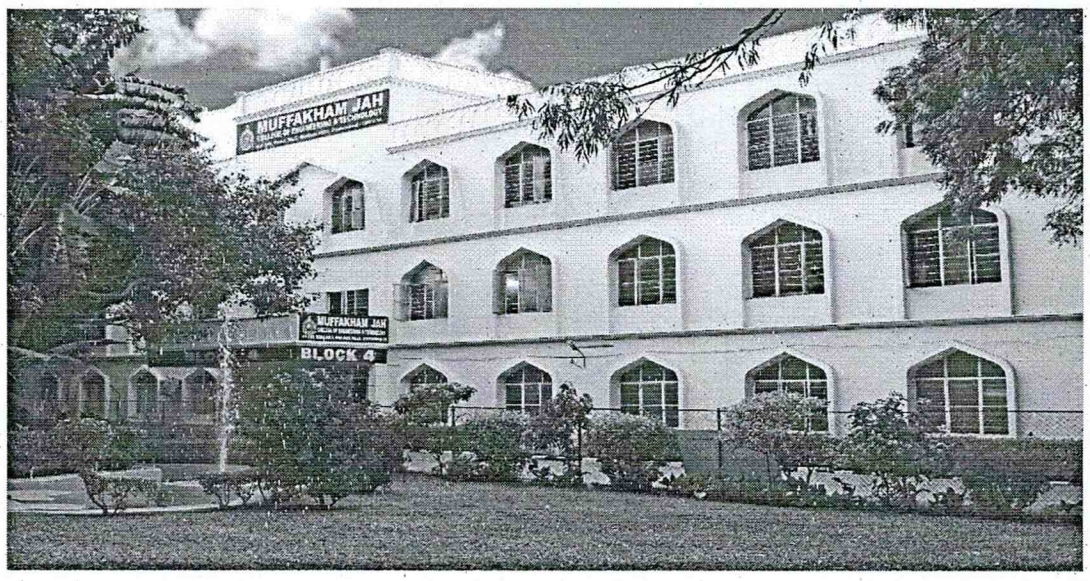
Scheme of Instruction & Syllabi

(In line with AICTE Model Curriculum with effect from AY 2025-26)

BACHELOR OF ENGINEERING

I & II SEMESTERS of
FOUR YEAR DEGREE PROGRAMME
IN
Mechanical Engineering Department (ME)

(R–25 Regulation)



MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY
An Autonomous Institution
Affiliated to Osmania University, Approved by AICTE
Accredited by NBA & NAAC (A+)

Mount Pleasant, 8-2-249 to 267, Road No.3, Banjara Hills,
Hyderabad– 500 034, Telangana, India
Website: www.mjcollege.ac.in, E-Mail: principal@mjcollege.ac.in,
Phone Nos.: 040-22280301 / 305

With effect from 2025-26

Scheme of Instruction & Syllabi

(In line with AICTE Model Curriculum with effect from AY 2025-26)

BACHELOR OF ENGINEERING

I & II SEMESTERS OF
FOUR YEAR DEGREE PROGRAMME
IN
Mechanical Engineering Department (ME)

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MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution)

Institute Vision

To be a part of the universal human quest for development and progress by contributing high caliber. ethical and socially responsible engineers who meet the global challenge of building a modern society in harmony with nature.

Institute Mission

- To attain excellence in imparting technical education from the undergraduate to through doctoral levels by adopting coherent and judiciously coordinated curricular and co-curricular programs.
- To foster a partnership with industry and Governmental agencies through collaborative research and consultancy.
- To nurture and strengthen auxiliary soft skills for overall development and improved employability in a multicultural workspace.
- To develop scientific temper and spirit of enquiry in order to harness the innovative talents.
- To develop a constructive attitude in the students towards the task of nation-building and empower them to become future leaders.
- To nourish the entrepreneurial instincts of the students and hone their business acumen.
- To involve the student and faculty in solving local community problems through economical and sustainable solutions.

Department Vision

To produce high caliber, competent, industry oriented Mechanical Engineers.

Department Mission

To impart quality education by providing state of art technical facilities and enhance the professional abilities to meet the demands of the ever-changing manufacturing industry.

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Program Educational Objectives (PEO's)

PEO 1: Graduates will be capable of demonstrating analytical and practical engineering skills using various techniques and tools in solving engineering problems.

PEO 2: Graduates will communicate efficiently as professional engineers in a team or as an individual in local and global cross cultural working scenario.

PEO 3: Graduates will demonstrate lifelong learning through higher education, skill improvement and professional development.

PEO 4: Graduates will be successful in devising sustainable solutions to environmental, socio economic and professional problems, with due regard to professional ethics.

Program Specific Outcomes (PSO's)

PSO 1: The graduates will be able to function in software industry in the areas of design and development using software tools such as AUTO CAD, SolidWorks, Ansys, etc.

PSO 2: The graduates will be able to work in power plants and manufacturing industry in the sphere of operation and maintenance.

Program Outcomes (PO's)

PO1: Engineering knowledge:

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis:

Identify, formulate, research literature, and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

PO3: Design/development of solutions:

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

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PO4: Conduct investigations of complex problems:

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage:

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society:

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability:

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics:

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work:

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication:

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance:

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning:

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY (A)
In line with AICTE Model Curriculum with effect from AY 2025-26

B.E. Mechanical Engineering Department (Mech)

SEMESTER-1			Scheme of Instruction				Scheme of Examination			Credits
S. No	Course Code	Name of the Course	Lecture	Tutorial	Practical	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
1	*25 MC101PO	Indian Constitution	2	-	-	2	50	-	-	0
2	25BS101MT	Matrices & Differential Calculus	3	1	-	4	40	60	3	4
3	25BS102PH	Engineering Physics	3	1	-	4	40	60	3	4
4	25ES101CS	Programming for Problem Solving	3	-	-	3	40	60	3	3
5	25ES102EE	Basic Electrical Engineering	3	1	-	4	40	60	3	4
6	25BS151PH	Engineering Physics Lab	-	-	2	2	25	50	3	1
7	25ES151CS	Programming for Problem Solving Lab	-	-	2	2	25	50	3	1
8	25ES152CE	Engineering Graphics	-	-	2x2	4	25	50	3	2
9	25ES153EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
		Total	**14**	**3**	**10**	**27**	**310**	**440**	**24**	**20**

SEMESTER-2			Scheme of Instruction				Scheme of Examination			Credits
S. No	Course Code	Name of the Course	Lecture	Tutorial	Practical	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
1	*25MC102CE	Environmental Sciences	2	-	-	2	50	-	-	0
2	*25MC103PY	Essence of Indian Traditional Knowledge	2	-	-	2	50	-	-	0
3	25HS101EG	English	2	-	-	2	40	60	3	2
4	25BS103MT	Differential Equations & Numerical Methods	3	1	-	4	40	60	3	4
5	25BS104CH	Engineering Chemistry	3	1	-	4	40	60	3	4
6	25ES105ME	Engineering Mechanics	3	-	-	3	40	60	3	3
7	25HS151EG	English Lab	-	-	2	2	25	50	3	1
8	25BS152CH	Engineering Chemistry Lab	-	-	2	2	25	50	3	1
9	25ES154ME	Engineering Workshop Practice	-	-	2x2	4	25	50	3	2
10	25PC155ME	Skill Development Course-1 (Concepts of Machine Drawing)	-	-	3	3	50	-	-	1
		Total	**15**	**2**	**11**	**28**	**385**	**390**	**21**	**18**

MC: Mandatory Course BS: Basic Science ES: Engineering Science

CIE: Continuous Internal Evaluation SEE: Semester End Evaluation

*GRADE: Satisfactory/Unsatisfactory (Non-credit Mandatory Course)

3/6/26

3/6/26

3/6/26

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SCHEME OF INSTRUCTION & EXAMINATION

(In line with AICTE Model Curriculum with effect from AY 2025-26)

B.E. (MECHANICAL ENGINEERING)

SEMESTER - 1			Scheme of Instruction				Scheme of Examination			Credits
S. No.	Course Code	Name of the Course	Lecture	Tutorial	Practical	Contact Hrs/Wk.	C.I.E.	S.E.E.	Duration in Hrs	
		*Induction Program (UHV-I)	2 Weeks				-	-	-	0
1	25MC101PO	*Indian Constitution	2	-	-	2	50	-	-	0
2	25BS101MT	Matrices & Differential Calculus	3	1	-	4	40	60	3	4
3	25BS102PH	Engineering Physics	3	1	-	4	40	60	3	4
4	25ES101CS	Programming for Problem Solving	3	-	-	3	40	60	3	3
5	25ES102EE	Basic Electrical Engineering	3	1	-	4	40	60	3	4
6	25BS151PH	Engineering Physics Lab	-	-	2	2	25	50	3	1
7	25ES151CS	Programming for Problem Solving Lab	-	-	2	2	25	50	3	1
8	25ES152CE	Engineering Graphics	-	-	4	4	25	50	3	2
9	25ES153EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
		Total	**14**	**3**	**10**	**27**	**310**	**440**	**24**	**20**

