



First Year Curriculum

Admission Year 2026-27

**Bachelor of Technology
Automobile Engineering**

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Semester 1

a. Course Name: Manufacturing Process in Automotive Industries

b. Course Code: 03010201PC01

c. Prerequisite: Basic understanding of Physics and Chemistry, particularly concepts related to materials, heat, and mechanics.

d. Rationale: This course provides students with foundational knowledge of key manufacturing processes used in the automotive industry. It bridges fundamental scientific principles with practical engineering applications, enabling students to understand process selection, manufacturing techniques, quality aspects, and safety considerations in automotive production systems.

e. Course Learning Objectives:

CLOBJ	Description
CLOBJ1	To introduce fundamental concepts of manufacturing processes in automotive industries
CLOBJ2	To develop understanding of metal casting and its applications
CLOBJ3	To impart knowledge of welding and joining techniques
CLOBJ4	To explain metal forming and machining processes
CLOBJ5	To familiarize students with plastic and composite manufacturing
CLOBJ6	To enable students to analyze manufacturing defects, quality, and process selection

f. Course Learning Outcomes:

CLO	Description
CLO1	Describe and explain fundamental manufacturing processes in automotive industries
CLO2	Select appropriate manufacturing processes and materials for automotive components
CLO3	Analyze defects, quality issues, and safety considerations in manufacturing
CLO4	Compare manufacturing methods based on efficiency, cost, and suitability
CLO5	Demonstrate basic process planning and workflow organization
CLO6	Apply knowledge to real-world automotive manufacturing scenarios

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction to Automotive Manufacturing: Importance, classification, process selection, safety, materials & components	20	9
2	Metal Casting Processes: Sand casting, die casting, shell moulding, centrifugal casting, CO ₂ process, pattern making, defects & inspection	20	9
3	Joining and Welding Processes: Gas welding, arc welding (TIG, MIG), resistance welding, advanced welding techniques, defects & inspection	20	9
4	Metal Forming and Machining: Forging, rolling, extrusion, sheet metal operations, machining processes (turning, milling, drilling, grinding), CNC	20	9
5	Plastic and Composite Manufacturing: Injection moulding, blow moulding, extrusion, thermoforming, composites, rapid prototyping & additive manufacturing	20	9
Total		100	45

i. Text Book and Reference Book: Text Book:

1. Manufacturing Technology – P.N. Rao, Tata McGraw Hill

Reference Books:

1. Manufacturing Science – A. Ghosh & A.K. Mallik, Wiley Eastern
2. Elements of Workshop Technology (Vol I & II) – Hajra Choudhary
3. Introduction to Machining Science – G.K. Lal, New Age International

a. Course Name: Physics of Semiconductors b. Course Code: 03019201BS01

c. Prerequisite: Knowledge of Physics and basic concepts in Mathematics such as differentiation, integration, limits, differential equations, and vector calculus up to 12th science level.

d. Rationale: Physics forms the foundation for all engineering disciplines. This course develops scientific temperament and analytical capability in students. Understanding semiconductor physics, quantum mechanics, and optoelectronics enables students to solve engineering problems logically and adopt a scientific approach in advanced technological domains.

e. Course Learning Objective:

CLOBJ	Description
CLOBJ1	To understand band theory and semiconductor materials
CLOBJ2	To study optoelectronic devices and optical fiber systems
CLOBJ3	To introduce fundamentals of quantum mechanics and quantum computing
CLOBJ4	To understand low-dimensional materials and nanotechnology concepts
CLOBJ5	To develop analytical skills for solving physics-based engineering problems
CLOBJ6	To relate semiconductor physics concepts to modern engineering applications

f. Course Learning Outcomes:

CLO	Description
CLO 1	Conceptualize semiconducting materials using band theory
CLO 2	Explain optical fibers and semiconductor optoelectronic devices
CLO 3	Understand principles of quantum physics and quantum computing
CLO 4	Analyze physical phenomena at low-dimensional (nano) scale
CLO 5	Apply physics concepts to solve engineering problems
CLO 6	Evaluate modern applications of semiconductor and quantum technologies

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Band Theory & Semiconductors: Band structure, E-k diagram, direct/indirect band gap, effective mass, Fermi energy, density of states, intrinsic & extrinsic semiconductors, ohmic & Schottky junctions	25	11
2	Optoelectronics: Interaction of radiation with matter, absorption, emission, lasers, LED, photodiodes, optical fiber principles, numerical aperture, types, attenuation & applications	25	11
3	Quantum Mechanics & Quantum Computing: Quantum postulates, wave function, Schrödinger equation, potential well, tunneling, principles of quantum computing, advantages & applications	30	13
4	Low Dimensional Materials: Quantum confinement, quantum dot, wire, well, synthesis, properties, novel materials & applications	20	10
Total		100	45

i. Text Book and Reference Book: Text Books:

1. Physics of Semiconductor Devices – S. M. Sze & K. N. Kwok, John Wiley & Sons
2. Engineering Physics – B.K. Pandey, S. Chaturvedi, M. Venkanna, Cengage

Reference Books:

1. Semiconductor Optoelectronic Devices – P. Bhattacharya, PHI
2. Semiconductor Optoelectronics – J. Singh, McGraw-Hill

- a. **Course Name:** Linear Algebra and Calculus
- b. **Course Code:** 03019101BS02
- c. **Prerequisite:** Elementary Algebra, Matrices, Differentiation and Integration
- d. **Rationale:** This syllabus builds essential mathematical tools for engineering applications, covering differential equations, Laplace transforms, and vector calculus.
- e. **Course Learning Objective:**

CLOBJ 1	To develop understanding of matrices, determinants, and techniques for solving systems of linear equations, along with eigenvalues and eigenvectors.
CLOBJ 2	To apply methods for solving first-order ordinary differential equations and model real-life engineering problems such as cooling, growth, and electrical circuits.
CLOBJ 3	To understand functions of multiple variables and apply concepts of partial differentiation in analyzing physical and geometric problems.
CLOBJ 4	To analyze and solve problems involving maxima and minima, tangent planes, and normal lines using partial derivatives.
CLOBJ 5	To evaluate double and triple integrals and apply them to compute areas, volumes, and other engineering quantities.

f. **Course Learning Outcomes:**

CLO 1	Understand the concept of eigenvalues and eigenvectors of a matrix.
CLO 2	Formulate first-order differential equations to solve the real-world problem.
CLO 3	Apply partial differentiation to optimize multivariable function.
CLO 4	Evaluate multiple integration in cartesian and polar coordinates.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			External Evaluation		Total
				T	CE	P	Theory	P	
4	-	0	4	40	20	0	60		100

Legend: L- Lectures; T- Tutorial; P- Practical; C- Credit MSE- Mid Semester Evaluation;

CE- Continuous Evaluation; ESE- End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Linear Algebra Linear Algebra: Review of Determinant and Matrices, types of matrices, Rank of a matrix, System of Linear equations homogenous and non-homogenous equations, solving techniques- Gauss Elimination method, Gauss-Jordan method, Consistency and inconsistency of the system, Eigenvalues and Eigenvector: Eigenvalues and Eigenvector, Algebraic multiplicity and Geometric multiplicity, Caley-Hamilton theorem, Diagonalization	30%	18
2	First order ordinary differential equations and applications First Order Ordinary Differential Equations: Exact and non-exact differential equations, Integrating factor- function of x only and functions of y only, Linear and non-linear differential equations, Applications: Newton's Law of cooling, Growth model and RL-Circuit and RC-Circuit	20%	12
3	Partial Differentiation and its application Partial Differentiation: Functions of several variables, Limit of function, continuity, partial differentiation, chain rule, Implicit functions and their derivatives, Homogeneous functions and Euler's theorem	30%	18

i. Text Book and Reference Book:

- a) **Advanced Engineering Mathematics (TextBook)** By Erwin Kreyszig | Willey India Education
- b) **Elementary Linear Algebra** By Howard Anton, Chris Rorres | Willy India Edition | 9th Edition
- c) **Calculus with early transcendental functions** By James Stewart | Cengage Learning
- d) **Thomas' Calculus** By Maurice D. Weir, Joel Hass, Frank R. Giordano | Pearson Education

a. Course Name: Elements of Mobility Engineering

b. Course Code: 03010201ES01

c. Prerequisite: Knowledge of Elements of Automobile Engineering

d. Rationale: The course is designed to provide fundamental understanding of automobile components, thermodynamic systems, and power transmission systems used in mobility applications. It helps students build a strong base in energy systems and automotive engineering concepts required for advanced studies.

e. Course Learning Objective:

CLOBJ	Description
CLOBJ 1	To understand basic thermodynamic concepts and energy systems
CLOBJ 2	To study properties of gases and steam relevant to engineering applications
CLOBJ 3	To introduce fundamentals of automobile engineering
CLOBJ 4	To understand automobile components and layouts
CLOBJ 5	To study working principles of IC engines and thermodynamic cycles
CLOBJ 6	To learn motion and power transmission systems

f. Course Learning Outcomes:

CLO	Description
CLO 1	Explain thermodynamic principles and laws
CLO 2	Apply gas laws and steam properties in engineering problems
CLO 3	Describe automobile systems and classifications
CLO 4	Identify and explain automobile components and layouts
CLO 5	Analyze IC engine working and efficiency parameters
CLO 6	Explain power transmission devices and their applications

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction: Prime movers, energy sources, thermodynamic concepts, laws of thermodynamics	13	4
2	Properties of Gases: Gas laws, thermodynamic processes (isothermal, adiabatic, etc.)	20	6
3	Properties of Steam: Steam formation, properties, dryness fraction, steam tables	20	6
4	Basics of Automobile Engineering: History, classification, types of automobiles	7	2
5	Automobile Components and Layouts: Chassis, engine, transmission, layouts (FWD, RWD, 4WD)	10	3
6	Basics of IC Engine: Cycles (Carnot, Otto, Diesel), engine types, efficiency calculations	20	6
7	Motion and Power Transmission Devices: Belt, chain, gear drives, clutch, brakes, coupling	10	3
Total		100	30

i. Text Book and Reference Book: Text Books:

1. Elements of Mechanical Engineering – S.B. Mathur & S. Domkundwar
2. Thermal Engineering – R.K. Rajput

Reference Books:

1. Thermal Science and Engineering – Dr. D.S. Kumar
2. Basic Mechanical Engineering – T.S. Rajan
3. Automotive Mechanics – W. Crouse
4. Automobile Engineering Vol I & II– K.M. Gupta

a. Course Name: Mechanics of Solids b. Course Code: 03010402ES01

c. Prerequisite: Understanding of Physics, Mathematics, units, force, and basic engineering concepts.

d. Rationale: Mechanics of Solids is a fundamental subject that applies principles of mechanics to analyze and design engineering structures. It builds the conceptual foundation required to understand forces, stresses, and structural behavior in real-world engineering applications.

e. Course Learning Objective:

CLOBJ	Description
CLOBJ 1	To understand force systems and equilibrium of rigid bodies
CLOBJ 2	To learn centroid and moment of inertia concepts
CLOBJ 3	To study stresses and strains in materials
CLOBJ 4	To analyze beams and their behavior under loading
CLOBJ 5	To understand bending and shear stress distribution
CLOBJ 6	To study friction and its engineering applications

f. Course Learning Outcomes:

CLO	Description
CLO 1	Analyze force systems and determine resultant and moments in 2D and 3D
CLO 2	Evaluate centroid and moment of inertia of different geometries
CLO 3	Apply concepts of stress and strain in engineering problems
CLO 4	Analyze beams for shear force and bending moment
CLO 5	Determine bending and shear stresses in structural elements
CLO 6	Apply principles of friction in engineering applications

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction: Force systems, equilibrium, free body diagrams, concurrent and non-concurrent forces, moments	15	6
2	Centroid and Moment of Inertia: Centroid of areas and volumes, Pappus-Guldinus theorem, MI by integration, parallel axis theorem	15	6
3	Stresses and Strains: Types, Hooke's law, elastic constants, thermal stress, principal stresses, Mohr's circle	30	12
4	Beams: Types of beams and loads, reactions, shear force and bending moment diagrams, bending theory, shear stress	30	12
5	Friction: Laws of friction, coefficient, angle of friction, applications, belt friction	10	4
Total		100	40

i. Text Book and Reference Book: Text Books:

1. Engineering Mechanics: Statics and Dynamics – R.C. Hibbeler
2. Engineering Mechanics: Statics and Dynamics – S. Rajasekaran

Reference Books:

1. Engineering Mechanics – J.A. Desai & B.B. Mistry
2. Engineering Mechanics – S.S. Bhavikatti & K.G. Rajashekarappa
3. Theory of Structures – R.S. Khurmi
4. Theory of Structures – S. Ramamrutham
5. Engineering Mechanics – J.L. Meriam & L.G. Kraige

- a. **Course Name:** Principles of Communication Skills
 b. **Course Code:** 03010001HM01
 c. **Prerequisite:** Knowledge of English Language studied till 12th standard
 d. **Rationale:** Basic Communication Skills are essential for all Engineers.
 e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamental grammatical structures including parts of speech, punctuation, tenses, phrases, clauses, determiners, Quantifiers, sentence types, and basic concepts of phonetics (IPA symbols, speech sounds, stress, and intonation) for accurate and effective language use.
CLOBJ 2	Develop basic reading and listening comprehension skills by using appropriate strategies to understand simple texts and spoken content with improved pronunciation awareness.
CLOBJ 3	Organize and express ideas clearly in written form through picture-based perception activities.
CLOBJ 4	Build confidence and fluency in spoken communication through correct pronunciation practice, meeting and greeting activities, extempore speech, and everyday conversational exercises.
CLOBJ 5	Apply goal-setting and self-reflection techniques to monitor personal language learning progress, pronunciation improvement, and overall communication skills development.

f. Course Learning Outcomes:

CLO 1	Identify and explain parts of speech, punctuation marks, tenses, phrases, clauses, determiners, Quantifiers, sentence structures, and basic IPA phonetic symbols for accurate language use.
CLO 2	Demonstrate effective basic conversational exchanges and short extempore speeches using correct pronunciation, appropriate greetings, logical organization of ideas, and improved fluency.
CLO 3	Apply basic reading and listening strategies to comprehend short passages and spoken texts, recognizing appropriate pronunciation, stress, and intonation patterns.
CLO 4	Analyse personal communication performance and evaluate SMARTER goals through self-assessment and reflective practices to monitor language and pronunciation improvement.
CLO 5	Compose structured short picture-based perceptions by developing clear topic sentences, supporting details, and coherent conclusions with grammatical accuracy.

