- S. Russell and P. Norvig, *"Artificial Intelligence: A Modern Approach"*, Prentice Hall, Third Edition, 2009.
- I. Bratko, *"Prolog Programming for Artificial Intelligence"*, Addison-Wesley Educational Publishers Inc., Fourth Edition, 2011.
- P. H. Winston, *"Artificial Intelligence"*, Addison-Wesley, Third Edition, 1992.

G. F. Luger, *"Artificial Intelligence: Structures and Strategies for Complex Problem Solving"*, Pearson Education, Sixth Edition, 2008.

Course Code	Course Title						Core/Elective
U26EN102	**Indian Constitution (Common to all Branches)**						Mandatory Course
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**40**	**60**	**-**

Course Objectives:

To expose the students to:

1. Create awareness about the Indian Constitution.
2. Acquaint the working conditions of union, state, local levels, the powers and functions.
3. Develop consciousness on fundamental rights and duties of the citizen.
4. Explain the relations between federal and provincial units.
5. Describe various statutory institutions.

Course Outcomes:

On successful completion of this course, the student would be able to:

1. .Recall the background of the present constitution of India thoroughly.
2. Recognize efficiently the working of the Union, State and Local government.
3. Identify the fundamental rights and duties completely.
4. Examine the relation between union and state policies carefully.
5. .Discuss the role of the various Statutory Institutions of India elaborately.

Desirable / Advanced Course Outcomes:

1. Interpret the ideological and structural transformation from colonial acts to the Indian Constitution accurately.
2. Correlate the interconnected nature of rights, duties, and state directives in constitutional governance significantly.

UNIT-I

Evolution of the Indian Constitution: 1909Act, 1919Act and 1935Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution

UNIT-II

Union Government: Executive-President, Prime Minister, Council of Minister
State Government: Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government

UNIT-III

Rights and Duties: Fundamental Rights, Fundamental Duties, Directive principles of State Policy

UNIT-IV

Relation between Federal and Provincial units: Union-State relations, Administrative, legislative, and Financial, Inter-State council, NITI Aayog, Finance Commission of India

UNIT-V

Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women

***Suggested Readings*:**

1. Ghosh, Peu, (2024), Indian Government & Politics, Prentice Hall of India, New Delhi.
2. Kashyap, Subhash, (2021), Our Parliament, National Book Trust, New Delhi.
3. Basu, D.D., (2026), *Introduction to the constitution of India*, Lexis Nexis, New Delhi, 28th Edition.
4. Fadia, B.Z. & Fadia, Kuldeep, (2020) *Indian Government & Politics*, Lexis Nexis, NewDelhi,16th Edition.

Course code	Course title						Core/Elective
U26PH1L1	**ENGINEERING PHYSICS LAB** (Common to CSE, CSD, CIVIL & MECH)						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	-	-	-	3	25	50	1.5

Course Objectives:

1. Enhance the experience of fundamental functioning, analyzing and characterization of different experiments.
2. Develop skills in the design and development of various electronic devices.
3. Create interest in working with lasers and semiconductor devices.
4. To gain the knowledge on mechanical properties.
5. Acquire the knowledge of communication through optical fiber.

Course Outcomes:

1. Apply the basic principles of lasers and optical fibers to determine wavelength and numerical aperture.
2. Apply the electrical properties to evaluate the energy band gap of the semiconductors.
3. Estimate the carrier concentration of semiconductor materials by applying Hall effect principle.
4. Analyze the temperature dependence of resistance using a thermistor experiment and build foundational knowledge of Classical Logic gates, semiconductor devices (V–I characterization of p–n junction diodes, solar cells, and LEDs.)
5. Demonstrate Sol-Gel method for the preparation of nano materials.

Advance Course Outcomes:

1. Investigate complex optical and semiconductor properties by designing and modifying experimental setups (e.g., laser diffraction, Hall effect, V-I analysis) to enhance measurement accuracy and experimental insight.
2. Correlate experimental data with theoretical models to critically evaluate material properties and device performance, enabling learners to bridge the gap between fundamental physics and practical engineering applications.

List of Experiments:

1. Determination of wavelength of a Laser by using diffraction Grating.
2. Determination of Numerical aperture of an optical fiber.
3. To draw the V-I Characteristics of a p-n junction diode.
4. Determination of carrier concentration and Hall Effect of Ge crystal using Hall Effect experiment.
5. To determine the constants of A and B using Thermistor Characteristics.
6. Determine the Energy gap of semiconductor diode.
7. To draw the V-I Characteristics of Solar Cell and to calculate the:
   i) Fill factor Efficiency ii) Series resistance
8. Photoelectric Effect: To determine the work function of a given material.
9. Plot the V-I characteristics of LED/QLED.
10. Verify Logic gates (AND, OR, NOT, NAND, NOR).
11. Verify De-Morgans 1st and 2nd Law.
12. Synthesis of Nanomaterial using Sol-Gel Method.

Note: *Minimum 8 experiments should be conducted in the semester.*

Text books:

1. Satya Sai Srikant, Prakash Kumar Chaturvedi, "Basic Electrical Engineering" Springer Singapore, 2020.
2. Joseph Thomas Andrews, Vipin Kumar Kaushik, "Physics Laboratory Manual" Shri Govind ram Seksaria Institute of Technology and Science 2022.
3. K. A. Navas, "Electronics Lab Manual" PHI Learning Pvt. Ltd., 2018.

Course Code	Course Title						Core/Elective
U26CS1L1	**PROGRAMMING FOR PROBLEM SOLVING LAB** (Common to CSE, CSD, CIVIL & MECH)						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
C		**0**	**0**	**3**	**25**	**50**	**1.5**

Course Objectives

1. The course will introduce the students to
2. Understand the fundamentals of C programming.
3. Develop programs using control statements, functions, and recursion.
4. Apply arrays, pointers, strings, and structures in C.
5. Perform file handling and data processing operations.

Course Outcomes

After successful completion of the course the students will be able to

1. Write and execute C programs to solve basic problems.
2. Implement arrays, matrices, searching, and recursion techniques.
3. Use pointers, strings, structures, and unions effectively.
4. Perform file handling operations using C.
5. Debug and analyze C programs using structured programming principles.

LIST OF EXPERIMENTS

1	**Basic Programs**

a. Write a C program to generate all prime numbers between 1 and n.
b. Write a C program to check whether the given number is Armstrong or not.
c. Write a C program to calculate all arithmetic operations using switchcase.