SEMESTER - 2			Scheme of Instruction				Scheme of Examination			Credits
S. No.	Course Code	Name of the Course	Lecture	Tutorial	Practical	Contact Hrs/Wk.	C.I.E.	S.E.E.	Duration in Hrs	
1	25MC102CE	*Environmental Sciences	2	-	-	2	50	-	-	0
2	25MC103PY	*Essence of Indian Traditional Knowledge	2	-	-	2	50	-	-	0
3	25HS101EG	English	2	-	-	2	40	60	3	2
4	25BS103MT	Differential Equations & Numerical Methods	3	1	-	4	40	60	3	4
5	25BS104CH	Engineering Chemistry	3	1	-	4	40	60	3	4
6	25ES105ME	Engineering Mechanics	3	-	-	3	40	60	3	3
7	25HS151EG	English Lab	-	-	2	2	25	50	3	1
8	25BS152CH	Engineering Chemistry Lab	-	-	2	2	25	50	3	1
9	25ES154ME	Engineering Workshop Practice	-	-	4	4	25	50	3	2
10	25PC255ME	Skill Development Course-1 (Concepts of Machine Drawing)	-	-	3	3	50	-	-	1
		Total	**15**	**2**	**11**	**28**	**365**	**390**	**21**	**18**

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Course Code	Course Title					Core/Elective
*25MC101PO	Indian Constitution (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	2	-	-	50	0	0

Course objectives: To learn

- To create awareness among students about the Indian Constitution.
- To acquaint the working conditions of union, state, local levels. their powers and functions
- To create consciousness in the students on democratic values and principles articulated in the constitution.
- To expose the students on the relations between federal and provincial units.
- To divulge the students about the statutory institutions.

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Know the background of the present constitution of India.

CO2: Understand the working of the union, state and local levels.

CO3: Gain consciousness on the fundamental rights and duties.

CO4: Be able to understand the functioning and distribution of financial resources between the centre and states.

CO5: Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.

UNIT-I:

Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. 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, Directive principles, Fundamental Duties.

UNIT-IV:

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

UNIT-V: Constitutional and Statutory Bodies

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

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Suggested Readings

1. Durga Das Basu. *"Introduction to the Constitution of India"*, Lexis Nexis Butterworths Wadhwa Nagpur. 2008
2. Subhash Kashyap. *"Our Parliament"*, National Book Trust, India, 2004.
3. M. V. Pylee. *"An introduction to the Constitution of India"*, Vikas Publishing House. 2007

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Course Code	Course Title					Core/Elective
25BS101MT	MATRICES & DIFFERENTIAL CALCULUS (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
Basics in Matrices, differentiation and integration	3	1	0	40	60	4

Course objectives: To learn

- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
- Geometrical approach to the mean value theorems and their applications to the mathematical problems.
- Finding maxima and minima of functions of two and three variables.
- Concept of double, and triple integrals.

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Find a rank of matrix and to analyze the solution of the system of linear equations.
CO2: Find the eigen values and eigen vectors, and to reduce the quadratic form to canonical form.
CO3: Apply Mean value theorems.
CO4: Find the extreme values of functions of two and three variables.
CO5: Evaluate double, and triple integrals.

UNIT-I: Matrices:
Rank of a matrix by Echelon form, Solving System of homogeneous and non-homogeneous linear equations. Linearly dependence and independence of vectors, Gauss elimination method, Gauss-Jordan method.

UNIT-II: Eigen values and Eigen vectors:
Linear transformation. Orthogonal transformation, Eigen values, Eigen vectors, Properties of Eigen values , Cayley-Hamilton theorem(without proof), Finding inverse of a matrix by Cayley-Hamilton theorem, Quadratic forms and Nature of quadratic forms, Reduction of quadratic form to canonical form.

UNIT-III
Calculus of one Variable: Rolle's theorem, Lagrange's Mean-value theorem, Cauchy's mean value theorem, Taylor's series (All theorems without proof), Curvature, Radius of Curvature, Centre of Curvature, Circle of Curvature (Cartesian form only).

UNIT-IV
Multivariable Calculus (Differentiation): Functions of two variables, Limits and Continuity, First order Partial derivatives, Total derivative, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobians, Maximum and minimum of values of functions of two variables, Lagrange's method of undetermined multipliers.

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UNIT-V

Multivariable Calculus (Integration): Double integrals, Change of variables from Cartesian to plane polar coordinates, Triple integrals.

Suggested Reading:

1. R.K.Jain & S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.
3. N.P.Bali & Dr.Manish Goyal, A textbook of Engineering Mathematics(Volume I), 10th Edition, Laxmi Publications, 2022.
4. H.K.Dass and Er.Rajnish Verma, Higher Engineering Mathematics, S.Chand and Company Limited, New Delhi.

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Course Code	Course Title					Core/Elective
25BS102PH	Engineering Physics (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	3	1	-	40	60	4

Course objective:

- To understand the fundamental principles of lasers and optical fibers in communication.
- To introduce quantum mechanics and quantum computing concepts.
- To study the structure and properties of magnetic, superconducting, and semiconductor materials.
- To comprehend electromagnetic theory and ultrasonic wave principles.
- To explore synthesis and applications of nanomaterials and thin films.

Course outcome:

CO1: Students will be able to explain the working and demonstrate applications of laser and fiber-based communication systems.

CO2: Students will be able to apply quantum principles to analyze qubits, quantum gates, and entanglement.

CO3: Students will be able to analyze the behaviour of advanced materials in devices like superconductors, QLEDs, and solar cells.

CO4: Students will be able to apply Maxwell's equations and evaluate ultrasonic testing methods for engineering problems.

CO5: Students will be able to evaluate the role of nanomaterials and thin films in modern technologies like foldable electronics.

UNIT-1 Laser & Optical Fiber

Characteristics of Laser, Stimulated Emission, Population Inversion, Einstein's Coefficients, Construction and working of CO_2 Laser & Semiconductor Laser, Advantages of Laser-Based Optical Communication in Space, Engineering Applications of Laser.

Construction of Optical Fiber, Types of Optical Fibers (Refractive Index Profiles), Fiber Drawing Process (Double Crucible Method), Basic principle of Optical fiber Sensors & its types, Block diagram of Optical fiber communication system, Applications of optical fibers

UNIT-2 Quantum Physics & Quantum Computing

Physical Significance of Wave Function, Schrodinger Time-Independent Wave Equation, Energy of Particle in 1-D Potential Box, Kronig-Penney Model (Qualitative).

Introduction to Quantum Computing, Types of Qubits & Quantum Gates, Quantum Entanglement & its properties, Applications of Quantum Computing.

UNIT-3 Advanced Materials

Types of Magnetic Materials, Weiss Molecular Field Theory, Hysteresis Curve, Soft and Hard Magnetic Materials, Applications of Magnetic Materials.

Superconductors, Meissner Effect, Type I and Type II Superconductors, BCS Theory (Qualitative), High-T_c Superconductors, Applications of Superconductors.

Direct and Indirect Bandgap Semiconductors, Hall Effect, Construction and Working of Quantum Light Emitting Diodes (QLEDs) & Solar Cell, Classification of Fabrication Techniques for Semiconductor Chips, Applications of Semiconductor Devices.

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UNIT-4 Electromagnetic Waves and Ultrasonic Waves

Displacement current, Maxwell's equations. Expression for Maxwell's Integral to Differential Equations, Poynting Theorem, Electromagnetic spectrum (brief) and Practical applications (microwave, terahertz, optical)

Properties of ultrasonic waves, Generation of ultrasonic waves (piezoelectric), Ultrasonic Pulse-Echo Testing Method, Types of computer methods for Ultrasonic Testing, Engineering applications of ultrasonic waves.

UNIT-5 Nanomaterials and Thin Film Technology

Introduction to nano materials, Surface-to-Volume Ratio at Nano Scale, Bottom-Up Method (Sol-Gel), Top-Down Method (Ball Milling), Properties of nanomaterials in nanoelectronics & 2D Materials, Applications of Nano materials

Introduction to Thin Films, Thermal Evaporation Method, Electron Beam Evaporation Method, Properties of Foldable Electronic devices, Applications of thin films

Characterization Techniques (working) - Scanning Electron Microscope, Raman spectrometer.