g. Teaching Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	0	2	1	0	0	20	0	30	50

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

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Parts of Speech, Punctuation and Tenses using time line <ul style="list-style-type: none">• Overview of 8 parts of speech• Basic punctuation marks and their usage• Types: Present, Past, Future• Forms and correct usage• Common tense errors	10	4
2	Introduction to Phonetics-Symbols and Pronunciation <ul style="list-style-type: none">• Introduction to Phonetics and IPA• English Speech Sounds• Stress and Intonation	10	4
3	Phrase and Clauses; Types of Sentence (Structure Wise) <ul style="list-style-type: none">• Difference between phrases and clauses• Classification of Simple, Compound & Complex• Interchange of Simple to Compound, Simple to Complex, Compound to Complex	8	2
4	Picture Perception <ul style="list-style-type: none">• Observing and interpreting images• Building a short story or description• Improving vocabulary and creativity	14	4
5	Determiners and Quantifiers <ul style="list-style-type: none">• Types of determiners• Order of determiners in a sentence• Quantifiers with countable and uncountable nouns• Common errors in the use of determiners and Quantifiers	8	2
6	Meeting and Greeting (Initiating a conversation) <ul style="list-style-type: none">• Basic conversation skill• Formal and informal greetings• Common phrases for starting interactions	10	4
7	Reading Comprehension (Level of difficulty-Basic) <ul style="list-style-type: none">• Types – Skimming & Scanning• Reading short passages• Identifying main ideas and details• Answering basic questions	10	2
8	Listening Comprehension <ul style="list-style-type: none">• Listening to short audios/Conversation• Understanding and responding to key information	8	2

9	Extempore Speech <ul style="list-style-type: none"> ● Speaking on random topics ● Organizing thoughts quickly ● Improving fluency and confidence 	12	4
10	Goal Setting and Tracking <ul style="list-style-type: none"> ● Setting SMARTER goals ● Planning and tracking progress ● Self-assessment and reflection 	10	2

i. Reference Books:

- a) **English Grammar in Use (TextBook)** By Murphy, Raymond | Cambridge University Press, Pub. Year 2019
- b) **A Practical English Grammar (TextBook)** By Thomson & Martinet | Oxford University Press, Pub. Year 1986
- c) **The St. Martin's Guide to Writing** By Rise B. Axelrod & Charles R. | Cooper, Bedford/St. Martin's, Pub. Year 2021
- d) **Tactics for Listening (Basic)** By Jack C. Richards | Oxford University Press, Pub. Year 2011
- e) **Active Skills for Reading: Book 1** By Neil J. Anderson | Cengage Learning, Pub. Year 2013
- f) **Speak with Impact** By Allison Shapira | HarperCollins Leadership, Pub. Year 2018

a. **Course Name:** Student Induction Program with Essence of Indian Knowledge System

b. **Course Code:** 03010001MC01

c. **Prerequisite:** Basic awareness about higher education, social values, ethics, and Indian culture will be beneficial for understanding the course effectively.

d. **Rationale:** This course helps students adapt to the academic environment, develop confidence, communication skills, ethical values, and understand the essence of Indian Knowledge System for holistic personal and professional growth.

e. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
15	-	-	0	-	50	-	-	-	50

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

f. **Course Content:**

Sr. No.	Content	Weightage	Teaching
1	<p>Activities in Mathematics</p> <ol style="list-style-type: none"> Exploring 3D Shapes (Cylinder, Cone, Cube, Cuboid) The Geometry of Conic Sections: Properties and Applications Measuring the Height of a Tree or Building Using Trigonometry Techniques for Measuring Top and Bottom Angle Reflections Fundamental Elements of Set Theory Set Theory Tools for Probability Analysis Key Concepts in Combinatorial Mathematics Probability Fundamentals: Key Ideas and Concepts Foundations of Statistical Theory: Key Concepts Explained. Principles of Geometric Progressions and Series . Matrix Application in Cryptography. An experimental approach to measure velocity and acceleration . Analysing Rate of Change and Optimisation. Utilising Integration for Problem Solving. A B C of Tangram 	25%	12

2	<p>Activities in Communication Skills</p> <p>Phase-1: Part of Speech, Articles, Tenses, Basic Sentence Formation Phase-2: Verb, Subject Verb Agreement, Active Passive Voice, Idioms and Phrases Phase-3: Introduction to IKS, Indian ways of Speaking and Listening, Healthy Daily Life: The Indian Way, Indian Achievers and Innovations.</p>	25%	12
3	<p>Activities in Computer Science</p> <p>Computer Basic Architecture: Introduction to Computer Systems, Von Neumann Architecture, Components of a Computer: CPU, Memory, I/O devices, Data Representation and Number Systems, Registers, ALU, Control Unit, Memory Hierarchy: Cache, RAM, ROM, Secondary Storage Indian Knowledge System in Context of Computing: Historical Contributions of Indian Scholars to Mathematics and Computing, Algorithms in Ancient Indian Texts, Concept of Zero and Decimal Number System, Indian Logic and Computation Models, Sanskrit Computational Models and Grammar, Traditional Indian Computing Tools and Techniques, Integration of Traditional Knowledge with Modern Computing Emerging Technologies in Computer</p> <p>Engineering: Introduction to Artificial Intelligence and Machine Learning, Internet of Things (IoT), Blockchain Technology, Quantum Computing Basics, Edge Computing and Cloud Computing Advances, Cybersecurity Trends and Challenges, 5G and Networking, Innovations, Bioinformatics and Computational Biology, Robotics and Automation in Computing.</p>	25%	12
4	<p>Activities of Physics</p> <p>Measurement, Electrostatics, Electromegnetics, Optics, Leaser and Fiber Optics, Vedic Physics and Cosmology</p>	25%	12

Semester 2

a. Course Name: Automobile Materials

b. Course Code: 03010202PC01

c. Prerequisite: Knowledge of Engineering Physics and Engineering Chemistry

d. Rationale: This subject provides essential knowledge of materials used in automotive engineering, focusing on their structure, properties, and performance. It enables students to select suitable materials for various vehicle components and understand heat treatment and testing methods. This foundation is crucial for ensuring safety, durability, and efficiency in modern automotive design and manufacturing.

e. Course Learning Objective:

CLOBJ	Description
CLOBJ 1	To understand classification and structure of engineering materials
CLOBJ 2	To study ferrous materials and their applications in automobiles
CLOBJ 3	To learn non-ferrous materials and alloys used in automotive systems
CLOBJ 4	To understand heat treatment processes and their effects
CLOBJ 5	To study polymers, composites, ceramics, and advanced materials
CLOBJ 6	To understand material testing and characterization techniques

f. Course Learning Outcomes:

CLO	Description
CLO 1	Identify and classify materials used in automotive applications
CLO 2	Analyze the effect of crystal structure and defects on properties
CLO 3	Select appropriate ferrous and non-ferrous materials
CLO 4	Explain heat treatment and surface engineering processes
CLO 5	Understand advanced materials and their applications
CLO 6	Apply material testing and NDT techniques in quality control

g. Teaching & Examination Scheme:

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

Legend: L- Lectures; T- Tutorial; P- Practical; C- Credit MSE- Mid Semester Evaluation;

CE- Continuous Evaluation; ESE- End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction to Automotive Materials: Classification, selection criteria, structure-property relationship, crystal structure, imperfections	10	4
2	Ferrous Materials: Carbon steels, alloy steels, stainless steels, cast irons, alloying elements and applications	15	7
3	Non-Ferrous Materials: Aluminium, magnesium, copper, titanium, zinc alloys and applications	15	7
4	Heat Treatment: TTT diagram, annealing, hardening, tempering, surface hardening, Jominy test	25	10
5	Polymers, Composites & Ceramics: Types, properties, manufacturing and applications in automobiles	15	8
6	Advanced Materials: Smart materials, shape memory alloys, nanomaterials, CFRP, graphene	10	4
7	Testing & Characterization: Metallography, hardness, tensile, impact, fatigue, corrosion testing, NDT methods	10	5
Total		100	45

i. Text Book and Reference Book: Text Books:

1. Material Science and Engineering – William D. Callister Jr.
2. Introduction to Physical Metallurgy – Sydney H. Avner

Reference Books:

1. Materials for Automobile Bodies – G. Davies
2. Automotive Materials Technology – Joseph D. Wagner
3. Practical Non-Destructive Testing – Baldev Raj, T. Jayakumar, M. Thavasimuthu

- a. **Course Name:** Differential Equations and Vector Calculus
- b. **Course Code:** 03019102BS02
- c. **Prerequisite:** Differential Calculus, Integral Calculus, Vector Algebra, Differential Equations.
- d. **Rationale:** This syllabus builds essential mathematical tools for engineering applications, covering differential equations, Laplace transforms, and vector calculus.
- e. **Course Learning Objective:**

CLOBJ 1	Solve higher-order linear differential equations using standard methods for homogeneous and non-homogeneous cases.
CLOBJ 2	Apply differential equations to physical problems such as free, damped, and forced oscillations and RLC circuits.
CLOBJ 3	Use Laplace transforms and their properties to solve initial value problems efficiently.
CLOBJ 4	Expand functions using Fourier series , including half-range expansions for even and odd functions.
CLOBJ 5	Apply vector calculus concepts like gradient, divergence, curl, and line integrals in solving practical problems.

f. Course Learning Outcomes:

CLO 1	Solve Second and Higher-Order Ordinary Differential Equations
CLO 2	Apply Laplace Transform to Solve Differential Equations.
CLO 3	Apply Fourier series techniques to approximate periodic functions in mathematical and engineering contexts.
CLO 4	Compute and interpret vector differentiation concepts.
CLO 5	Evaluate vector integrals.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				T	CE	P	Theory	P	
4	-	-	4	40	20	-	-	60	100

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Second and Higher-Order Ordinary Differential Equations Homogeneous Linear ODE, Homogeneous constant coefficient linear ODE, non-homogeneous linear constant coefficient linear ODE, Undetermined coefficient and Variation of Parameter, Applications of higher order linear differential equations in Free oscillations, forced oscillations, Damped oscillations, RLC circuit	25	15
2	Laplace Transformations and Its Applications: Definition and Laplace transformation of elementary functions, Properties of Laplace Transformations - linearity property, First-Shifting Theorem, Derivative of Laplace transformation, Integration of Laplace transformation, Laplace transformation of Integral, Laplace transformation of derivatives, Inverse Laplace Transformation, Convolution theorem and Application of Laplace Transformation to solve ODE.	30	18
3	Fourier Series Fourier Series of periodic functions with arbitrary period, Even and Odd functions, Half-Range Fourier Series	15	9
4	Vector Calculus: Vector Differentiation: Vector-valued functions, smooth curve, vector differentiation, scalar valued function, Gradient of scalar valued function, Divergence and curl of vector-valued functions, Laplacian operator, Scalar potential function, Vector Integration: Line integral of scalar functions, Line integral of vector valued function, conservative vector field and independent of path, Green's theorem.	30	18

i. Text Book and Reference Book:

1. Advanced Engineering Mathematics (TextBook) By Erwin Kreyszig | Willey India Education
2. D.A. Murray, Introductory Course in Differential Equations. Orient Longman (India).
3. Fourier Series and Boundary Value Problems, By James Brown and Ruel Churchill, | McGraw Hill
4. Elementary Differential Equations and Boundary Value Problems, By William E Boyce and Richard C. D'Prima | Willey India Edition
5. Advanced Engineering Mathematics, By K. A. Stroud and Dexter Booth, | Macmillan Publication

- a. **Course Name:** Engineering Graphics & Design
- b. **Course Code:** 03010901ES02
- c. **Prerequisite:** Zeal to learn the subject.
- d. **Rationale:** Engineering Graphics is the language of communication for Engineers. Engineering Graphics course provides tools and techniques of communication for various fields of Engineering
- e. **Course Learning Objective:**

CLOBJ 1	To develop fundamental knowledge of engineering drawing, including standards, drawing instruments, scales, dimensioning, and BIS practices.
CLOBJ 2	To understand and construct various engineering curves such as conics, spirals, involutes, and cycloids with their practical applications.
CLOBJ 3	To apply principles of projections for points, lines, and planes, and determine true lengths, inclinations, and auxiliary views.
CLOBJ 4	To visualize and draw projections and developments of solids, including sectional views and surface developments used in engineering design.
CLOBJ 5	To interpret and create orthographic and isometric projections and develop basic skills in computer-aided drafting for 2D and 3D modeling.

- f. **Course Learning Outcomes:**

CLO 1	Understand the uses of drawing instruments, accessories, scales and BIS drawing standards in engineering graphics.
CLO 2	Form various engineering curves using basic drafting techniques.
CLO 3	Illustrate the projections of points, lines and planes in different quadrants using orthographic projection techniques.
CLO 4	Draw section of solids and development of surfaces using reference planes.
CLO 5	Draw orthographic and isometric projections of 3D objects using basic principles of projection.
CLO 6	Draft 2D and 3D engineering drawings with aid of basic AutoCAD.

- g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				T	CE	P	Theory	P	
2	-	4	4	40	20	20	60	30	150

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

h. Course Content:

Sr. No.	Topics	W	T
1	Introduction Scope of Engineering Drawing in all Branches of Engineering, Uses of Drawing Instruments and Accessories, Introduction to Drawing Standards BIS-SP-46, Representative Fraction, Engineering Scales, Dimensioning Terms and Notations, Types of Lines used in Engineering. Practice recommended by BIS.	10	5
2	Engineering Curves Classification of Engineering Curves, Application of Engineering Curves, Constructions of Engineering Curves - Conics, Spirals, Involutives and Cycloids with Tangents and Normals.	15	10
3	Principles of Projections Types of Projection, Parallel Projection, One-point Perspective projection. Introduction to principal planes of projections, Projections of the points: Projections of the points located in the same quadrant and different quadrants. Projections of line: Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes. Projections of planes: Projections of planes (polygons, circle and ellipse) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane.	20	10
4	Projections and Development of Solids Projections of Solids: Classifications of basic Solids, Projections of Solids - Right Regular Prism, Pyramid, Cone, Cylinder, Tetrahedron and Cube; Sectional Views. Development of Surfaces: Methods of Development of Lateral Surfaces of Right Regular Solids, Parallel Line Development and Radial Line Development, Applications of Development of Surfaces.	20	10
5	Orthographic and Isometric Projections Orthographic Projections: Principle of orthographic projections, Conversion of pictorial views into orthographic projections including sectional orthographic projections. Isometric Projections: Conversion of orthographic views into isometric projections/views.	20	5
6	Computer Aided Drafting Basic User Interface of Drafting Software, Demonstration of basic modelling commands, Preparation of 2D and 3D models using Drafting Software.	15	5

i. Text Book and Reference Book:

- 1. A Text Book of Engineering Graphics (TextBook)** By P.J.Shah | S.Chand & Company Ltd., New Delhi | 2021st edition
- 2. Engineering Drawing** By N. D. Bhatt | Charotar Publishing House | 55th edition, Pub. Year 2010
- 3. A Text Book of Engineering Drawing** By P.S.Gill | S.K. Kataria & Sons | 2013th edition
- 4. Engineering Graphics with Auto CAD** By James D.Bethune, | Pearson Education | 2020th edition

j. List of Practical

Sr. No.	Practical
1	Demonstration of different drawing instruments, dimensioning systems, symbols and Engineering Scale.
2	Exercise on Projections of Points and Lines.
3	Exercise on Projections of Planes.
4	To draw a sheet involving Projections of Solids and Sections of Solids
5	To draw a sheet involving Development of Surfaces.
6	Practice sheets on Orthographic Projections.
7	Practice sheets on Isometric Projection.
8	Demonstration of Industrial Drawings.
9	To create basic objects (2D sketches) using Computer Aided Drafting tool
10	To create precise drawing (3D modeling), dimensions and editing using Computer Aided Drafting tool

a. Course Name: Manufacturing & Measuring Practices

b. Course Code: 03010202ES01

c. Prerequisite: Basic knowledge of Engineering Workshop Practices and Engineering Physics.

d. Rationale: This course focuses on the practical application of manufacturing methods and precision measurement techniques for automotive components. It develops students' understanding of machining operations, fitting practices, dimensional accuracy, GD&T concepts, and advanced inspection systems used in the automotive industry.

e. Course Learning Objectives:

CLOBJ	Course Learning Objective
CLOBJ 1	To understand the fundamentals of automotive manufacturing practices and workshop safety.
CLOBJ 2	To develop knowledge of machining processes used for automotive component manufacturing.
CLOBJ 3	To understand fitting, assembly, and finishing practices in automotive applications.
CLOBJ 4	To learn principles of engineering metrology and measurement systems.
CLOBJ 5	To understand limits, fits, tolerances, and GD&T concepts for precision manufacturing.
CLOBJ 6	To familiarize students with advanced measuring instruments and quality inspection systems used in automotive industries.

f. Course Learning Outcomes:

After completion of the course, students will be able to:

CLO	Course Learning Outcome
CLO 1	Explain manufacturing processes and safety practices used in automotive
CLO 2	Perform machining operations such as turning, drilling, milling, and grinding.
CLO 3	Apply fitting and assembly practices for automotive components.
CLO 4	Use precision measuring instruments for dimensional inspection.
CLO 5	Interpret and apply GD&T symbols, limits, and tolerance systems in engineering applications
CLO 6	Demonstrate the use of advanced metrology systems such as CMM and profile projectors for quality control.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No	Content	Weightage (%)	Teaching Hours
1	Introduction to Automotive Manufacturing Practices: Role of manufacturing in vehicle assembly; process selection; material behavior in machining; automotive part tolerances	13	4
2	Machining of Automotive Components: Turning, drilling, milling, shaping and grinding processes used in fabrication of shafts, hubs, housings, and brackets	20	6
3	Fitting & Assembly Practices: Manual fitting, layout tools, hand tools, files, surface preparation; relevance to suspension and steering linkages	13	4
4	Metrology in Automotive Industry: Need for inspection, types of measurement errors, linear and angular measurements	17	5
5	Geometric Dimensioning & Tolerancing (GD&T): Limits, fits, tolerance systems; flatness, roundness, cylindricity, concentricity, etc.	17	5
6	Advanced Measuring Systems: CMM, profile projector, surface roughness tester, non-contact sensors in automotive quality assurance	20	6
	Total	100	30

List of Practicals:

1. Safety practices and workshop protocols in automotive labs
2. Vernier caliper and micrometer practice on automotive bush, shaft, and bolts
3. Angular and taper measurement on conical automotive components
4. Surface roughness testing using roughness tester

5. Measurement of GD&T features using dial gauge
6. Fitting practice: Marking, cutting, and assembling automotive linkages
7. Turning operation on lathe to prepare cylindrical components
8. Drilling operation on fixture plate or engine bracket
9. Milling operation for keyways or flats on automotive shafts
10. Thread measurement using pitch gauge and thread micrometer
11. Demonstration of profile projector for contour analysis
12. CMM-based dimensional inspection of automotive components

i. Text Book and Reference

Book: Text Books:

1. Hajra Choudhary, *Elements of Workshop Technology (Vol I & II)*, Media Promoters and Publishers Pvt. Ltd.
2. R.K. Jain, *Production Technology*, Khanna Publication.

Reference Books:

1. N. D. Bhatt, *Engineering Drawing*, Charotar Publishing House.
2. S. Kalpakjian, *Manufacturing Engineering & Technology*, Prentice Hall.
3. Raghuvanshi, *Workshop Technology*, Dhanpat Rai Publications.
4. Galyer & Shotbolt, *Metrology for Engineers*.

- a. **Course Name:** Advanced Communication and Interpersonal Skills
- b. **Course Code:** 03010002HM01
- c. **Prerequisite:** Basic Communication Skills are essential for all Engineers
- d. **Rationale:** Strengthen core language and soft skills through applied grammar, communication tasks, and vocabulary building.
- e. **Course Learning Objective:**

CLOBJ 1	Apply core grammatical principles including subject–verb agreement, reported speech, and active–passive voice to improve accuracy in spoken and written communication.
CLOBJ 2	Expand functional vocabulary and language usage by applying synonyms, antonyms, homonyms, idioms, and contextual word meanings effectively.
CLOBJ 3	Develop effective reading comprehension skills to understand, interpret, and respond to intermediate-level texts and spoken content.
CLOBJ 4	Enhance written and spoken expression through structured essay writing, Paragraph development, confident self-introduction, and professional grooming practices.
CLOBJ 5	Develop self-management and personal development skills by applying SWOT analysis, practicing effective time management strategies, and engaging in reflective learning processes.

f. Course Learning Outcomes:

CLO 1	Remember rules of subject–verb agreement, reported speech, and active–passive voice to produce grammatically correct sentences in real-life contexts.
CLO 2	Understand the usage of appropriate vocabulary including synonyms, antonyms, homonyms, homophones, homographs, and idioms in spoken and written communication.
CLO 3	Apply structured essays, Paragraph, and confident self-introductions using appropriate language, logical organization, professional etiquette, and positive body language.
CLO 4	Analyse intermediate-level reading passages by identifying main ideas, supporting details, tone, and purpose.
CLO 5	Evaluate SWOT analysis and time-management techniques to plan personal goals, prioritize tasks, and improve academic and professional effectiveness.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	40	0	20	60	30	150