2	**MAX and MIN of set of given numbers & finding roots of quadratic equation**

a. Write a C program to find roots of a Quadratic Equation.
b. Write a C program to find maximum and minimum of given list of numbers.

3	**Sin x & Cos x values using series expansion**

a. Write a C program to compute sine x for given x.
b. Write a C program to compute cosine of x for given x.

4	**Conversion of Binary to Decimal, Octal, Hexadecimal and vice versa**

a. Write a C program to convert Binary to Decimal.
b. Write a C program to convert Decimal to Binary.
c. Write a C program to convert Decimal to Hexadecimal.
d. Write a C program to convert Hexadecimal to Octal.

5	**Generating Pascal Triangle & Pyramid of Numbers**

a. Write a C program to generate the following pattern. 1

```
12
12 3
12 3 4
```

b. Write a C program to generate the following pattern.

```
*
* *
* * *
* * * *
```

c. Write a C program to generate Pascal Triangle up to N rows.

6	**Programs on Recursions**

Q) Write a C program that uses recursion to find:
i) GCD
ii) Factorial
iii) Fibonacci

7	**I. Matrix Addition & Multiplication using Arrays** **Linear and Binary Search**

a. Write a C program to perform addition of two matrices.
b. Write a C program to perform multiplication of two matrices.
c. Write a C program to find an element in an Array using Linear Search.
d. Write a C program to find an element in an Array using Binary Search.

References

1. Balagurusamy E, Programming in ANSI C, 4th Edition (2024), TMG.
2. Forouzan B.A & Richard F. Gilberg, A Structured Programming Approach using C,3rd Edition (2023), Cengage Learning.
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd Edition (2015), Prentice-Hall.
4. A.K. Sharma —"Computer Fundamentals and Programming in C", UniversitiesPress,2ndEdition, 2018.

Jeri R. Hanly, Elliot B. Koffman, Problem Solving and Program Design in C, 5thEdition (2015), Pearson Education

Web References:

1. http://www.geeksforgeeks.org/c
2. http://www.cprogramming.com/tutorial/c
   http://www.cs.princeton.edu

Course Code	Course Title					Core/Elective
U26ME1L1	Engineering Graphics & Design Practice (Common to CSE, CSD, CIVIL & MECH)					Core
Prerequisite	Contact Hours per Week			CIE	SEE	Credits
	L	T	D / P			
-	1	-	2	50	50	2

Course Objectives

The objective of this course is to import knowledge of

1. Design a system, component and process to meet desired needs within realistic constraints such as economic, environmental, ethical, health and safety, manufacturability and sustainability.
2. Communication effectively.
3. Techniques, skills and modern engineering tools necessary for engineering practice.
4. Different solids and their section in orthographic projections.
5. Cad package and its utility.

Course Outcomes

After completing this course, the student will be able to:

1. Identify basics of Dimensioning, lettering and use of different drawing instruments.
2. Demonstrate different geometric methods to construct conics & engineering curves.
3. Apply the concept of Orthographic projection and projection of lines and planes to develop physical objects.
4. Analyze the need of projection of solids and section of solids in real world using CAD tool.
5. Apply the concept of development of surfaces of right regular solids i.e., Prisms, Pyramids, Cylinder, Cone etc., Isometric Views, and Orthographic projections on AutoCAD.

List of Experiments

S No	Topic / Exercises
1	**Introduction to Engineering Graphics** Engineering Graphics, Significance, drawing instrument used in engineering drawing and types of sheet layout and their folding. Types of lines used in engineering drawing, various lettering and dimensioning formats.
2	**Conic Sections-I:** Conic section, Types, Construction of Ellipse, Parabola & Hyperbola given focus and eccentricity
3	**Conic Sections-II:** Construction of ellipse [given major and minor axis], parabola [given base and height] & rectangular hyperbola
4	**Cycloids** (Cycloid and Epi-Cycloid)
5	**Involutes** (Involute of triangle, square & circle)
6	**Scales:** Representative fraction [RF], Plain Scale and Diagonal Scale
7	**Introduction to AutoCAD:** Basic commands and simple drawings. Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (standard, object properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Short menus (Button Bars), The Command Line (Where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects]
8	**Orthographic Projections:** Principles of Orthogonal Projections-Conventions – Projections of points situated in different quadrants.
9	**Projections of straight lines – I:** Line parallel to both the reference planes, line perpendicular or inclined to one reference plane.

10	**Projections of straight lines – II:** Line inclined to both the reference planes.
11	**Projection of Planes – I:** Perpendicular Planes.
12	**Projection of Planes – II:** Oblique Planes.
13	**Projection of Solids:** Projections of solids axis Inclined to one or both the reference planes.
14	**Section of Solids:** Sectional plane is parallel or perpendicular to one reference plane
15	**Development of surfaces:** Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.
16	**Isometric projection-I:** Planes and Principle of isometric projection, Isometric scale, Isometric Views – Conventions lines & Planes.
17	**Isometric projection-II:** Compound solids, isometric Projections of simple solids & compound solids
18	**Conversion of Isometric to Orthographic Projections and Vice-versa**
19	**To create a 3D basic CAD model using a modeling software**
20	**Optional [Any one must be done]** Floor plan windows, doors, and fixtures such as WC, bath, sink,

NOTE:

1. At least 15 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 20 (AutoCAD drawings)

Suggested Readings:

1. Bhatt N.D., Panchal V.M. & Ingle P.R, Engineering Drawing, Charotar Publishing House,53rd Edition, (2018).
2. Shah, M.B. &Rana B.C. Engineering Drawing and Computer Graphics, Pearson Education, 2nd Edition, (2018).
3. Agrawal B. &Agrawal C. M., Engineering Graphics, TMH Publication, 2nd Edition, (2016).
4. Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, (2009).
5. S.N Lal, Engineering Drawing with Introduction to Auto CAD, Cengage Learning India Pvt Lid, New Delhi, (2018).
6. Dhananjay A Jolhe, Engineering Drawing, Tata Mcgraw Hill Education Private Limited, Third print, (2009).
7. K Venkata Reddy, Text Book of Engineering drawing with AUTO CAD, BS Publications, 4th Edition, (2003).
8. (Corresponding set of) CAD Software Theory and User Manuals.