PRESCRIBED BOOKS

1. Modern Engineering Physics – I & II : S. Chandralingam, K. Vijayakumar, S. Chand & Co.
2. Engineering Physics: P.K. Palanisamy, Scitech Publishers.
3. Engineering Physics: S.O. Pillai, New Age International.
4. Nielsen M.A., I.L. Chuang, Quantum Computation & Quantum Information, Cambridge Univ. Press.
5. Thin Film Fundamentals, A. Goswami, New Age International, New Delhi.
6. Nano Materials, A.K. Bandyopadhyay, New Age Publishers.

REFERENCE BOOKS

1. Solid State Physics – Charles Kittel, Wiley & Sons (Asia) Pvt. Ltd.
2. Fundamentals of Physics – Halliday, Resnick, Walker.
3. Engineering Physics – V. Rajendran, McGraw Hill Education.
4. Solar Photovoltaics – Fundamentals, Technologies and Applications, 3rd Edition, PHI.
5. Principles of Quantum Computation and information – G. Benenti, G.Casati, G. Strini, World Scientific.

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Course Code	Course Title					Core/Elective
25ES101CS	PROGRAMMING FOR PROBLEM SOLVING (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	3	0	0	40	60	3

Course Objectives:

- To interpret the various steps in problem-solving and program development.
- To recall and reuse the fundamentals, syntax and semantics of C programming language.
- To illustrate problem solving using arrays, strings, structures and pointers.
- To demonstrate structured and modular programming approach in solving problems.
- To interpret code and debug the given problems using files.

Course Outcomes:

CO1: Recognize functional components in computing environment and develop simple programs.
CO2: Implement control structures and modular programming for problem solving.
CO3: Demonstrate arrays and strings concepts to store and manipulate data.
CO4: Apply pointers and memory management techniques.
CO5: Create User defined data-types and manage File I/O.

UNIT I

Introduction to Computers: Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow Charts.
Number Systems: Binary, Octal, Decimal and Hexadecimal.
Introduction to C Language: Background, C Programs, Identifiers, Data types, Variables, Constants, Input/output Statements.
Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversion.

UNIT II

Conditional Control Statements: Bitwise Operators, Relational and Logical Operators, if, if-else, switch Statement and examples.
Loop Control Statements: for, While, do-while and examples, continue, break and goto statements.
Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing, Recursive Functions.
Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers

UNIT III

Preprocessors: Preprocessor Commands.
Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble sort.

UNIT IV

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Pointers - Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, L -value and R-value, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing Arrays to a Function, Memory- Allocation Functions, Array of Pointers, Programming Applications, Pointer to void, Pointers to Functions, Command-line arguments.

Strings: Concepts, C Strings, String Input/output Functions, Arrays of Strings, String manipulation Functions.

UNIT V

Structures: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self -Referential Structures, Unions, Type Definition (typedef), Enumerated Types.

Input and Output: Introduction to Files, Modes of Files, Streams, Standard Library Input/output Functions, Character Input/output Functions.

Suggested TextBook:

1. B.A. Forouzan and R.F. Gilberg, "A Structured Programming Approach in C ", Cengage Learning, 2007

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
3. Rajaraman Y,"The Fundamentals of Computer",4thEdition, Prentice-Hall of India,2006
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.

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Course Code	Course Title					Core/Elective
25ES102EE	BASIC ELECTRICAL ENGINEERING (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	3	1	--	40	60	4

Course objectives: To learn

- To provide an understanding of basics in Electrical circuits.
- To explain the working principles of Electrical Machines and single phase transformers.

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Simplify complex circuit by network reduction technique & theorems

CO2: Analyze Electrical circuits with AC excitation.

CO3: Comprehend the working principles of DC Machines and single phase transformers.

CO4: Comprehend the working principles of Induction Motor

CO5: Identify Electrical Installation and switchgear for Safety measures.

UNIT-I: DC Circuits:

Network elements (R, L, C), energy stored in inductor & capacitor. Voltage and current sources, Ohm's Law, KVL,KCL, network reduction technique (series, parallel and series parallel combination), Superposition theorem, Thevenin's theorem and Norton's theorem(simple problems)

UNIT-II: AC Circuits:

Representation of sinusoidal waveforms, peak and RMS values, Form Factor, Peak Factor phasor representation, real power, reactive power, apparent power, power factor, Analysis of single phase AC circuits consisting of R, L, C and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: DC Machines and Transformers:

DC Generators: Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications. **DC Motors:** Principle of operation of DC motor, Types of DC motors, applications.

Transformers: Construction and principle of operation of ideal and practical transformer, EMF equation of transformer, Types of losses and efficiency (simple problems)

UNIT-IV: Induction Motor:

Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications.

Single-Phase Induction motor: Construction and principle of operation, Capacitor start & capacitor run motor.

UNIT-V: Electrical Installation:

Components of LT Switchgear, Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Earthing, Elementary calculations for energy consumption, power factor improvement.

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Suggested Reading:

1. N.K. De, —Basic Electrical Engineering‖, Universities Press, 2015
2. J.B. Gupta, —Fundamentals of Electrical Engineering and Electronics‖ S.K. Kataria & Sons Publications, 2016.
3. J.B. Gupta, —Utilization of Electric Power and Electric Traction‖ S.K. Kataria & Sons Publications, 2010.
4. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, —Basic Electrical Engineering‖ Tata McGraw Hill, Publications,2009.
5. Hughes, —Electrical Technology", VII Edition, International Student -on, Addison Wesley Longman Inc., 1995.

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Course Code	Course Title					Core/Elective
25BS151PH	Engineering Physics Lab (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	-	-	2	25	50	1

Course Objectives:

- To understand fundamental concepts of semiconductors, optics, magnetism, and modern materials.
- To perform experiments for measuring electrical, optical, and mechanical properties
- To analyze and interpret experimental data scientifically.
- To develop computational and simulation skills using Python/MATLAB
- To integrate experimental and computational methods for applications in advanced technologies.

Course Outcomes:

CO1: Apply physics principles to study electrical, optical, and magnetic properties of materials.
CO2: Analyze semiconductor, solar cell, and optical fiber characteristics for device applications.
CO3: Demonstrate computational skills for solving problems in quantum mechanics and electromagnetics.
CO4: Evaluate mechanical and elastic properties of materials using experiments and simulations.
CO5: Integrate theoretical and experimental results to understand lasers, nanomaterials, NDT,
CO6: and quantum devices.

1. Study of I–V Characteristics of a P–N Junction Diode – Determination of Resistance & Cut-in Voltage.
2. Measurement of Energy Band Gap of a Semiconductor
3. Study of Hall Effect in Semiconductors – Determination of Hall Coefficient, Carrier Concentration, and Mobility.
4. Study of Thermistor Characteristics – Determination of Temperature Coefficient of Resistance and Constants A & B.
5. Plotting of B–H Curve for a Ferromagnetic Material and Determination of energy Loss.
6. Study of V–I Characteristics of a Solar Cell – Determination of Fill Factor and Series Resistance.
7. Determination of Planck's Constant using Photoelectric Effect (Work Function of Photometal).
8. Determination of Numerical Aperture (NA) and Acceptance Angle of an Optical Fiber.
9. Measurement of Wavelength of a Laser Source using a Diffraction Grating.
10. Determination of Rigidity Modulus of a Wire using Torsional Pendulum.
11. Determination of Wavelength of Light using Newton's Rings.
12. Visualization of Electromagnetic Wave Propagation – Python Simulation of Maxwell's Equations.
13. Ultrasonic NDT Using Python Simulation – Signal Analysis for Flaw Detection.
14. Visualization of Energy Bands in Kronig–Penney Model & Particle in a 1-D Potential Box using Python Simulation.

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15. Prediction of Density and Elastic Properties of Oxide Glasses/Polymers using Machine Learning.

Note: Minimum eight experiments should be conducted in the Semester

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Course Code	Course Title					Core/Elective
25ES151CS	PROGRAMMING FOR PROBLEM SOLVING LAB (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	0	0	2	25	50	1

Course Objectives:

- To use tools available under LINIIX for C programming
- To gain hands on experience on basic constructs of C Programming.
- To formulate problems and implement algorithm solutions in C.
- To write modular programs in C using structure programming techniques and data files.