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Subject Verb Agreement Rules of subject- verb matching Singular vs plural forms Common agreement error s	10	1
2	Reported Speech Direct and indirect speech Changing tenses, pronouns, and time expressions Reporting statements, questions, and commands	10	1
3	Active and Passive Voice Difference between Active and Passive Rules for converting sentences Usage in real-life contexts	10	1
4	Building Vocabulary Word meanings and usage Synonyms and antonyms Homonyms, Homophones, Homographs, Idioms	10	2
5	Grooming and Personality Development Importance of dressing and professional etiquette Building confidence and positive body language	10	2
6	SWOT Analysis with Self Introduction Identifying strengths, weaknesses, opportunities, threats Preparing and delivering a confident self-introduction Developing self- awareness and a growth mindset	10	2
7	Reading Comprehension (Intermediate Level) Understanding written texts Finding main ideas and supporting details Answering questions accurately	10	2
8	Listening Comprehension (Intermediate Level) Listening for specific information Identifying tone and purpose Responding appropriately	10	1
9	Essay Writing Structure of an essay: introduction, body, conclusion Organizing ideas logically Using appropriate language and tone	10	2
10	Time Management Importance of managing time Prioritization Creating schedules	10	1

Lab (Practical)

Sr. No.	Content	Weightage	Teaching Hrs.
1	Subject Verb Agreement Fill-in-the-blank exercises Sentence correction tasks Group quiz competition Role-play using correct subject- verb forms	10%	2
2	Reported Speech Dialogue conversion practice Pair work: narrate a conversation Reporting classroom news Role-play followed by reporting	10%	2
3	Active and Passive Voice Transform active sentences to passive and vice versa Rewrite instructions in passive voice Classroom narration using passive structures Group activity: change story Voice	10%	2
4	Building Vocabulary Daily word journal Vocabulary flashcards and games Synonym-antonym match-up Word building through storytelling	10%	4
5	Grooming and Personality Development Personal grooming checklist task Group discussion on personality traits Mock social interaction Confidence-building exercises	10%	4
6	SWOT Analysis with Self Introduction SWOT worksheet filling Self-introduction in pairs or groups Strength-sharing circle Feedback on introductions	10%	4
7	Reading Comprehension (Level of Difficulty – Intermediate) Reading passage followed by Q&A Find-the-theme activity Vocabulary hunt from the passage	10%	4

	Summarizing a short text		
8	Paragraph Development Paragraph writing using prompts Sentence reordering activity Peer editing for coherence	10%	2
9	Essay Writing Brainstorming and outline creation Writing on guided topics Peer feedback session Editing and final draft submission	10%	4
10	Time Management and Team Building Create a weekly schedule Prioritization task (urgent vs important) Reflection on time use habits	10%	2

i. Text Book and Reference Book:

- i. Technical Communication: Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press | 2nd Edition
- ii. Personality Development and Soft Skills By Barun K Mitra | Oxford, 2011
- iii. High School English Grammar and Composition By Wren & Martin | S. Chand Publishing, Pub. Year 2017
- iv. English Grammar in Use By Raymond Murphy | Cambridge University Press, Pub. Year 2019
- v. Communication Skills and Soft Skills By Suresh Kumar | Pearson Publication, 2010.

- a) **Course Name:** Environmental Science
- b) **Course Code:** 03010002MC01
- c) **Prerequisite:** Knowledge of Mathematics up to 12th science level
- d) **Rationale:** The proposed syllabus of Environmental Science is comprehensive and multidisciplinary, reflecting the interconnectedness of ecological systems, technological development, human behavior, and urban planning. This rationale explains the relevance and importance of each thematic area covered: Environmental Health, Ecology, and Quality of Life; Pollution Prevention; Population Growth and Global Environmental Challenges; Environmental Information Systems and Technological Tools; Smart Cities
- e) **Course Learning Objective:**

CLOBJ 1	Apply systems thinking to analyse the city as a system, demonstrating application
CLOBJ 2	Evaluate the role of smart citizens and approaches for citizen engagement
CLOBJ 3	Identify sources and stressors of water resources, demonstrating understanding
CLOBJ 4	Analyse the causes, effects, and control measures of population explosion

f) **Course Learning Outcomes:**

CLO 1	Analyze the impact of human activities on environmental sustainability and ecosystems.
CLO 2	Promote awareness about biodiversity conservation and its importance for ecological balance.
CLO 3	Assess the effects of pollution and propose strategies for pollution control and waste management.
CLO 4	Describe the significance of climate change and its global implications on ecosystems and human life.
CLO 5	Develop skills to evaluate and mitigate environmental risks in industrial and urban development

g) **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
				Internal Evaluation			ESE		
L	T	P	C	MSE	CE	P	Theory	P	Total
1	-	-	0	50	50	-	-	-	100

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

h) Course Content:

Sr.	Topics	W	T
1	<p>FUNDAMENTALS OF ENVIRONMENTAL SCIENCE Definition, Principles and Scope of Environmental Science. Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere. Laws of thermodynamics, heat transfer processes, mass and energy transfer across various interfaces, material balance. Meteorological parameters - pressure, temperature, precipitation, humidity, radiation and wind velocity. Interaction between Earth, Man and Environment. Biogeographic provinces of the world and agro-climatic zones of India. Concept of sustainable development goals. Environmental education and awareness.</p> <p>Environmental ethics</p>	15	3
2	<p>ENVIRONMENTAL POLLUTION AND CONTROL Air, Noise, Water, Soil, Thermal, Marine, and Radioactive pollution, focusing on sources, types of pollutants, and their impacts on human health, plants, and materials. It includes the measurement techniques and standards for air and water quality, along with pollution control devices and methods. Key topics include criteria air pollutants, noise indices, wastewater treatment, and soil pollution management.</p>	25	4
3	<p>ENVIRONMENT MANAGEMENT AND LEGISLATION</p> <p>Overview of Environmental Laws in India: Constitutional provisions in India (Article 48A and 51A), Forest Conservation Act, 1980, Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975, Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986, The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, The Solid Waste Management Rules, 2016, , Noise Pollution (Regulation 8 and Control) Rules, 2000, Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Basel Convention (1989, 1992), Earth Summit at Rio de Janeiro, 1992, Agenda-21, Global Environmental Facility (GEF), Convention on Biodiversity (1992), UNFCCC, Kyoto Protocol, 1997, Clean Development Mechanism (CDM), Copenhagen Summit, 2009.</p>	25	3
4	<p>CONTEMPORARY ENVIRONMENTAL ISSUES Current Environmental Issues in India: Environmental issues related to water resource projects - Narmada dam, Tehri dam etc., Hydro-power projects in Jammu & Kashmir etc.. Water conservation-development of watersheds, Rain water harvesting and ground water recharge. National river conservation plan – Namami Gange and Yamuna Action Plan. Eutrophication and restoration of lakes.</p>	15	3