Course Code	Course Title						Core/Elective
U26EE1L1	**BASIC ELECTRICAL ENGINEERING LAB** (Common to CSE, CSD)						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
....	-	-	-	3	25	50	1

Course objectives:

1. Understand the basic concepts of ohms law and theorems with DC excitation.
2. Understand the concepts of self and mutual inductance, coefficient of coupling.
3. Identify Sinusoidal steady state response of R-L, and R-C circuits.
4. Understand the different phenomenon for balanced three phase circuit connected in Star and Delta.
5. Understand the characteristics of DC and AC Machine and performance of Single-phase transformer.

Course outcomes:

1. **Calculate** the ohms law and Network Theorems by practical and theoretically.
2. **Evaluate** of self and mutual inductance, coefficient of coupling.
3. **Demonstrate** the Sinusoidal steady state response of R-L, and R-C circuits
4. **Analyze** the different phenomenon for balanced three phase circuit connected in Star and Delta.
5. **Demonstrate** the ability to compare the characteristics of DC and AC machines and to conduct and interpret standard tests on a single-phase transformer.

Desirable/Advanced Outcomes:

1. Understand and explain the use of electrical machines (like motors and transformers) in real-life and industrial applications.
2. Design and build basic electrical circuits or small machine models for practical use or technical competitions.

Demonstration - 1: Basic safety precautions, Introduction and use of measuring instruments, Voltmeter, Ammeter,Multi- meter, Oscilloscope, Real-life resistors, Capacitors and Inductors.

1. Verification of Ohm's Law, KVL and KCL.
2. Verification of Super position theorem (with DC excitation).
3. Verification of Thevenin's and Norton's theorems (with DC Excitation).
4. Determination of self and mutual inductance, co-efficient of coupling.
5. Sinusoidal steady state response of RL and RC series circuits.
6. Sinusoidal steady state response of RLC series circuits.

Demonstration – 2: Demonstration of cut-out sections of Machines: DC Machine (Commutator- brush arrangement), Transformers, Induction Machine (Squirrel cage rotor),

1. Synchronous Machine (Field winging- slip ring arrangement) and Single-Phase Induction Machine.

2. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta.

3. Measurement of primary and secondary voltages, currents and power of a single-phase Transformer.

4. O.C test and S.C test on single phase Transformer.

5. OCC characteristics of DC Shunt Generator

Note: It is mandatory to conduct any 8 experiments from the above list of experiments.

Suggested Readings:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. J.B Gupta "Fundamentals of Electrical Engineering and Electronics" S.K Kataria & sons,10th edition, 2018.
3. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2024.
4. D.P Kothari and I.J Nagarath "Electrical Machines", Tata McGraw hill Publications, 4th edition, 2019.

Course Code	Course Title						Core / Elective
U26CE1L3	ENGINEERING MECHANICS LAB (Common to CIVIL & MECH)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
	0	0	0	3	25	50	1

Course Objectives

The objectives of this course is to impart knowledge of :

1. Fundamental laws of forces and their verification.
2. Static equilibrium and analysis of simple machines.
3. Key mechanical properties and friction concepts.
4. Performance evaluation of simple machines.
5. Determining acceleration due to gravity using pendulums.

Course Outcomes

After completing this course, the student will be able to:

1. Verify Lami's Theorem and Polygon Law of forces.
2. Determine reactions, centre of gravity, and mechanical properties.
3. Evaluate mechanical advantage and efficiency of simple machines.
4. Measure acceleration due to gravity ('g') using pendulums.
5. Analyze frictional forces and determine coefficients.

S.NO.	NAME OF THE EXPERIMENT
01	Verification of Lami’s Theorem using Gravesands Apparatus.
02	Verification of Lami’s Theorem using universal Force Table.
03	Verification of the Law of Parallelogram of forces using Gravesands apparatus.
04	Verification of Polygon Law of Coplanar Forces using Gravesands Apparatus.
05	Verification of Polygon Law of Coplanar Forces using universal Force Table.
06	Verification of the principle of moments using Bell Crank Lever.
07	Determination of the Reactions at the supports of a simply supported beam.
08	Determination of Centre of gravity of Irregular Shaped Bodies.
09	Determination of the Mass Moment of Inertia of a Fly Wheel.
10	Determination of the coefficient of friction between two surfaces on an inclined plane.
11	Determination of mechanical advantage, velocity Ratio, and Efficiency of a Simple Screw Jack.
12.	Determination of mechanical advantage, velocity Ratio, and Efficiency of a differential wheel and axel.

13.	Determination of the value of acceleration due to gravity 'g' with the help of the simple pendulum.
14.	Determination of the value of acceleration due to gravity 'g' with the help of the bar pendulum or compound pendulum.

Suggested Readings:

1. *Engineering Mechanics, Lab Manual by Dr.A.K Gupta, Scientific* publishers.
2. *Engineering Mechanics,* S.S Bhavakatti, New age International publishers.
3. *A Textbook of Engineering Mechanics,* R.S Khurmi, S. Chand Publications,
4. *Engineering Mechanics,* Ferdinand L. Singer, Collins, Singapore, 1975.
5. *A Textbook of Engineering Mechanics,* R.K Bansal, Laxmi Publications.
6. *Applied Mechanics,* Junarkar, S.B. and H.J. Shah., Publishers, 2001.
7. *Engineering Mechanics,* Reddy Vijay Kumar K. and K. Suresh Kumar, Singer's 2010.

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(A UGC Autonomous Institution)

SCHEME OF INSTRUCTION & EXAMINATION
(With effect from the Academic Year 2026-27)

I-B.E. II-Semester (Group-B)
(Common to CSE, CSD, CIVIL & MECH)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			CREDITS
				L	T	P/ D	Contact Hours/Week	Maximum Marks CIE	Maximum Marks SEE	Duration in Hours	
MC: Three Week Induction Programme											
Theory Course											
1	U26MA201	BSC	Mathematics-II	3	1	-	4	40	60	3	4
2	U26CH201	BSC	Engineering Chemistry	3	-	-	3	40	60	3	3
3	U26CS201	ESC	Python Programming	3	-	-	3	40	60	3	3
4	U26EN201	HMSC	English for Professional Communication	3	-	-	3	40	60	3	3
5	U26EN203	HSMC	Universal Human Values	1	-	-	2	40	60	3	1
6	U26CH202	MC	Environmental Science	2	-	-	2	40	60	3	-
Practical/ Laboratory Course											
7	U26CH2L1	BSC	Engineering Chemistry Lab	-	-	3	3	25	50	3	1.5
8	U26CS2L1	ESC	Python Programming Lab	-	-	3	3	25	50	3	1.5
9	U26EN2L1	HSMC	Effective Communication and Soft Skills Lab	-	-	2	3	25	50	3	1
10	U26ME2L1	ESC	Workshop/Manufacturing Practice Lab	1	-	3	4	50	50	3	2
Total				**16**	**1**	**11**	**29**	**365**	**560**	**30**	**20**