Course Outcomes:

CO1: Implement, run and debug basic C programs on Linus.
CO2: Build programs with modular design using I/O operations, decisions and loops.
CO3: Demonstrate search and sort algorithms using structured type of Data.
CO4: Apply the concept of strings to manipulate data.
CO5: Design and implement programs to store data using user defined data types and files.

List of Experiments:

1. Introducing to programming Environment(Linux commands, Editing tools such as vi editor, sample program entry, compilation and execution)
2. Write programs using Arithmetic, Logical, Bitwise and Ternary operators.
3. Write programs for simple control statements : Roots of a Quadratic Equations, Extracting Digits of Integers, Reversing Digits, Finding Sum of Digits, Printing Multiplication tables, Armstrong Numbers, Checking for Prime, Magic number.
4. Sin x and Cos x values using series expansion.
5. Conversion of Binary to decimal, Octal, Hexadecimal and vice versa.
6. Generating Pascal triangle, pyramid of numbers.
7. Recursion: factorial, Fibonacci, GCD.
8. Finding the maximum, Minimum, Average, and Standard Deviation of a given set of numbers using Arrays.
9. Reversing an Array, Removal of Duplicates from Array.
10. Matrix Addition, Multiplication and Transpose of a Square Matrix using functions.
11. Bubble sort and selection sort.
12. Programs on Linear Search and Binary Search using iteration and recursion.
13. Functions of string manipulations: Inputting and Outputting String, using Strinag Functions such as strlen(), strcat(), stcpy(), etc.
14. Write simple programs for strings without using string functions.
15. Finding the number of Characters, Words and Lines of a given text file.
16. File handling programs: Students Memo Printing.

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Course Code	Course Title					Core/Elective
25ES152CE	ENGINEERING GRAPHICS (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	-	-	2x2	25	50	2

Course Objectives: To learn

- Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- Communicate effectively using graphical methods
- Understand the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Introduction to engineering design and its place in society
CO2: Exposure to the visual aspects of engineering design
CO3: Exposure to engineering graphics standards and solid modeling
CO4: Exposure to computer-aided geometric design
CO5: Exposure to creating working drawings.

Sheet No	Description of the Topic	Contact Hours Drawing
	Principles of Engineering Graphics and their significance.	2
1	**Introduction to AutoCAD** Basic commands	2
	Simple drawings.	4
2	**Conic Sections – I** Construction of ellipse, parabola and hyperbola given focus and eccentricity.	2
3	**Conic Sections – II** Construction of ellipse (given major and minor axis), parabola (given base and height), rectangular hyperbola.	2
4	**Cycloids** (cycloid & epicycloids)	2
5	**Involutes** (involute of triangle, square & circle)	2
6	**Scales** (plain & diagonal scales)	4
7	**Orthographic Projection** Projections of points situated in different quadrants.	4
8	**Projections of straight lines** Line parallel to both the reference planes, line perpendicular or inclined to one reference plane.	2
	Line inclined to both the reference planes.	4
9	**Projections of planes** Perpendicular planes and Inclined to one plane.	4

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10	**Projections of solids** Polyhedra and solids of revolution. Projections of solids in simple position and Inclined to one plane.	4
11	**Section of Solids** When the sectional plane is parallel or perpendicular to one reference plane.	4
12.	**Isometric Projection-I** Planes and simple solids	4
13.	**Isometric Projection-II** Combination of two or three solids	4
14.	**Conversion of Isometric Views to Orthographic Views**	6

Note: Sheet numbers 1 to 14 (CAD Drawings)

Suggested Readings

1 Bhatt N.D., Panchal V.M. & Ingle P.R., *Engineering Drawing*, Charotar Publishing House, 2014

2 Shah, M.B. & Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008

3 S.N Lal, Engineering Drawing with Introduction to Auto CAD, Cengage Learning India Pvt Lid, New Delhi, 2018

4 Agrawal B. & Agrawal C. M., Engineering Graphics, TMH Publication, 2012

5 Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, 2008

6 Corresponding set of CAD Software Theory and User Manuals

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Course Code	Course Title						Core/ Elective
25ES153EE	Basic Electrical Engineering Lab (Common to All Branches)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	25	50	1

Course Objectives: To Learn

- To impart the practical knowledge on testing of DC and AC Machines.
- To learn the usage of common electrical measuring instruments.

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

CO1: Get an exposure to common electrical components and their ratings.
CO2: Analyze the performance of DC and AC Machines.
CO3: Comprehend the usage of common electrical measuring instruments.
CO4: Test the basic characteristics of transformers and electrical machines.

Suggested List of Laboratory Experiments/Demonstrations:

Demo 1: Basic safety precautions, Introduction and use of measuring instruments–voltmeter, ammeter, multi-meter, wattmeter, tachometer, resistors, capacitors and inductors.

1. Verification of KVL and KCL, superposition theorem (with DC excitation)
2. Verification of Thevenin's and Norton's theorems (with DC excitation)
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification of phase differences between current and voltage and Power factor calculation.
4. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta.
5. Predetermination of efficiency by OC and SC test on Single phase transformer.

Demo 2: Cut-out sections of machines: dc machine, induction machine (squirrel cage rotor), and single-phase induction machine.

6. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
7. Power factor improvement of Induction Motor using static capacitors
8. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.
9. OCC characteristics of DC Generator
10. Load Test of DC Motor.

Note: Minimum eight experiments should be conducted in the semester

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Course Code	Course Title					Core/Elective
*25MC102CE	Environmental Sciences (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	2	-	-	50	-	0

Course Objectives: To learn

- To create awareness and impart basic knowledge about the environment and its allied problems.
- To know the functions of ecosystems, social and environment related issues and their preventive measures.
- To understand importance of biological diversity different pollution and their impact on environment

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Adopt environment ethics to attain sustainable development.
CO2: Develop an attitude of concern for the environment.
CO3: Conservation of natural resources and biological diversity.
CO4: Creating awareness of Green technologies formation's security.
CO5: Imparts awareness for environmental laws and regulations.

UNIT–I

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 –Growing energy needs, Renewable and Non-renewable energy resources.

UNIT–II

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, pond, river, forest, grassland, desert).

UNIT–III

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.

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UNIT–IV

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

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

UNIT–V

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/ pond/lake/terrestrial ecosystem. Visit to a local polluted area-market/slum area/Industrial area/traffic area.

Suggested Readings:

1. Anil Kumar, D. (2016). *Environmental Chemistry*. New Age International Publishers Pvt. Ltd., New Delhi.
2. Odum, E. P. (1971). *Fundamentals of Ecology*. W.B. Saunders Co., USA.
3. Rao, M. N., & Datta, A. K. (2009). *Waste Water Treatment*. Oxford and IBH Publications, New Delhi.
4. Joseph, B. (2009). *Environmental Studies*. Tata McGraw Hill, New Delhi.
5. Sharma, V. K. (1999). *Disaster Management*. National Centre for Disaster Management, IIPE, New Delhi.

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Course Code	Course Title					Core/MC
*25MC103PY	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (Common to all branches)					Mandatory course
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
-	2	0	0	50	-	0

Course Objectives: To learn

- Basics of Indian philosophy, culture, civilization, and heritage.
- Significance of scriptures, Sanskrit, Dravidian and regional literatures.
- Role of religion, philosophy, and reform movements in Indian society.
- Philosophy of Indian fine arts, architecture, science, and technology.
- Indian education system across ages and applied philosophy in modern contexts.

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Explain the foundations of Indian philosophy, culture, and heritage.
CO2: Appreciate the role of scriptures, Sanskrit, Dravidian and regional literatures.
CO3: Analyze the impact of religion, philosophy, and reform movements on Indian society.
CO4: Recognize the philosophical basis of Indian fine arts, architecture, science, and technology.
CO5: Evaluate the Indian education system across different periods and apply philosophical insights to contemporary issues.

UNIT – I: Introduction to Indian Philosophy & Culture

Introduction to Philosophy and its branches, Understanding Culture, Civilization, and Heritage, Ancient Indian Culture, Medieval Indian Culture, Modern Indian Culture

UNIT – II: Indian Language, Literature & Scriptures

Significance of scriptures to current society, Role of Sanskrit and other Northern Indian Languages and Literature, Dravidian and other Southern Indian Languages and Literature.