	Conservation of wetlands, Ramsar sites in India. Climate change - adaptability, energy security, food security and sustainability. Wild life conservation projects: Project tiger, Project Elephant etc., Carbon sequestration and carbon credits. Waste Management – Swachha Bharat Abhiyan. Sustainable Habitat: Green Building, GRIHA Rating Norms. Vehicular emission norms in India. Epidemiological Issues: Fluorosis, Arsenocosis, Goitre, Dengue. Environmental Disasters: Minnamata Disaster, Love Canal Disaster, Bhopal Gas Disaster, 1984		
5	CLIMATE RESILIENT CITY Introduction to Climate Resilience – Understanding the need for cities to adapt to climate change. Impact of Climate Change on Cities – Urban heat islands, flooding, pollution, and infrastructure challenges. Sustainable Urban Planning – Role of green spaces, energy-efficient buildings, and smart city concepts. Green Infrastructure – Importance of urban forests, permeable surfaces, and nature-based solutions. Case Studies and Future Trends – Learning from cities like Singapore, Rotterdam, and Copenhagen.	20	2

i) Text Book and Reference Book:

- a) Textbook of Environmental Studies for Undergraduate Courses' (TextBook) By Erach Bharucha | Universities press
- b) Basics of Environmental Studies By U K Khare | Tata McGraw Hi
- c) Environmental Studies (TextBook) By Anindita Basak | Drling Kindersley(India)Pvt. Ltd Pearson
- d) Environmental Sciences By Daniel B Botkin & Edward A Keller | John Wiley & Sons
- e) Air Pollution By M. N. Rao and H. V. N. Rao; | Tata McGraw-Hill Publishing Company
- f) Environmental Engineering By Howard S. Peavy, Donald R. Rowe, George Tchobanoglous | McGraw-Hill

- a. **Course Name:** Privacy and Security in Online Social Media
- b. **Course Code:** 03M10002UE01
- c. **Prerequisite:** Basic knowledge of social media, privacy and security.
- d. **Rationale:** The course explores the fundamentals of Online Social Networks (OSNs), focusing on data collection, analysis, trust, security, and privacy.
- e. **Course Learning Objective:**

CLOBJ 1	Understand the concepts, architecture, and applications of Online Social Networks (OSNs) and their impact on society.
CLOBJ 2	Develop analytical skills to evaluate trust, reputation, privacy, and security issues in social networking platforms.
CLOBJ 3	Apply social media data collection, processing, and analysis techniques using APIs and analytical tools.
CLOBJ 4	Enhance awareness regarding cyber threats, phishing, misinformation, and ethical issues related to online social systems.
CLOBJ 5	Encourage research aptitude and critical thinking in emerging areas of social media analytics, security, and digital investigations.

f. **Course Learning Outcomes:**

CLO 1	Understand Online Social Networks and Data Collection – Explain the fundamentals of online social networks, data collection methods, and the challenges and opportunities associated with them.
CLO 2	Analyze Trust, Credibility, and Reputation in Social Systems – Evaluate the role of trust and reputation in online communities and develop strategies to detect misinformation and enhance credibility.
CLO 3	Examine Privacy and Security Risks in OSNs – Assess the impact of privacy disclosure, phishing, and fraudulent activities in social media and propose countermeasures.
CLO 4	Apply Data Collection and Analysis Techniques – Utilize social media APIs and data processing methods to extract, clean, and analyze information from online social networks.
CLO 5	Conduct Research on Emerging OSN Topics – Engage in discussions and research on social media security, privacy, and law enforcement applications, contributing to the field through case studies and research papers.

G. Teaching & Examination Scheme:

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

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

i. Course Content:

Sr. No.	Content	Weightage	Teaching Hour
1	Introduction to Online Social Networks: Definition and Evolution of Online Social Networks (OSNs), Data Collection from Social Networks, Challenges, Opportunities, and Pitfalls in OSNs, Social Media APIs for Data Extraction.	20%	8
2	Data Collection and Analysis in OSNs Techniques for Collecting Data from Online Social Media, Ethical Considerations in Social Media Data Collection, Data Processing and Cleaning for Analysis, Case Studies on Social Media Data Collection.	20%	8
3	Trust, Credibility, and Reputation in Social Systems: Understanding Trust and Credibility in Online Communities, Reputation Systems and Their Impact on User Behavior, Detecting Misinformation and Fake News in OSNs, Methods for Enhancing Trustworthiness in Social Media.	20%	8
4	Security, Privacy, and Fraud Detection in OSNs: Online Social Media and Its Role in Law Enforcement & Policing, Information Privacy: Disclosure, Revelation, and Its Effects, Phishing Attacks in OSNs and Their Countermeasures, Identifying Fraudulent Entities and Fake Profiles in OSNs	20%	8
4	Research and Practical Applications: Review and Discussion of Key Topics (Refresher), Analyzing Real-World OSN Case Studies, Research Paper Discussions on Online Social Networks and Security, Future Trends in OSN Security and privacy.	20%	8

j. Text Book and Reference Book

1. Social Media Mining: An Introduction By Reza Zafarani, Mohammad Ali Abbasi, Huan Liu: Provides a comprehensive introduction to social media data mining, including machine learning and network analysis techniques.

2. Mining the Social Web By Matthew A. Russell: Covers data collection, analysis, and visualization techniques using Python and APIs from platforms like Twitter, Facebook, and LinkedIn.

3. Security and Privacy-Preserving Techniques in Social Networks By Barbara Carminati & Elena Ferrari Explores security challenges, privacy risks, and trust management in online social networks.

- a. **Course Name:** Design, Technology and Innovation
- b. **Course Code:** 03M10002UE02
- c. **Prerequisite:** Zeal to learn the subject.
- d. **Rationale:** Design, Technology, and Innovation (DT&I) subject's lies in equipping students with the skills to be creative problem-solvers and innovators in a rapidly evolving world. These subjects foster critical thinking, creative exploration, and the ability to translate ideas into tangible solutions, preparing students for future careers and societal challenges.
- e. **Course Learning Objective:**

CLOBJ 1	Introduce students to the principles and processes of design thinking for solving user-centered problems.
CLOBJ 2	Develop creative thinking, brainstorming, and ideation skills for innovative product and system design.
CLOBJ 3	Enable students to create and evaluate low-fidelity and high-fidelity prototypes while understanding fabrication constraints.
CLOBJ 4	Apply engineering concepts and technical knowledge in design, innovation, and problem-solving activities.
CLOBJ 5	Enhance students' visual communication skills through sketching, graphical representation, and design tools.
CLOBJ 6	Familiarize students with the basics of entrepreneurship, startup development, and innovation management.

f. **Course Learning Outcomes:**

CLO 1	Apply design thinking methodologies to identify and solve user-centered problems
CLO 2	Demonstrate creative thinking and effective ideation strategies.
CLO 3	Develop low-fidelity and high-fidelity prototypes and understand fabrication challenges.
CLO 4	Incorporate engineering principles into design and innovation. .
CLO 5	Communicate ideas visually through sketching and graphical tools.