L: Lecture *(Hrs/Wk/Sem)* **T**: Tutorial *(Hrs/Wk/Sem)* **P**: Practical **D**: Drawing *(Hrs/Wk/Sem)*
CIE: Continuous Internal Evaluation **SEE**: Semester End Examination
MC: Mandatory Course **BS**: Basic Science **ES**: Engineering Science
HS: Humanities and Social Sciences **MA**: Mathematics **CH**: Chemistry
EN: English
CE: Civil Engineering **ME**: Mechanical Engineering. **EE:** Electrical Engineering

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

Course Code	Course Title						Core/Elective
U26MA201	MATHEMATICS-II (Differential equations and Vector Calculus) (Common to all Branches)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
- -	3	1	-	-	40	60	4

Course Objectives

1. To provide an over view of ordinary differential equations
2. To learn Laplace Transforms and its properties
3. To study vector differential and integral calculus

Essential Course Outcomes

The students will able to

1. Discuss the methods for solving certain first order differential equations and insight into its applications.
2. Determine solution of linear higher order differential equations with constant coefficients.
3. Apply the concept of Laplace Transforms in improper integrals and to the solution of ordinary differential equations.
4. Interpret and apply the concepts of Vector differentiation, gradient, curl and divergence
5. Compute integrals over vectors and understand its conversion by using vector integral theorems.

Desirable /Advanced Course Outcomes

1. **Solve** linear systems and Eigen value problems using matrix decomposition techniques and interpret their role in dynamic systems and stability analysis.
2. **Construct and solve** first and higher-order differential equations arising in engineering applications using integrating factors, variation of parameters, and reduction methods.

Unit-I

Differential Equations of First Order: Exact differential equations, integrating factors, Linear differential equations, Bernoulli's differential equation, Riccatti's Differential equation, Orthogonal trajectories of a given family of curves (Cartesian and polar), Newton's Law of Cooling.

Unit-II

Differential Equations of Higher Orders: Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters.

Unit-III

Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary Differential Equations using Laplace Transforms.

Unit-IV

Vector Differentiation: Scalar and vector fields, Gradient of a scalar field, Application of Gradient: Normal vector, Angle between normals and Surfaces. Directional derivative, Divergence and Curl of a vector field, Vector Identities.

Unit-V

Vector Integration: Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and problems on their verification.

Textbooks:

4. B.S.Grewal,"HigherEngineeringMathematics",Khannapublishers,45th edition,2026.
5. ErwinKreyszig,"AdvancedEngineeringMathematics,Wiley,10th edition,2023.
6. R.K.Jain & S.R.K.lyengar, Advanced Engineering Mathematics, Narosa Publications,5thEdition,2026.

Reference Books:

4. B.V.Ramana,"HigherEngineeringMathematics",TataMcGraw-Hill,2018
5. N.P.BaliandManishGoyal,"AtextbookofEngineeringMathematics",LaxmiPublications,latestedition.
6. H.K.Dass and Er. Rajnish Verma," Higher Engineering Mathematics", S.Chand Publishing, 3rd edition, 2024

Course code	Course Title						Core/Elective
U26CH201	ENGINEERING CHEMISTRY						Core
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
-	L	T	D	P			
	3	–	-	-	40	60	3

Course Objectives:

1. To understand and apply fundamentals of battery chemistry in Engineering applications.
2. To get acquainted with hard water and corrosion and apply the techniques for softening and corrosion control method.
3. Correlate the properties of materials with their internal structure and their use for Engineering application
4. Exposure to qualitative and quantitative parameters of chemical fuels.
5. To develop the concept of green chemistry in modern trends in engineering.

Course Outcomes:

1. Discuss the fundamental principles of electrochemical cells.
2. Determine the total hardness of water and apply the corrosion control methods.
3. Illustrate the synthesis and applications of engineering materials.
4. Identify various fuels and compare their key properties and applications.
5. Apply the principles of green chemistry for sustainable environment**.**

Desirable / Advanced Course Outcomes

1. Develop electroplating and corrosion prevention methods and critically evaluate the electrochemical performance of batteries.
2. Formulate strategies to optimize fuel usage

UNIT-I ELECTROCHEMISTRY AND BATTERIES:

Electrochemistry: Types of cells, cell notation, cell reaction and cell potential. Nernst equation and its derivation. Applications of Nernst equation to electrode potential and EMF of a cell. Numerical problems. Types of electrodes: Calomel and Quinhydrone. Determination of pH by using Quinhydrone electrode.

Batteries: Introduction to Batteries**, Secondary battery:** Lead acid battery and Li-Ion battery.

Flow batteries: Methanol-Oxygen fuel cells.

UNIT- II WATER CHEMISTRY AND CORROSION:

Water Chemistry: Hardness of water, its types and units of hardness, Estimation of hardness by EDTA method. Softening of water by Ion exchange process, reverse osmosis method. Potable water and its specifications, disinfection of water by chlorination and break point Chlorination. **Corrosion:** Introduction, causes and its effects. Theories of corrosions- Wet corrosion and its mechanism. Factors affecting rate of corrosion. **Corrosion Control Methods:** Cathodic Protection, Sacrificial anodic method, impressed current method and Surface coating method- Electroplating, Electroless Ni plating.

UNIT- III POLYMERS

Polymers: Basics terms in polymers: Monomer and its functionality, Polymers and Degree of polymerization. Types of polymerizations, Classification of Polymers – Thermoplastics and Thermosetting resins. **Preparation, Properties and engineering applications of: Plastics-** PVC and Bakelite. **Fibres:** Nylon 6:6 & Kevlar. **Elastomers:** Buna-S.

Conducting polymers: classification Mechanism of conduction in Poly-acetylene, Applications ofconducting polymers.

Biodegradable polymers: Introduction, preparation, properties and applications of Polylactic acid.

UNIT- IV CHEMICAL FUELS: Definition and classification of fuels- Primary and secondary fuels. Solid, liquid and gaseous fuels. Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong 's formula – Numerical problems.

Solid Fuels: Analysis of coal - Proximate and Ultimate analysis.

Liquid Fuels: Refining of Petroleum. Composition and uses of Gasoline, Diesel and Kerosene. **Gaseous Fuels:** LPG, CNG -Composition and Uses. **Combustion:** Calculation of air quantities by weight required for combustion of a fuel- Numerical problems.