UNIT – III: Religion, Philosophy & Reform Movements

Religion and Philosophy in Ancient India, Religion and Philosophy in Medieval India, Religious, Political, and Social Reform Movements in Modern India

UNIT – IV: Indian Fine Arts, Science & Technology

Fine Arts: Indian Painting, Handicrafts, and Sculptures. **Performance Arts:** Music, Dance, Drama, and Puppetry (ancient & modern). **Applied Fine Arts:** Indian Architecture (ancient, medieval & modern). Science and Technology in India: Developments in Ancient, Medieval & Modern Periods

UNIT – V: Education & Applied Philosophy

Education in: Ancient, Medieval, Modern India, Applied Philosophy : Indian philosophical ideas in AI and consciousness studies, Indian perspectives towards neuroscience: Digital detox and mindfulness, philosophical perspectives on globalization : Vasudhaiva Kutumbakam vs Neoliberalism.

Suggested Books:

1. Jha, A. (2023). Traditional knowledge system in India. Atlantic Publishers & Distributors. Atlantic Books
2. Mishra, O. P. (2021). Essence of Indian traditions (2nd ed.). Khanna Publishers.

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Reference books:

1. Nitonde, R. (2024). Introduction to Indian knowledge system: A textbook for UG students as per NEP. Barnes & Noble Publications.
2. Dwivedi, D., & Mohan, S. (2024). Indian philosophy. Indian revolution: On caste and politics. Hurst / Westland.
3. Kapoor, S., & Danino, M. (2017). *Knowledge traditions and practices of India*. National Council of Educational Research and Training (NCERT).
4. Radhakrishnan, S. (2018). *Indian philosophy* (Vols. 1–2). Oxford University Press. *(Original work published 1923).*
5. Menon, S., Todariya, S., & Agerwala, T.. (2024). *AI, consciousness and the new humanism: Fundamental reflections on minds and machines*. Springer Nature.
6. Birch, J. (2024). *The edge of sentience: Risk and precaution in humans, other animals, and AI*. Oxford University Press.
7. Sebo, J. (2025). *The moral circle: Who matters, what matters, and why*. W. W. Norton & Company.
8. Summerfield, C. (2025). *These strange new minds: How AI learned to talk and what it means*. Oxford University Press.
9. Hendrycks, D. (2024). *Introduction to AI safety, ethics, and society* [Preprint]. arXiv. https://arxiv.org/abs/2411.01042
10. Pandikattu, K. (Ed.). (2025). *Applied ethics and rationality: Contemporary Indian perspectives* (Studies in Applied Philosophy, Epistemology and Rational Ethics, Vol. 74). Springer.

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Course Code	Course Title					Core/Elective
25HS101EG	ENGLISH (Common to all branches)					Core
Prerequisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
Knowledge of grammar and vocabulary, along with tertiary-level skills in reading, writing, listening, and speaking	2	0	0	40	60	2

Course Objectives:

The objectives of this course are to enhance the English language abilities of students by

- Developing appreciation to a variety of context-rich contents and encouraging them to think critically;
- Enhancing word knowledge and usage in varied contexts;
- Strengthening grammar knowledge for effective expression;
- Fostering originality and creativity while improving writing style and coherence;
- Developing skills in writing clear, formal, and effective professional letters.

Course Outcomes: After learning the contents of this course, the student will be able to

CO1: Interpret and understand a variety of texts for language learning at literal, evaluative and appreciative levels;

CO2: Demonstrate the use of rich and contextually appropriate vocabulary;

CO3: Construct grammatically accurate sentences;

CO4: Develop academic writing skills and construct cohesive and persuasive paragraphs;

CO5: Compose a variety of letters for professional requirements with appropriate format and tone.

Unit I

Reading : "If" by Rudyard Kipling
Vocabulary: Words often confused, Compounding and Blending
Grammar : Sentence Structures and Types: Prepositions
Writing : Note-Taking, Note-Making: Importance and Strategies

Unit II

Reading : "Anukul" by Satyajit Ray
Vocabulary: Collocations, Synonyms and Antonyms
Grammar : Connectives and Concord
Writing : Guided writing and Paragraph Writing

Unit-III

Reading : "Leisure" by W. H. Davies
Vocabulary : Phrasal Verbs, One word substitutes
Grammar : Tenses and Voice
Writing : Formal letters: Inquiry letters, Complaint letters and Response letters

Unit -IV

Reading : "Of Studies" by Francis Bacon
Vocabulary : Homonyms, Homophones and Homographs

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Grammar : Reported Speech
Writing : Describing a process/events/ experiences

Unit-V

Reading : "The Danger of a Single Story" by Chimamanda Ngozi Adichie
Vocabulary: Inclusive language and euphemism
Grammar : Degrees of Comparison, Common Errors
Writing : Summarizing and paraphrasing

Suggested Books:

1. Board of Editors, **Language and Life: A Skills Approach**. Orient BlackSwan,2018
2. Bhatnagar, Nitin, and Mamta Bhatnagar. ***Communicative English for Engineers and Professionals***. 1st ed., Pearson Education India, 2010.
3. Kumar,Sanjay and Pushpa Lata. **English Language and Communication Skills for Engineers**. Oxford University Press,2018.
4. Sudarshana, NP and C. Savitha, **English for Engineers**, Cambridge University Press, 2018.
5. Wood, F. T. A **Remedial English Grammar for Foreign Students**. Trinity Press, 2022

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Course Code	Course Title					Core/Elective
25BS103MT	DIFFERENTIAL EQUATIONS & NUMERICAL METHODS (Common to all branches)					Core
Pre-requisites	Contact hours per week			CIE	SEE	Credits
	L	T	P			
MDC	3	1	0	40	60	4

Course Objectives: To learn

- Methods of solving the ordinary differential equations of first order.
- Methods of solving the ordinary differential equations of second and higher order.
- The physical quantities involved in engineering field related to vector valued functions.
- Various numerical methods to find roots of polynomial and transcendental equations.
- Evaluation of integrals using numerical techniques

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Identify whether the given differential equation of first order is exact or not.
CO2: Solve the second and higher order ordinary differential equations.
CO3: Find the Gradient, Divergence, Curl and directional derivatives.
CO4: Find the root of a given polynomial and transcendental equations.
CO5: Estimate the value for the given data using interpolation.

UNIT-I: Ordinary Differential Equations of First Order:
Exact differential equations, Equations reducible to exact differential equations, Integrating factors, Linear differential equations, Leibnitz's linear equation, Bernoulli's equation, and Clairaut's differential equations, Orthogonal trajectories of a given family of curves (Cartesian coordinates only).

UNIT-II: Ordinary Differential Equations of Higher Order: Solution of second and higher order linear homogeneous equations with constant coefficients, Solutions of non-homogeneous linear differential equations of the type $e^{ax}, sinax, cosax$, polynomials in $x, e^{ax}V(x), and\ xV(x)$, Method of variation of parameters.

UNIT-III: Vector Differentiation:
Vector point functions and scalar point functions, Normal vector, Unit normal vector, Gradient, Divergence, Curl, Directional derivatives, Solenoidal and irrotational vectors.

UNIT-IV: Numerical Methods-I: Solution of polynomial and transcendental equations- Bisection method, Regula-Falsi method, and Newton-Raphson Method. Finite differences-forward differences-backward differences. Interpolation using Newton's forward and backward formulae: Lagrange's method of interpolation.

UNIT-V: Numerical Methods-II: Numerical Integration: Trapezoidal rule and Simpson's $1/3^{rd}$ rules. Ordinary differential equations: Taylor's series method; Euler's method; Modified Eulers's method; Runge-Kutta method of fourth order.

Suggested Reading:

1. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications, 43rd Edition, 2014.
2. R.K.Jain & S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Publications, 2014.

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3. N.P.Bali & Dr.Manish Goyal, A textbook of Engineering Mathematics(Volume I), 10th Edition, Laxmi Publications, 2022.
4. H.K.Dass and Er.Rajnish Verma, Higher Engineering Mathematics, S.Chand and Company Limited, New Delhi.

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Course Code	Course Title					Core/Elective
25BS104CH	ENGINEERING CHEMISTRY (Common to all branches)					Core
Pre-requisities	Contact hours per week			CIE	SEE	Credits
	L	T	P			
Chemistry	3	1	0	40	60	4

Course Objectives: To learn

- Explain the principles of electrochemical processes and study analyse working principles and applications of various batteries.
- Gain knowledge about the causes of corrosion and its prevention. Attain Knowledge about the hard water and treatment of water for drinking purpose.
- Appraise Engineering materials their classifications, structure-property Relationship
- Expose to qualitative and quantitative parameters of chemical fuels and awareness of eco-friendly materials, fuels and processes.
- Understand the concepts and applications of spectroscopy.

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Apply concept of electrode potential in identifying feasibility of electrochemical reaction; develop a more in-depth perception on working of various types of batteries and their applications especially in electric vehicles.