CLO 6 Understand the fundamentals of entrepreneurship and the startup process.

g. Mapping of Course Learning Outcomes and Bloom's Taxonomy:

Course Learning Outcomes		Bloom's Level
CLO 1	Apply design thinking methodologies to identify and solve user-centered problems	3, 4
CLO 2	Demonstrate creative thinking and effective ideation strategies.	3
CLO 3	Develop low-fidelity and high-fidelity prototypes and understand fabrication challenges.	6
CLO 4	Incorporate engineering principles into design and innovation.	5
CLO 5	Communicate ideas visually through sketching and graphical tools.	3
CLO 6	Understand the fundamentals of entrepreneurship and the startup process.	2

h. Teaching & Examination Scheme:

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

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

i. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Design Thinking and Methodologies: Introduction to Design Thinking: Understanding the design process, user needs, and problem definition. Design Process: Exploring different design methodologies, including brainstorming, sketching, and prototyping. Human and Culture Centered Design: Focusing on user needs, ergonomics, and user	30%	12

	experience. Design for Social and Life style change. Concept Generation and Evaluation: Developing and evaluating design concepts through various techniques.		
2	Technology and its Role in Design: Technology for Design: Exploring how technology enables and enhances the design process. Specific Technologies: Relevant areas like CAD and Graphics software, 3D printing, Machining technologies, digital fabrication, and other relevant technology. Innovation in Emerging Technologies and methods like AR/VR, IOT, AI and ML, Supply Chain Management and Project Management. Technology to Solution: Understanding how technology can be leveraged to solve real-world problems. Engineering Aspect of design Electrical, Mechanical, Design, Material, Aspect, Safety and Reliability aspect, Sustainable and Eco friendly materials.	35%	16
3	Innovation and Entrepreneurship: Introduction to Innovation: Understanding the principles of innovation and its role in product development. Role of Innovation in Life and Society Grassroots Innovation: Learning from innovative solutions developed at the community level. Collaborative Innovation: Exploring how different individuals and teams can collaborate to drive innovation. Intellectual Property: Learning about patents, copyrights, and other forms of intellectual property. Business Model Development: Exploring how to develop a business model for a new product or service. Entrepreneurship: Fundamentals of starting a business and the challenges and opportunities of entrepreneurship.	35%	17

j. Text Book and Reference Book:

1. "Design Thinking for Strategic Innovation" by Idris Mootee."
2. "Product Design and Development" by Karl T. Ulrich and Steven D. Eppinger
3. "The Design of Everyday Things" by Don Norman.
4. "Sketching: Drawing Techniques for Product Designers" by Koos Eissen and Roselien Steur.
5. "Innovation and Entrepreneurship" by Peter F. Drucker.
6. "The Lean Startup" by Eric Ries.

7. "Universal Principles of Design" by William Lidwell, Kritina Holden, and Jill Butler.

- a. **Course Name:** Indian Economy: Some Contemporary Perspectives
- b. **Course Code:** 06M10102UE02
- c. **Prerequisite:** Basic understanding of economic principles and macroeconomic concepts is recommended. Familiarity with the Indian economic structure and current affairs will be beneficial but is not mandatory
- d. **Rationale:** This course is designed to provide students with a comprehensive understanding of the Indian economy's evolution, key reforms, and current challenges.
- e. **Course Learning Objective:**

CLOBJ 1	Analyze the evolution of the Indian economy since independence, with emphasis on pre- and post-reform phases, including agricultural and industrial reforms in a mixed economy framework.
CLOBJ 2	Evaluate key socio-economic, tax, and financial sector reforms, including financial inclusion initiatives and challenges in the Indian banking system.
CLOBJ 3	Assess India's integration with the global economy, focusing on WTO regulations, structural shocks, recent policy measures, and current economic challenges.

f. **Course Learning Outcomes:**

CLO 1	To critically assess the trajectory of India's economic development since independence and explain the impact of major sectoral reforms in agriculture and industry.
CLO 2	To evaluate the effectiveness of financial sector reforms, tax policies, and India's engagement with WTO regulations in promoting inclusive and sustainable economic growth.
CLO 3	To analyze the impact of recent policy shocks and government initiatives on the Indian economy and identify key challenges to future economic stability and growth.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	40	20	0	60	0	100

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

h. Course Content:

Unit No.	Topic	Weightage	Teaching Hrs.
1.	Module 1 Indian economy since independence; analysis of the pre- and post-reform periods of India's economic growth and development; Assessment of agriculture sector reforms; industrial reforms in a mixed economic set up and tracing the contours of liberalization and self-reliance.	40	18
2.	Module 2 Socio-economic development and tax reforms; Financial sector reforms and financial inclusion; Indian banking sector crisis and recent developments	40	18
3.	Module 3 India and WTO regulations: Inward and outward analysis; Structural shocks and analysis of recent policy initiatives; Indian economy: Recent outlook and challenges.	20	9

Course Name: Principles of Management

Course Code: 06M10202UE01

Prerequisite: Basic understanding of organizational structure and general awareness of business operations.

Rationale: This course lays the foundational framework for understanding managerial roles and functions in contemporary business settings.

Course Learning Objective:

CLOBJ 1	Understand fundamental management concepts and functions, including planning, forecasting, and the evolution of management thought in a business environment.
CLOBJ 2	Apply managerial processes and techniques, such as decision-making, organizing, staffing, directing, coordination, and management by objectives in organizational settings.
CLOBJ 3	Analyze leadership, communication, and organizational development strategies, including career development, change management, and challenges faced by contemporary businesses.

Course Learning Outcomes:

CLO 1	To describe the core principles of management, analyze historical developments, and apply planning techniques considering environmental factors.
CLO 2	To evaluate various management styles, design effective organizational structures, and apply decision-making and staffing techniques in managerial contexts.
CLO 3	To demonstrate effective leadership and communication strategies, manage organizational change, and critically assess modern-day managerial challenges

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Module 1:Introduction to Management; Evolution of Management Thought; Planning; Understanding environment of business; Forecasting and Premising.	40	18
2	Module 2Decision-making; Management by Objectives and Styles of Management; Organizing and Directing; Staffing and Coordination	20	9
3	Module 3Career Development Strategy; Leadership styles of Managers; Organizational Communication; Change management; Challenges of Contemporary Business	40	18

Course Name: Intellectual Property

Course Code: 06M10502UE03

Prerequisite: A basic understanding of business, innovation, or creativity-related fields will be helpful.

Rationale: The course aims to empower future managers, entrepreneurs, and innovators to make informed IP-related decisions..

Course Learning Objective:

CLOBJ 1	Understand the fundamentals of Intellectual Property (IP), including patents, trademarks, and copyright, and their role in the intangible economy.
CLOBJ 2	Analyze the scope, enforcement, and commercial value of IP, including unconventional IP forms and strategies for using IP as a business asset.
CLOBJ 3	Evaluate the role of IP in research, creativity, and policy-making, including its significance in universities, creative industries, and government initiatives for promoting innovation.

Course Learning Outcomes:

CLO 1	To identify different forms of IP, understand their role in value creation, and analyze real-world examples of patents, trademarks, and copyrights.
CLO 2	To evaluate unconventional IPs, assess enforcement mechanisms, and apply business strategies to monetize intellectual assets.
CLO 3	To analyze the role of IP in research institutions and creative industries and assess the importance of policy and education in strengthening the IP framework.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	-	3	40	20	-	60	-	100

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Module 1 Basics of Intellectual Property; The Intangible Economy; Patents—From ball pens to biologics; Trade Marks—What does red soles and barbie girl mean?; Copyright—Is it right to copy?	40	18
2	Module 2 Unconventional IP—The expanding scope; Enforcement of IP—Protecting your rights; IP for Business—A profit making asset class .	40	18
3	Module 3 IP, Research, and Universities; IP for the Creative and Entertainment Industries; Governments Role in Fostering IP; Teaching IP—Let everyone learn IP	20	9