Biodiesel: Sources, Concept of Trans esterification and carbon neutrality. Properties and significance.

UNIT –V GREEN CHEMISTRY & SPECTROSCOPY

Green Chemistry: Concept and Principles of Green Chemistry.

Spectroscopy: Description of Electromagnetic spectrum.

Principles of UV-Visible Spectroscopy: Statement of Beer-Lamberts law.

Absorption and intensity shifts: Bathochromic**,** Hypsochromic, Hyperchromic and hypochromic shifts with one example each.Principle and applications of UV-Visible Spectroscopy

IR Spectroscopy: Principles and applications of IR Spectroscopy.

NMR Spectroscopy: Principles of H ^{1}-NMR Spectroscopy, multiplicity, Chemical Shift. Principle and applications of MRI.

Text Books:

1. P.C. Jain & M. Jain, Engineering Chemistry, Dhan Patrai and sons Publishing Company,17th Edn, New Delhi (2019)
2. Rama Devi, Venkata Ramana Reddy and P. Rath, Engineering Chemistry, Cengage Learning, New Delhi (2016)
3. S.S. Dara, S. Chand, A Text Book of Engineering Chemistry, S. Chand Publications,Reprint edition, 2017
4. Puri and Sharma, Principles of Physical Chemistry, Vishal Publications Co.2019
5. Agarwal Shikha, Engineering Chemistry, Cambridge University Publications.

Reference Books:

1. C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", WileyIndia, 5thEdition, 2013.
2. R. P. Mani, K. N. Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rdEdition, 2015

Course Code	Course Title						Core/Elective
U26CS201	**PYTHON PROGRAMMING**						**Core**
Prerequisite	**Contact Hours per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
-	**3**	**-**	**-**	**-**	**40**	**60**	**3**

Course Objectives:

The course will introduce the students to

1. Learn programming basics, problem-solving, and Python fundamentals.
2. Develop skills in functions, recursion, and string handling.
3. Understand and apply Python data structures.
4. Implement object-oriented programming concepts in Python.
5. Handle exceptions, file operations, and basic data analysis tools

Course Outcomes

At the end of the Course, Student would be:

1. Apply problem-solving techniques and write basic Python programs using control structures and operators.
2. Develop modular programs using functions, recursion, and string manipulation techniques.
3. Implement and utilize Python data structures such as lists, dictionaries, tuples, and sets effectively.
4. Design and develop applications using object-oriented programming concepts in Python.
5. Handle exceptions, perform file operations, and use basic libraries for data processing and visualization

UNIT 1:

Python Basics: Introduction to Python, getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, Conditional statements, Loops, Nested loops, Break, continue, pass.

Micro Project: Smart Calculator (Exception-Free Basic Version), Pattern & Number Analyzer

UNIT 2:

Functions & Strings: overview of functions and strings in Python, including function creation and calls, parameters and scope, type conversion, recursion, and conditional logic; along with string creation, access, operations, comparison, and built-in methods.

Micro Project: Password Strength Checker, Recursive Problem Solver Toolkit.

UNIT 3:

Data Structures: overview of Python data structures including lists, dictionaries, tuples, and sets covering creation, access, traversal, modification, operations, methods, and concepts like mutability and immutability, along with frozen set usage.

Micro Project: Student Record Management System, Matrix Operations Tool

UNIT 4:

Object Oriented Programming: Introduction to OOP concepts in Python, including classes, objects, abstraction, encapsulation, inheritance, and polymorphism; creating and using classes, object behavior, access modifiers, methods, constructors, operator overloading and polymorphism.

Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem;
Micro Project: Bank Account Simulation, Library Management System

UNIT 5:
Exceptions & File Handling:
Exception Handling: Difference between syntax errors and exceptions, built-in exceptions, raising exceptions, handling exceptions, exception hierarchy, User-Defined Exceptions.
Files handling: Reading/writing files, CSV basics, Introduction to python Libraries ,NumPy ,Pandas, Matplotlib.
Micro Project: Robust File Reader, Data Analysis Mini Project

Suggested Readings:

1. Fundamentals of Python Programming Richard L. Halterman Southern Adventist University,2019
2. Kanetkar, Yashavant, Let Us Python, BPB Publications, 2022. ISBN-13: 978-9355516558.
3. Lutz, Mark, Learning Python, 5th Edition, O'Reilly Media, 2013. ISBN-13: 978-1449355739.
4. Peters, Shawn, Python Essentials You Always Wanted to Know: Beginner's Guide to Python Programming, Data Structures, Data Analytics with Hands-On Coding Exercises, Hardcover Edition, Vibrant Publishers, 9 December 2024.

Course code	Course title						Core/Elective
U26EN201	**English For Professional Communication** (Common to all Branches)						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	3	-	-	-	40	60	3

Course Objectives

To expose the students to:

1.Understand the total content and underlying meaning in the context.
2.Identify the text to develop language competency.
3.Develop vocabulary among the students.
4.Practice the grammar skills involved in writing sentences and short paragraphs.
5.Write paragraphs, letters, narrative pieces, reports, etc.

Essential Course Outcomes

On successful completion of this course, the students would be able to:

1.Study and write the content meaningfully.
2.Restate the given texts and respond with precision accurately.
3.Demonstrate proficiency in vocabulary to enrich communication effectively.
4.Build grammar structures while writing sentences and paragraphs coherently.
5.Apply knowledge of diverse writing forms—paragraphs, letters, reports, and narratives confidently.

Desirable/Advanced Course Outcomes:

1.Analyze the language connectors and transitional Signals for different types of writing thoroughly.
2.Synthesize complex texts into clear, relevant written responses effectively.