CO2: Identify the mechanism of corrosion of materials on the basis of electrochemical approach and devise corrosion control methods; Estimate the physical and chemical parameters of quality of water and explain the process of water treatment.

CO3: Explain the influence of chemical structure on properties of materials and their choice in engineering applications.

CO4: Classify chemical fuels and grade them through qualitative analysis and Acquire knowledge on environment friendly bio-diesel.

CO5: Relate the concept of green chemistry to modify engineering processes and materials; understand the concepts and applications of spectroscopy.

UNIT-1

Electrochemistry: Electrolytic conductance, its types, factors affecting electrolytic conductance. Electrochemical cells: Electrolytic and Galvanic cells. Cell notation, cell reaction and cell potentials. Electrochemical series & its significance. Nernst equation and its derivation.

Applications of Nernst equation to electrode potential and EMF of cells.

Numerical problems. Types of electrodes, Calomel, Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode.

Battery Chemistry: Types of batteries-Primary and secondary batteries, Construction and Applications of Secondary batteries: Pb-Acid storage battery and Li-ion battery, Fuel cells: Methanol-Oxygen fuel cells and Hydrogen-oxygen fuel cells.

UNIT-2

Corrosion: Causes and its effects. Types of Corrosion-Dry or Chemical Corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion — Galvanic and Waterline Corrosion. Factors influencing rate of corrosion.

Corrosion control methods: Cathodic protection methods - Sacrificial anodic and Impressed current Cathodic protection methods.

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Surface coating methods: Hot Dipping-Galvanizing.

Water Chemistry : Hardness of Water-Types and units of hardness of water, estimation of hardness of water by EDTA method - Numerical problems. Alkalinity of water and its sources. Water softening by Ion exchange and Reverse Osmosis methods. Specifications of potable water.

Sterilization by Chlorination. Break Point of Chlorination.

UNIT-3

Engineering Materials: Polymers: Monomer and its functionality, Polymers and degree of polymerization. Types of Polymerization - Addition, Condensation and Co-Polymerization with one example each. Classification of polymers—Plastics: (Thermoplastics & Thermosetting Resins - PVC and Bakelite). Fibre's: (Nylon-6:6)

Elastomers: (Buna-S and Buna —N rubber).

Conducting polymers: Introduction, classification, properties and applications of conducting polymers.

Biomaterials : Introduction, Definition of Biomaterials, Preparation, properties and applications of Poly lactic acid (PLA).

UNIT -4

Chemical Fuels : Introduction, definition and classification of chemical fuels. - primary and secondary — 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: Coal and its Ranking. Analysis of coal-Proximate and Ultimate analysis.

Liquid Fuels: Composition and uses of Gasoline, Diesel and kerosene. Knocking, Fuel-rating— Octane and Cetane numbers.

Gaseous Fuels: LPG, CNG-Composition and Uses.

Biodiesel: Sources, Concept of Trans esterification , properties and applications of biodiesel . Carbon neutrality and its significance.

Unit-5

Spectroscopy- Description of Electromagnetic spectrum.

Principles of UV-Visible Spectroscopy: Statement of Beer-Lambert law Absorbance and intensity shifts: Bathochromic, Hypsochromic, Hyperchromic and Hypochromic shifts . Types of Electronic transitions .

Applications of UV — Visible Spectroscopy.

IR Spectroscopy : Principle and applications of IR spectroscopy

NMR Spectroscopy: Principle of H-1 NMR Spectroscopy, Multiplicity, Chemical Shift, Applications of NMR. Principle & Applications of MRI.

Green Chemistry: Concept, Mention – Principles of Green Chemistry – example Diels-Alder reaction.

Suggested Books:

1. *Principles of Physical Chemistry*, S.N. Chand & Co. New Delhi, 1987
2. PC Jain and M Jain .—*Engineering Chemistry*, Dhanpat Rai&Sons, 15th Edition, New Delhi. 2004

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3. JCKuriacoseandJRajaram,—*ChemistryinEngineeringandTechnology*—,TataMcGrawHill, New Delhi,2010
4. OG Palanna, —*Engineering Chemistry*‖,TataMcGrawHill, New Delhi, 2009
5. S S Daraand SSU mare, —*Engineering Chemistry*‖ ,S.N. Chand & Co. New Delhi, 2004
6. Sashi Chawla,—*Engineering Chemistry*‖, DhanpatRai&Sons, New Delhi, 2017
7. Prasanta Rath,—*Engineering Chemistry*‖,Cengage Learning India Pvt. Ltd, 2015
8. Dr. Kishore Palle, Dr. V. Shanthi , Dr. A. Kishore Kumar and K. Ramesh -*Engineering Chemistry*.
9. Dr.Shanthi Vunguturi, Dr. Geetha Swarupa Pamidimalla – *Fundamentals of Engineering Chemistry. Applications in Modern Engineering and Technology*.

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Course Code	Course Title						Core/Elective
25ES105ME	**Engineering Mechanics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**40**	**60**	**3**

Course Objectives

The objectives of this course is to impart knowledge of

- Resolution of forces, equilibrium, and static load analysis.
- Various forces in the axial force members, and to analyze the trusses.
- Friction laws and applications in engineering systems.
- Computation of centroids and moments of inertia for composite sections.
- Basic concepts of dynamics, its behavior, analysis and motion bodies, Apply dynamics principles.

Course Outcomes

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

CO1: Analyze force systems and equilibrium using free-body diagrams.
CO2: Solve friction/truss problems for engineering applications.
CO3: Determine geometric properties (centroids, inertia) for complex shapes.
CO4: Evaluate motion of particles/rigid bodies kinematically and kinetically.
CO5: Solve dynamics problems using energy/momentum methods.

UNIT – I

System of Forces: Fundamental Concepts, System of Forces, Parallelogram Law, Triangle Law, Forces and Components, Resultant of Coplanar and Spatial system of Forces, Moment of force Principle of Moments, Varignon's Theorem, Couple, Resultant of Concurrent and Non-Concurrent Force System.

Equilibrium of Systems of Forces: Definition, Free Body Diagrams, Equations of Equilibrium. Equilibrium of Planar Systems.

UNIT – II

Analysis of Trusses: Introduction, Construction and Assumptions in simple Trusses, Method of joints in trusses.

Friction: Theory of friction, Angle of Friction, Laws of Friction.

UNIT – III

Centroid and Centre of Gravity: Introduction, Centroid of Areas, Centroids of Composite, Pappu's Theorem, Centre of gravity of Bodies, Centroids of Volumes.

Area Moment of Inertia: Definition of Moment of Inertia, Polar Moment of Inertia, Radius of Gyration, Transfer Formula for Moment of Inertia, Moment of Inertia for Composite Areas.

Mass Moment of Inertia: Basic principles of mass moment of inertia of simple bodies.

UNIT – IV

Kinematics: Motion of a Particle, Rectilinear motion, Motion curves, Normal and Tangential Components of Acceleration, Newton's Laws of Motion for a Particle, D'Alembert's Principle.

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Kinetics: Fundamental Equation of Kinetics for a Particle, Translation-Analysis for a Particle, Kinetics and Rigid Body.

UNIT – V

Work -Energy: Work-Energy Equation for Translation, Work-Energy Applied to Particle Motion, Connected Systems, Linear Impulse Momentum, Conservation of Linear Momentum, Elastic Impact.

Introduction to Mechanical Vibrations: Definition, concepts, simple harmonic motion, free vibrations, simple and compound pendulum.

Suggested Readings:

1. Ferdinand L. Singer, Engineering Mechanics, Collins, Singapore, 1994.
2. Reddy Vijay Kumar K. and K. Suresh Kumar, Singer s Engineering Mechanics, 2010.
3. S.S Bhavakatti, Engineering Mechanics, New age International publishers.
4. Rajeshakharam, S. and Sankarasubrahmanyam, G., Mechanics, Vikas Publications, 2002.
5. Junarkar, S.B. and H.J. Shah., Applied Mechanics, Publishers, 2001.
6. Shah., Applied Mechanics, Publishers, 2001.

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Course Code	Course Title					Core/Elective
25HS151EG	ENGLISH LAB (Common to all branches)					Core
Prerequisites	Contact hours per week			CIE	SEE	Credit
	L	T	P			
Tertiary-level competence in listening to spoken English and comprehending written texts	0	0	2	25	50	1

Course Objectives: This course seeks to develop learners' language abilities by

- Giving them adequate practice in listening with comprehension.
- Providing them ample opportunities to improve their public speaking skills.
- Training them in the use of correct pronunciation, stress, and intonation.
- Sensitizing them to the use of verbal and non-verbal communication appropriate to the context.
- Encouraging them to learn the art of conversation to suit formal and informal situations.
- Preparing them to make formal presentations and face interviews.