UNIT-I

Reading: O' Henry, 'After Twenty Years'
Vocabulary: Word Building – Prefixes, Suffixes, Root words, Collocations
Grammar: Articles, Prepositions
Writing: Formal/Official Letter Writing

UNIT-II

Reading: Kamala Das, 'My Mother at Sixty-six'
Vocabulary: Word Formation –Blending, Acronyms
Grammar: Concord
Writing: Paragraph Writing-Structure & Development

UNIT-III

Reading: Amberish K. Diwanji, 'Dabbawallahs: Mumbai's Best Managed Business'
Vocabulary: Homophones, Homonyms, Homographs
Grammar: Punctuation
Writing: Basics of Report Writing

UNIT-IV

Reading: Anna Funk, 'A Swarm of Cyborg Insects'
Vocabulary: One Word Substitutes
Grammar: Tenses
Writing: Essay Writing

UNIT-V

Reading: A. G. Gardiner, 'The Rule of the Road'
Vocabulary: Idioms, Phrases

Grammar: Common Errors in English
Writing: Blog Writing

Suggested Readings:

1. Raman, Meenakshi & Sharma, Sangeeta. (2022). *Technical Communication: Principles and Practice* (3rd ed.). Oxford University Press, New Delhi
2. Rizvi, Ashraf, M. (2024). *Effective Technical Communication*, (3rd ed.) Tata McGraw Hill
3. Kumar, Sanjay & Lata, P. (2018). *Communication Skills: A Workbook,* (1st ed.) Oxford University Press
4. McCarthy, M & O'Dell, Felicity. (2017*). English Vocabulary in Use*, (3rd ed.) Cambridge University Press.
5. Yule, George. (2019). *Oxford Practice Grammar,* Oxford University Press, Oxford.
6. Kumar, Suresh, E., Sreehari & Savithri, J., (2009). *Effective English*, (1st ed.) Pearson, India.

Course code	Course title						Core/Elective
U26EN203	**Universal Human Values (Common to all Branches)**						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	1	-	-	-	40	60	1

Course Objectives

To expose students to:

1.Grasp value education's role in personal and social growth.
2.Embrace universal values like truth, peace, non-violence, and compassion.
3.Practice cyber ethics by safeguarding privacy and behaving responsibly online.
4.Apply professional ethics to stay accountable, competent, and trusted.
5.Understand Indian Knowledge Systems, their scope and relevance to sustainable development.

Essential Course Outcomes

On successful completion of this course, the students would be able to:

1. Understand the importance of value education and use self-exploration for personal growth.
2. Integrate human values into daily life and decision-making.
3. Identify cyber risks and practice safe, responsible digital behavior.
4. Exhibit professional ethics and its codes, stay accountable, and build public trust.
5. Explain IKS, compare knowledge types, and apply them to modern sustainability.

Desirable / Advanced Course Outcomes:

1. Address ethical challenges like disparities, rights, and global conflicts with a holistic approach.
2.Promote cyber ethics by managing privacy risks and practicing secure digital behaviour.

UNIT I: Introduction to Value Education

Value education, definition, concept and need for value education, the content and process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as parts of value education.

UNIT II: Universal Human Values

Introduction to Truth, Peace, Non-Violence, Righteous Conduct, Compassion and Service, Practicing, learner's experience, Case Studies

UNIT III: Cyber Ethics and Privacy in the Digital Age

Understanding cyber ethics, defining privacy, privacy in the digital age, cyber safety and responsible digital behaviour, legal and ethical issues in cyberspace

UNIT -IV: Professional Ethics

Value based life and profession, personal & professional accountability, competence in professional ethics, issues in professional ethics – the current scenario, maintaining public confidence and understanding ethical codes.

UNIT V: Indian Knowledge Systems

Definition, Concept and Scope of IKS, traditional knowledge vis-a-vis indigenous knowledge,
traditional knowledge vs. western knowledge, Town planning and architecture- Construction, Health, wellness and Psychology-Medicine, Agriculture, United Nations Sustainable development goals.

Suggested Readings:

1. Gaur. R.R., Sangal. R, Bagaria. G. P. (2023). *A Foundation Course in Value Education*, (3rd ed.). Excel Books.
2. Krishnamacharyulu, C. S. G., & Ramakrishnan, L. (2025). *Universal Human Values*, (1st ed.). Himalaya Publishing House.
3. R. Subramanian. (2024). *Professional ethics,* Oxford University Press India.
4. Anand, R. (2025). *Foundation Course in Universal Human Values and Professional Ethics,* (1st ed.). CBS Publishers & Distributors.
5. Spinello, R. A. (2022). *Cyber Ethics: Morality and Law in Cyberspace*, (7th ed.). Jones & Bartlett Learning.
6. Tavani, H. T. (2022). *Ethics And Technology: Controversies, Questions, and Strategies for Ethical Computing* (6th ed.). Wiley.
7. Kapoor, K., Singh, Kumar, A., (2005). Knowledge *Traditions and Practices of India,* (*Vol.1),*
   DK Print World (P) Ltd.

Course Code	Course Title						Core / Elective
U26CH202	ENVIRONMENTAL SCIENCES (Common to all Branches)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
-	L	T	D	P			
	2	-	-	-	40	60	-

Course Objectives:

1. To create awareness and impart basic knowledge about the various types of natural resources.
2. To know the functions of ecosystems.
3. To understand importance of biological diversity.
4. To explain environmental pollution and its control measure and apply the principal sustainable development.
5. To know social and environment related issues and their preventive measures.

Course Outcomes:

After completing this course, the student will be able to:

1. Recognize the environmental science is interdisciplinary and need for sustainable development
2. Explain the role of ecosystems to preserve ecological balance.
3. Determine the importance and conservation strategies for biodiversity.
4. Illustrate the sources and effects of pollution and the importance of sustainable development goals.
5. Categorize how environmental problems affect society and propose suitable strategies for efficient disaster management.

Desirable / Advanced Course Outcomes

1. Design sustainable environmental management practices and recommend innovative solutions to address local and global environmental challenges using interdisciplinary approaches.
2. Evaluate environmental policies, disaster management strategies, and conservation programs to propose effective measures for sustainable resource utilization and environmental protection.

UNIT 1:

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

Natural Resources:

Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems.

Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity.

Forest Resources – Use and over exploitation, deforestation & its effect on tribal people.

Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification.

Energy Resources –Renewable and Non- renewable energy resources.

UNIT 2:

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, river, forest, grassland).

UNIT 3:

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT 4:

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation

Sustainable Development Goals: Definition, Sustainable Goals, Threats, Strategies to achieve sustainable development.

UNIT 5:

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Field Work:

- Visit to a local area to document environmental issues – agricultural area/ lake
  - / terrestrial ecosystem.
- Visit to a local polluted area-market/slum area/Industrial area/traffic area.

Textbooks

1.Erach Bharucha, Environmental Studies for undergraduate courses, 4th edition, Universities Press.

2.R. Rajagopalan, Environmental Studies from crisis to cure, 4th edition, oxford Publication.

Reference Books:

1. A.K. De, Environmental Chemistry, 3rd Edition,Wiley Eastern Ltd.
2. E. P. Odum, Fundamentals of Ecology, 5th Edition,W. B. Sunders Co., USA.
3. M.N. Rao and A.K. Datta, Revised 3rd Edition, Waste Water Treatment, Oxford and IBK Publications.
4. Benny Joseph, Environmental Studies, 3rd Edition, Tata McGraw Hill, 2018.
5. V.K. Sharma, Disaster Management, National Centre for Disaster Management, IIPE, 2013.

Course code	Course Title						Core/Elective
U26CH2L1	ENGINEERING CHEMISTRY LAB (Common to CSE, CSD, CIVIL & MECH)						Core
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
-	L	T	D	P			
	-	-	-	3	25	50	1.5

Course Objectives:

1. Conduct experiments, take measurements and analyze the data through hands-onexperience in order to demonstrate understanding of the theoretical concepts of quantitative analysis while working in small group.
2. Interpret the electro analytical principles with experimental results graphically.
3. Demonstrate writing skills through clear laboratory reports.

Course Outcomes:

1. Demonstrate the amount of Ferrous ions by volumetric analysis.
2. Calculate the total hardness and alkalinity of water.
3. Explain the mobility of ions in strong acids and weak acids using conductivity meter.
4. Compute the amount of Fe^{+2} and HCl by using potentiometer.
5. Infer Beer- Lambert's law by Colorimetry and demonstrate the synthesis of Aspirin and paracetamol.

Desirable / Advanced Course Outcomes

1. Analyze data critically and draw meaningful conclusions from experimental results.
2. Relate laboratory findings to industrial, environmental, and medical fields.

LIST OF EXPERIMENTS

Introduction to Chemical
Analysis.
Techniques of Weighing.

VOLUMETRIC ANALYSIS:

1. Determination of strength of Ferrous solution by Dichrometry.
2. Determination of strength of Ferrous solution by Permanganometry.
3. Determination of hardness of water by Complexometric method using EDTA.
4. Determination of strength of Carbonates and bicarbonates in a given mixture.

INSTRUMENTAL ANALYSIS:

Conductometer:

5. Determination of strength of given HCl solution.
6. Determination of strength of CH_3COOH solution.
7. Determination of strength of HCl & CH_3COOH in given mixture

Potentiometer:

8. Determination of strength of HCl solution.
9. Determination of strength of Ferrous solution.

pH Meter:

10. Determination of strength of HCl solution.

Colorimeter:

11. Verification of Beer-Lambert 's law and determination of Permanganate.

CHEMICAL KINETICS:

12. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.

DRUG SYNTHESIS:

13. Synthesis of Drug-Aspirin / Paracetamol.

(Note: Minimum ten experiments should be conducted in the semester)

Textbooks:

1. B.D. Khosla, A. Gulati and V.Garg, _Senior Practical Physical Chemistry‟, (R. Chand& Co., Delhi)
2. K. K. Sharma and D.S. Sharma, _An Introduction to Practical Chemistry‟, (Vikas publishing, N.Delhi

Course Code	Course Title						Core/Elective
U26CS2L1	**PYTHON PROGRAMMING LAB** (Common to CSE, CSD, CIVIL & MECH)						**Core**
Prerequisite	**Contact Hours per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
-	**3**	**-**	**-**	**-**	**25**	**50**	**1.5**

Course Objectives:

Develop ability to

1. Learn programming basics, problem-solving, and Python fundamentals.
2. Develop skills in functions, recursion, and string handling.
3. Understand and apply Python data structures.
4. Implement object-oriented programming concepts in Python.
5. Handle exceptions, file operations, and basic data analysis tools

Course Outcomes

At the end of the Course, Student would be:

1. Apply problem-solving techniques and write basic Python programs using control structures and operators.
2. Develop modular programs using functions, recursion, and string manipulation techniques.
3. Implement and utilize Python data structures such as lists, dictionaries, tuples, and sets effectively.
4. Design and develop applications using object-oriented programming concepts in Python.
5. Handle exceptions, perform file operations, and use basic libraries for data processing and visualization

Lab Experiments

1. a) Write a program to display "Hello, Python!" using both interactive and script mode
   b) Program to perform arithmetic operations (addition, subtraction, multiplication, division)
2. a) Write a program to find the largest of three numbers using if-elif-else
   b) Program to check whether a number is even or odd
3. a) Write a program to print multiplication tables using loops
   b) Generate number patterns (pyramid, reverse pyramid)
4. a) Write a function to calculate the sum of two numbers
   b) Write user-defined functions with parameters and return values
   c) Program to demonstrate recursion (Fibonacci series)
5. String programs:
   - Reverse a string
   - Check palindrome string
   - Count vowels and consonants
   - Compare two strings
   - Demonstrate string slicing and methods
6. a) Create, append, update, and delete elements in a list
   b) Program to find largest/smallest element in a list
   c) List traversal and slicing
7. a) Create a class and object in Python
   b) Program to demonstrate constructors (__init__)
   c) Implement encapsulation using private variables
8. a) Program to demonstrate multiple inheritance
   b) Implement polymorphism using method overloading
9. a) Program to handle division by zero exception

b) Use try-except-else-finally blocks
c) Raise custom exceptions

10 a) Read/write CSV files
b) Basic NumPy operations (arrays, indexing)
c) Basic Pandas operations (DataFrame creation)
d) Simple data visualization using Matplotlib

Additional Experiments

1. a) Program to demonstrate break, continue, and pass
b) Write a program to calculate factorial using loops

2. a) Create tuple and demonstrate immutability.
b) Convert list to tuple and vice versa.

3. a) Create and manipulate dictionary (add/update/delete)
b) Program to count frequency of elements using dictionary

4. a) Perform set operations: union, intersection, difference
b) Program using frozenset

Suggested Readings:

1. Fundamentals of Python Programming Richard L. Halterman Southern Adventist University,2019
2. Kanetkar, Yashavant, Let Us Python, BPB Publications, 2022. ISBN-13: 978-9355516558.
3. Lutz, Mark, Learning Python, 5th Edition, O'Reilly Media, 2013. ISBN-13: 978-1449355739.
4. Peters, Shawn, Python Essentials You Always Wanted to Know: Beginner's Guide to Python Programming, Data Structures, Data Analytics with Hands-On Coding Exercises, Hardcover Edition, Vibrant Publishers, 9 December 2024.