Course Outcomes: On successful completion of this course, the learners will be able to

CO1: Comprehend audio or audio-visual contents to improve listening competence;
CO2: Demonstrate intelligible pronunciation and distinguish RP from other varieties of English;
CO3: Improve speaking skills through interactive activities;
CO4: Demonstrate appropriate body language in various oral communication settings;
CO5: Demonstrate writing skills.

Activities in English Language Lab:

Experiments and Practice Sessions to Enhance Listening and Speaking Skills

1. Introduction to English Phonetics
2. Sound System of English: Varieties of English: Indian, British, American
3. Word Stress, Sentence Stress and Intonation
4. Listening Skills, Barriers to Listening, Listening for Comprehension
5. Conversation Skills: Introducing oneself to another, making requests and responding aptly, agreeing and disagreeing
6. JAM
7. Poster designing and presenting
8. Role Play
9. Group Discussions
10. Debate
11. Public Speaking Skills and aspects of Body Language
12. Interview Skills
13. Formal Presentations with PowerPoint Slides

Suggested Reading

1. Balasubramanian, T. **A Textbook of English Phonetics for Indian Students**. Macmillan, 1981.
2. Board of Editors. **Language and Life: A Skills Approach**. Orient Black Swan, 2018.
3. CIEFL. **Exercises in Spoken English**. Parts. I-III. Oxford University Press.
4. Pillai, Radhakrishna G. **Spoken English for You - Level II**, 8th Edition. Emerald Publishers, 2014.

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5. Sethi, J, PV Dhamija. **A Course in Phonetics and Spoken English**. 2nd Edition, Prentice Hall, 1999.
6. Shinde, Maithry et al. **Life Skills and Personality Development**. Cambridge University Press, 2022.

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Course Code	Course Title					Core/ Elective
25BS152CH	**Engineering Chemistry Lab (Common to All Branches)**					**Core**
Pre requisite	Contact Hours per Week			CIE	SEE	Credits
	L	T	P			
-	-	-	2	**25**	**50**	1

Course Objectives: To learn

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

Course Outcomes: After learning the contents of this course, the student must be able to

CO1: Apply the Electro analytical techniques in quantitative analysis.

CO2: Estimate the amount of Iron (II), hardness and alkalinity present in the given test solution.

CO3: Synthesize small drug molecules.

List of Experiments:

- Introduction to Chemical Analysis.

Volumetric Analysis:

- Preparation of Standard Mohr's salt solution, Standardization of KMnO4 and estimation of ferrous ion by Permanganometry
- Estimation Iron (II) by Dichrometry.

Water Analysis:

- Preparation of Standard Magnesium sulphate solution, standardization of EDTA and Estimation of Total Hardness.
- Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity.

Conductometry:

- Estimation of HCl
- Estimation of CH3COOH
- Estimation of mixture of acids

Potentiometry:

- Estimation of HCl
- Estimation of Iron

pH metry:

- Estimation of HCl

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Colorimetry:

- Verification of Beer-Lambert's law and estimation of Manganese

Drug Synthesis

- Preparation of Aspirin

Polymer Synthesis

- Preparation of Urea-Formaldehyde resin.

Note: Minimum ten experiments should be conducted in the semester.

Suggested Books:

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

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Course Code	Course Title						Core/Elective
25ES154ME	ENGINEERING WORKSHOP PRACTICE (Common to All Branches)						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-			-	2x2	25	50	2

Course Objectives:

- To gain hands-on experience in using various engineering materials, tools, equipment, and processes commonly applied in the engineering field.
- To have a study and hands-on exercise on Plumbing, Carpentry and House-wiring components.
- To have a practice on Fitting, Sheet metal operations, Arc welding, Brazing and Soldering.
- To study and demonstrate the operation and applications of various hand-operated power tools and computer hardware components.
- To adopt and follow safety practices while working with tools, machines, and equipment in the workshop environment.

Course Outcomes:

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

CO1: Demonstrate **hands-on proficiency** in using various engineering materials, tools, and
CO2: equipment applied in common engineering practices.
CO3: **Perform basic operations** in **Plumbing, Carpentry, and House Wiring**, applying suitable techniques and materials.
CO4: **Execute practical tasks** involving **Fitting, Sheet Metal Work, Arc Welding, and Soldering** with proper procedure and accuracy.
CO5: Demonstrate the operation and application of various hand-held power tools, along with computer hardware assembly and disassembly.
CO6: **Apply and follow safety norms** while handling tools, machines, and equipment to ensure a safe working environment in the workshop.

COURSE CONTENT

Module I: Introduction to Manufacturing Methods:
Casting, forming, joining, machining and advanced manufacturing methods.

Module II: Plumbing:
Study of plumbing materials, fittings, and practices involved in the installation and maintenance of water supply systems.

Module III: Carpentry:
Study and practice of techniques for measuring, cutting, joining, and finishing wood to form structural joints.

Module IV: House Wiring:
Study and practice of electrical circuits involving wiring, switches, sockets, and their applications in household systems.

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Module V: Fitting Operations:
Study and practice of shaping metal components using cutting, filing, and drilling tools.

Module VI: Sheet Metal Operations:
Study and practice of cutting, bending, and joining sheet metals to fabricate simple components.

Module VII: Welding, Brazing & Soldering Operations:
Study and practice of joining metals using filler materials, and fusion techniques.

Module VIII: Smithy:
Study and practice of forging and shaping metal objects through controlled heating and deformation processes.

Module IX: Plastic Moulding:
Study and practice of shaping and forming plastics using the injection moulding process.

Module X: Foundry:
Study of making moulds and casting metals to produce shaped components.

Module XI: Glass Cutting:
Study and practice of cutting and shaping glass into desired forms using appropriate tools, proper handling techniques, and safety precautions.

Module XII: Power Tools:
Hands-on study of hand held power-driven tools, focusing on their applications, operational techniques, and safe handling practices.

Module XIII: I.T. Workshop:
Study and practice of computer hardware, including identification of components, and assembly and disassembly to achieve a fully working system.

Module XIV: Additive Manufacturing (3D Printing):
Study and demonstration of creating three-dimensional objects using additive manufacturing techniques.

Note: 1. Minimum eight modules should be covered in the semester.
2. Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Suggested Readings:

1. Venugopal, K, "*Workshop Manual*", Anuradha Publications, Kumbakonam, TN, 2012.
2. K.C. John, "*Mechanical Workshop*" 2nd Edn., PHI, 2010.
3. **Hajra Choudhury, S. K.** (2021). *Elements of Workshop Technology, Volume 1: Manufacturing Processes* (16th Edition). Media Promoters & Publishers Pvt. Ltd., Mumbai.
4. **Kalpakjian, S., & Schmid, S. R.** (2023). *Manufacturing Engineering and Technology* (8th Edition). Pearson India.
5. **Rao, P. N.** (2018). "*Manufacturing Technology: Foundry, Forming and Welding*" (5th Edition). McGraw Hill Education (India) Pvt. Ltd., New Delhi.

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Course Code	Course Title					Core/Elective
**25PC155ME	Skill Development Course - 1 (Concepts of Machine Drawing)					Core
Prerequisite	Contact Hours per Week			C.I.E.	S.E.E.	Credits
	L	T	P			
-	-	-	4	50	-	1

Course Objectives

The objectives of this course is to:

- Learn standard representations of materials, machine elements, and drawing sheet sizes.
- Draw views for machine parts like screws, keys, cotters, and pin joints.
- Draw views for riveted joints, shaft couplings, and bearings.
- Apply limits, fits, and dimensional tolerances to machine elements.
- Interpret and apply geometric tolerances and surface finishes to machine parts.

Course Outcomes

After completing this course, students will be able to:

CO1: Create drawings according to BIS standards.
CO2: Understand the structure of various screwed fasteners, keys, cotters, and pin joints.
CO3: Understand the structure of different riveted joints, shaft couplings, and bearings.
CO4: Apply limits, fits, and dimensional tolerances based on production requirements.
CO5: Apply geometric tolerances and surface finishes as per production specifications.