Course code	Course title						Core/Elective
U26EN2L1	**Effective Communication Skills Lab (Common to all Branches)**						Core
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	-	-	-	2	25	50	1

Course Objectives

To expose the students to:

1. Develop attentive listening skills for effective comprehension in varied contexts.
2. Build foundational phonetic knowledge for clear and intelligible pronunciation.
3. Enhance oral communication abilities in introducing, describing, narrating, and directing.
4. Foster interactive competence through role play, JAM, group discussions, and debates.
5. Strengthen public speaking and presentation skills for academic and professional settings.

Essential Course Outcomes

On successful completion of this course, the students would be able to:

1. Understand spoken English effectively using active listening strategies.
2. Apply phonetic principles confidently to produce accurate pronunciation.
3. Introduce, describe, and narrate clearly across personal, social, and professional contexts.
4. Engage constructively in group activities such as discussions, debates, and role plays.
5. Deliver impactful speeches and formal presentations with clarity and confidence.

Desirable/Advanced Course Outcomes:

1.Lead and moderate discussions, debates, and role plays inclusively and coherently.

2.Design and deliver persuasive, engaging, and polished presentations.

Unit-I: Listening for comprehension: Definition, importance, process, types, how to listen effectively

Unit-II: Phonetics: Definition, classification, organs of speech, phonetic symbols

Unit-III: Conversational Skill: Self introduction & introducing others, giving information, instructions, direction

Unit-IV: Describing: Person, object, place

Unit-V: Narrating experience, events, opinion

Unit-VI: Role Play: Importance, tips, role play on different situations

Unit-VII: JAM: Definition, importance, rules, dos and don'ts

Unit-VIII: Group Discussion: Importance, characteristics, tool for selection, strategies

Unit-IX: Debate: Introduction, why debate, debate formats (oxford, parliamentary, panel, technical symposium), rules of engagement and etiquette

Unit-X: Public Speaking: Importance, speech structure & organization, voice & delivery, non-verbal communication

Unit-XI: Formal Presentation: Importance, types, stages of a presentation, visual-aids in presentation

Suggested Readings:

1. Rizvi, Ashraf, M. (2024). *Effective Technical Communication,* (3rd ed.). Tata McGraw Hill.
2. Bala Subramaniam, T.A. (2022). *Text book of English Phonetics for Indian Students,* (3rd ed). Macmillan Publishers India.
3. Raman, Meenakshi & Sharma, Sangeeta. (2022). *Technical Communication: Principles and Practice,* (4th ed.). Oxford University Press, New Delhi.
4. Tyagi, Kavita & Misra, Padma. (2011). *Advanced Technical Communication*. New Delhi, PHI Learning.
5. Mohan, Krishna & Singh, N., P. (2015). *Speaking English Effectively*, (2nd ed.) Trinity Press.

Course code	Course title						Core/Elective
U26ME2L2	**Workshop/ Manufacturing Practices** (Common to CSE, CSD, CIVIL & MECH)						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
-	1	-	-	3	50	50	2

Course Objectives:

The Objective of this course is to impart knowledge of

1. Engineering Practices & develop holistic understanding ofvarious Engineering materials and Manufacturing processes.
2. Steel, Plastic, Composite and other materialsfor suitable applications.
3. Hands on practice on techniques of fabrication, welding, casting, manufacturing, metrology, and allied skills.
4. Productivity, create skilled manpower which is cognizant of industrial workshop componentsand processes and can communicate their work in a technical, clear andeffective way.
5. Engineering Skill development with regard to making components, systemintegration and assembly to form a useful device.

Course Outcomes :

After completing this course, the student will be able to

1. Differentiate the tools and Fabricate components with their own hands.
2. Examine the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. Perform the Assembling of different components and will be able to produce small mechanisms/devices of their interest.
4. Demonstrate experiments of black smithy, plumbing, carpentry, tinsmithy, fitting, house wiring.
5. Select different Engineering Materials and Manufacturing Methods.
6. Develop different techniques used in Workshop and chooses the best material/ manufacturing process for the application.

Desirable/Advanced Outcomes:

1. Understand and explain the use of mechanical tools and machines (like measuring, marking and lathe machine) in real-life and industrial applications.
2. Design and build basic mechanical models by small hand tools and also with 3D printing technology for practical use or technical competitions.

A. TRADES FOR EXERCISES

1. **FITTING SHOP**
    1. Square fitting
    2. Dovetail fitting
    3. V- Template fitting

2. **CARPENTRY**
    1. End lap joint
    2. T- Bridlejoint
    3. Dovetail lap joint

3. **ELECTRICAL & ELECTRONICS /HOUSE WIRING**
    1. Two lamps in parallel with 5 Pin 6amp socket and switches.
    2. Two lamps in series connection with switches.
    3. Staircase wiring.
4. **TIN SMITHY**
    1. Square Tin
    2. Rectangular Scoop
    3. Conical funnel
5. **WELDING PRACTICE**
    1. Lap Joint
    2. V- Butt Joint
    3. T-joint
6. **DIGITAL FABRICATION (3D Printing)**
    1. To Study the method of Additive Manufacturing process using a 3D printer.
    2. To print a door bracket using an extruder type 3D Printer.

B. TRADES FOR DEMONSTRATION AND EXPOSURE

1. Machining (Lathe & Drilling)
2. Plumbing (Introduction of tools, joints, couplings, and valves etc)
3. Blacksmithy (Introduction, Round to Square, Square to Octogon)

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Brazing
3. Glass Cutting
4. CNC LATHE
5. Plastic Moulding
6. Casting
7. Gas Welding

Note: At least two exercises from each trade.

Suggested Readings :

1. H S Bawa, "Workshop Practice", Tata Mc Graw Hill Education Private Limited ,New Delhi, Second Edition, 2009.
2. V Ramesh Babu, “Engieering Workshop Practice”, VRB Publishers Pvt Ltd, New Edition, 2009.
3. P. Kannaiah& K. L. Narayana “Workshop manual” 2nd Ed., Scitech publications (I) Pvt. Ltd., Hyderabad.
4. Hajra Choudhury S.K., HajraChoudhury A.K., Nirjar Roy S.K. “Elements of Workshop Technology” Vol-I 2008 &Vol-II 2010 Media Promoters & Publishers Pvt. Limited, Mumbai.
5. B S Raghuwanshi, “A Course In Workshop Technology”, Dhanpat Rai & Co.(P) Ltd, Educational & Technical Publishers, Vol-II, 2011.
6. K Venkata Reddy,”Workshop Practice Manual” Sixth Edition, B S Publications Books Pvt.Ltd, Hyderabad.