Course Topics:

1. **Types of Drawings and Dimensioning:** Types of drawings, Dimensioning principles, BIS conventions, Drawing sheet sizes and layout as per BIS, Placement of functional and non-functional dimensions, First angle and third angle projections, Conventions of sectional views.
2. **Conventional Representation of Machine Elements:** Engineering materials, Spur, helical, and bevel gears, Worm and worm wheel, Rack and pinion, Gear assemblies, Types of helical, disc, and leaf springs.
3. **Conventional Representation of Mechanical Components:** fasteners, keys, joints, rivets, couplings and bearings.
4. **Standard Representation of:** Internal and external threads, Square heads, spline shafts, diamond knurling, Symbolic representation of welds as per BIS, Surface finish symbols.
5. **Orthographic Projections:** Orthographic projection of simple machine components including sectional views.
6. **Limits, Fits, and Tolerances:** Introduction to system of limits and fits, Basic concepts and terminology, Types of tolerances, Necessity of limit system.
7. **Geometrical Tolerances and Surface Texture:** Terminology of geometrical tolerances, Surface texture and roughness, Surface roughness number and symbols.

Suggested Readings:

1. N.D. Bhatt, Machine Drawing, Charotar Publishing house, Anand, New Delhi, 51st edition, 2022.
2. K.L. Narayana, P. Kannaiah, K. Venkat Reddy, Machine Drawing, New Age International (P) Ltd., 2nd edition 1999.

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3. N. Siddeshwar, Machine Drawing, Tata McGraw Hill Publishing Co. Ltd., 5th edition, 1994.
4. K. C. John, Text book of Machine Drawing, PHI Learning, 2009.

Note:

a) First angle projection method will be adopted during drawing the components
b) Minimum of Eight exercises have to be completed for the award of grades

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CO – PO & PSO MAPPING

B.E. (Mechanical Engineering)
I - SEMESTER (2025-26)

Course Title: **Indian Constitution** Course Code: **25 MC101PO**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	2	-	-	-	-	-	-	2	-	-
CO2	1	-	-	-	2	-	-	-	-	-	-	2	-	-
CO3	1	-	-	-	2	-	-	-	-	-	-	2	-	-
CO4	1	-	-	-	2	-	-	-	-	-	-	2	-	-
CO5	1	-	-	-	2	-	-	-	-	-	-	2	-	-

Course Title: **Matrices Differential Calculus** Course Code: **25 BS101MT**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	3	2	3
CO2	-	3	-	-	-	-	-	-	-	-	-	3	2	3
CO3	-	3	-	-	-	-	-	-	-	-	-	3	2	3
CO4	-	3	-	-	-	-	-	-	-	-	-	3	2	3
CO5	-	3	-	-	-	-	-	-	-	-	-	3	2	3

Course Title: **Engineering Physics** Course Code: **25 BS102PH**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	3	-	3
CO2	-	3	-	-	-	-	-	-	-	-	-	3	-	3
CO3	-	3	-	-	-	-	-	-	-	-	-	3	-	3
CO4	-	3	-	-	-	-	-	-	-	-	-	3	-	3
CO5	2	3	-	-	1	-	-	-	-	-	-	3	-	3

Course Title: **Programming for Problem Solving** Course Code: **25 ES101CS**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	2	1	-	-	-	-	-	3	2	-
CO2	2	3	-	-	2	2	-	-	-	-	-	3	2	-
CO3	2	3	-	-	1	2	-	-	-	-	-	3	2	-
CO4	2	3	-	-	2	2	-	-	-	-	-	3	2	-
CO5	2	3	-	-	1	2	-	-	-	-	-	3	3	-

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Course Title: **Basic Electrical Engineering** Course Code: **25 ES102EE**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	2	-	-	-	-	-	2	-	2
CO2	3	3	1	-	-	2	-	-	-	-	-	2	-	2
CO3	3	2	-	-	-	2	-	1	-	-	-	2	-	2
CO4	3	2	-	-	-	2	-	1	-	-	-	2	-	2
CO5	3	3	-	-	-	3	3	2	-	-	-	2	-	2

Course Title: **Engineering Physics Lab** Course Code: **25 BS151PH**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO2	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO3	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO4	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO5	3	2	-	-	2	-	-	1	3	3	-	2	-	3

Course Title: **Programming for Problem Solving Lab** Course Code: **25 ES151CS**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	1	1	3	3	-	2	3	-
CO2	3	2	-	-	2	-	1	1	3	3	-	2	3	-
CO3	3	2	-	-	2	-	1	1	3	3	-	2	3	-
CO4	3	2	-	-	2	-	1	1	3	3	-	2	3	-
CO5	3	2	-	-	2	-	1	1	3	3	-	2	3	-

Course Title: **Engineering Graphics** Course Code: **25 ES152CE**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	-	-	1	-	-	1	-	-	-	-	3	-
CO2	1	2	1	-	1	-	-	1	-	-	-	-	3	-
CO3	1	2	-	1	1	-	-	1	-	-	-	-	3	-
CO4	1	2	-	-	1	-	-	1	-	-	-	-	3	-
CO5	1	2	-	-	1	-	-	1	-	-	-	-	3	-

Course Title: **Basic Electrical Engineering Lab** Course Code: **25 ES153 EE**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	2	-	-	3	3	-	3	-	2
CO2	3	2	-	1	-	-	-	-	3	3	-	3	-	2
CO3	3	2	-	3	-	-	-	-	3	3	-	3	-	2
CO4	3	2	-	2	-	-	-	-	3	3	-	3	-	2
CO5	3	3	-	2	-	-	-	-	3	3	-	3	-	2

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CO – PO & PSO MAPPING

B.E. (Mechanical Engineering)
II - SEMESTER (2025-26)

Course Title: **Environmental Sciences** Course Code: ***25MC102CE**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	-	-	1	2	1	-	-	-	1	-	-
CO2	-	1	1	-	-	-	2	-	-	-	-	1	-	-
CO3	-	1	1	1	-	1	2	-	1	-	-	1	-	-
CO4	1	1	1	1	-	1	2	-	1	-	-	1	-	2
CO5	-	1	1	1	-	1	2	-	1	1	-	1	-	-

Course Title: **Essence of Indian Traditional Knowledge** Course Code: ***25 MC103PY**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	3	-	2	-	-	-	2	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	3	-	2	-	-	-	2	-	-
CO4	-	-	-	-	-	2	-	-	3	-	-	2	-	-
CO5	-	-	-	-	-	-	-	3	3	3	-	2	-	-

Course Title: **English** Course Code: **25 HS101EG**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	1	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	1	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	1	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	1	3	-	-	-	-

Course Title: **Differential Equations and Numerical Methods** Course Code: **25 BS103MT**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	2	-	2	2	1
CO2	2	1	-	-	-	1	-	-	-	2	-	2	2	1
CO3	2	3	-	-	1	-	-	-	-	-	-	1	2	1
CO4	-	1	-	-	-	-	-	-	-	2	-	2	1	1
CO5	-	1	-	-	-	-	-	-	-	-	-	2	1	1

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Road No. 3, Banjara Hills, Hyderabad-34. (T.G.)

Course Title: **Engineering Chemistry** Course Code: **25 BS104CH**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	3	3	-	-	-	2	3	-	3
CO2	3	3	3	-	-	3	3	-	-	-	3	3	-	3
CO3	3	2	2	-	-	3	2	-	-	-	3	2	-	2
CO4	3	3	3	-	-	3	2	-	-	-	3	2	-	-
CO5	3	2	3	-	1	3	3	-	3	-	2	3	-	-

Course Title: **Engineering Mechanics** Course Code: **25 ES105ME**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	2	1	1	1	1	1	2	-	1
CO2	1	2	1	1	-	1	-	1	1	1	1	2	-	1
CO3	2	2	3	2	1	-	1	-	-	1	1	2	-	1
CO4	3	1	1	1	2	1	2	-	-	1	-	3	-	1
CO5	1	1	1	2	-	-	3	-	-	1	3	2	-	1

Course Title: **English Lab** Course Code: **25 HS151EG**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	3	-	-	-	-

Course Title: **Engineering Chemistry Lab** Course Code: **25 BS152CH**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	2	-	-	2	-	2	2	-	-	2
CO2	3	3	2	1	2	3	-	2	-	2	2	-	-	2
CO3	-	-	3	-	2	-	-	2	-	-	-	-	-	-

Course Title: **Engineering Workshop Practice** Course Code: **25 ES154ME**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO2	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO3	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO4	3	2	-	-	2	-	-	1	3	3	-	2	-	3
CO5	3	2	-	-	2	-	-	1	3	3	-	2	-	3

CHAIRPERSON
Board of Studies in Mechanical Engineering
Muffakham Jah College of Engg. & Tech. (Autonomous)
Road No. 3, Banjara Hills, Hyderabad-34. (T.G.)