First Year Curriculum

Admission Year 2026-27

Industry Embedded Bachelor of Technology Aerospace Engineering In Association with NDC

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Semester 1

a. **Course Name:** Engineering Drawing
b. **Course Code: 303158102**
c. **Prerequisite:** Knowledge of Geometry up to 12th science level
d. **Rationale:** Basic knowledge of the environment is essential for all human beings for a good life and sustainable existence

e. **Course Learning Objective**

CLOBJ 1	Understand and apply types of lines and lettering conventions for clear engineering communication.
CLOBJ 2	Develop skills in projecting points, lines, and planes in orthographic and isometric views.
CLOBJ 3	Master techniques for precise geometric constructions in engineering drawings for accurate representation.
CLOBJ 4	Practice drawing engineering curves to convey complex shapes and design elements accurately.
CLOBJ 5	Locate and interpret aircraft components using schematic diagrams for understanding aerospace engineering principles.

f. **Course Learning Outcomes:**

CLO 1	Execute precise drawings utilizing diverse engineering line types
CLO 2	Developed spatial visualization skills through isometric and orthographic projections, aiding design comprehension.
CLO 3	Attained precision in geometric constructions, ensuring an accurate representation of complex engineering shapes.
CLO 4	Proficiently located and understood aircraft components using schematic diagrams, enhancing aerospace engineering comprehension.
CLOBJ 5	Applied knowledge in sketching nuts, bolts, shafts, gears, etc., for practical engineering applications.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
0	**0**	**4**	**2**	**-**	**20**	**20**	**-**	**60**	**100**

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

h. Course Content:

Sr.	Content
1	Introduction to Engineering Graphics: Types of lines, Letterings, Drawing Symbols, Numberings, Dimensioning Terms and Notations, Title Block, Geometric Constructions etc.
2	Exercise on Engineering Curves.
3	Exercise Sheet on Projections of Points and Lines.
4	Exercise on Projections of Planes.
5	Exercise on Orthographic Projections.
6	Exercise on Isometric Projection/View or Drawing.
7	Sketches of nuts, bolt, screw thread, different types of locking devices e.g. Double nut, Castle nut, Pin, etc.
8	Sketch of shaft and pulley, belt, gear, gear drives.
9	Locate the aircraft components using a schematic diagram.

i. Text Book and Reference Book:

1. Shop Theory by James Anderson
2. FAA AMP General Handbook
3. Engineering Drawing by ND Bhatt

a. **Course Name:** Electrical Fundamentals 1
b. **Course Code:** 303158104
c. **Prerequisite:** Requires Basic Physics
d. **Rationale**: This course is aim to deepen understanding and practical application of fundamental electrical principles. By exploring Ohm's Law, internal cell resistance, Kirchhoff's laws, Wheatstone Bridge, and electromagnetism, students gain essential skills in electrical circuit analysis and construction.

e. **Course Learning Objective:**

CLOBJ 1	Understand and apply Ohm's law principles in electrical circuits.
CLOBJ 2	Demonstrate proficiency in measuring the internal resistance of electrical cells.
CLOBJ 3	Apply Kirchhoff's voltage and current laws to analyse circuit behaviour.
CLOBJ 4	Utilize the Wheatstone bridge to measure and determine unknown resistor values.
CLOBJ 5	Develop practical skills in constructing, testing, and evaluating electromagnets.

f. **Course Learning Outcomes:**

CLO 1	Verify Ohm’s law through experimental measurements and calculations.
CLO 2	Measure the internal resistance of cells using appropriate experimental techniques.
CLO 3	Confirm Kirchhoff’s voltage and current laws through practical experimentation.
CLO 4	Determine the unknown resistor value using the Wheatstone bridge in experiments.
CLO 5	Construct, test, and analyze the performance of a simple electromagnet.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**6**	**3**	**-**	**-**	**40**	**-**	**60**	**100**

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

h. Course Content:

Sr.	Content
1	Verify Ohm's law
2	Measure internal resistance cells
3	Verify Kirchhoff's voltage and current laws.
4	Measure the value of the unknown resistor using Wheatstone bridge.
5	Construct a simple electromagnet and perform its testing.
6	Verify the law of electromagnetic induction.
7	Construct a simple type of inductor and verify the effect of inductor in AC and DC circuits.
8	Perform transformer testing under "No Load" and "Load Condition"
9	Construct a simple DC motor and test its functioning.
10	Dismantling of DC generator.
11	Perform mica undercutting commutator.
12	Assembling of DC generator.
13	Dismantling and inspection of the DC starter motor.
14	Assembling and testing of DC starter motor.
15	Inspect the generator for brush wear.
16	Growler testing of armature binding.

i. Text Book and Reference Book:

1. Electrical & Electronics Technology by Edward Hughes
2. Electrical Technology Vol- 1 & Vol- 2 by BL Thereja

a. **Course Name:** Maintenance Practices – I
b. **Course Code:** 303158106
c. **Prerequisite:** Zeal to learn and develop skills
d. **Rationale:** The practical exercises aim to equip learners with essential metalworking skills, fostering safety awareness, and proficiency in cutting, shaping, and precise measurement. This hands-on approach enhances readiness for diverse industrial applications

e. **Course Learning Objective:**

CLOBJ 1	Develop proficiency in using and applying various safety devices for personal protection in metalworking activities.
CLOBJ 2	Demonstrate skill in performing precise metal cutting using a hand hacksaw, ensuring accuracy and safety.
CLOBJ 3	Acquire expertise in metal filing techniques to achieve desired shapes and dimensions with different types of files.
CLOBJ 4	Master the use of precision instruments for dimensional measurement and profiling of metal job pieces.
CLOBJ 5	Gain practical experience in diverse metalworking processes, including power hacksaw cutting, lathe operations, sheet metal fabrication, and drilling techniques.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate proper use of safety equipment in metalworking for injury prevention and personal protection.
CLO 2	Master hand hacksaw techniques for accurate metal cutting, ensuring precision and safety.
CLO 3	Acquire proficiency in metal filing, creating precise shapes and dimensions with various file types.
CLO 4	Apply precision measurement skills to assess and profile metal pieces accurately for desired specifications.
CLO 5	Gain expertise in diverse metalworking operations, including power hacksaw cutting, lathe work, and sheet metal fabrication.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**6**	**3**	**-**	**-**	**40**	**-**	**60**	**100**

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

h. Course Content:

Sr. No.	Content
1	Use of protective/safety devices like hand gloves, safety goggles, apron, belt etc
2	Perform metal cutting using a hand hacksaw
3	Perform metal filing to make desired shape and dimension using various types of files
4	Perform dimensional measurement/profiling of prepared job piece using precision instruments
5	Perform metal rod cutting using a power hack saw machine and chamfer its end by grinding
6	Perform turning and facing of a metal rod on the lathe and manufacture the desired object/job
7	Perform grooving and knurling on the lathe machine and manufacture the desired object/job
8	Perform stretching/pinning with the use of a hammer
9	Perform cutting of sheet metal using hand snips (right, left and straight cutting)
10	Drill holes of various diameters on power drill machine
11	Perform angle drilling, blind drilling, and drilling at curves on sheet metal.
12	Perform punching and drilling a hole using a hand drill machine

i. Text Book and Reference Book:

1.Shop Theory by James Anderson
2.FAA AMP General Handbook

a. **Course Name:** Project -I
b. **Course Code:** 303158108
c. **Prerequisite:** Basic understanding of electrical circuits and fundamental metalworking concepts.
d. **Rationale:** The project integrates electricity generation and metalworking operations, aligning theoretical knowledge with practical skills. It equips learners with expertise in sustainable energy and essential machining techniques, preparing them for diverse industrial applications.
e. **Course Learning Objective:**

CLOBJ 1	Interpret electricity generation methods and metalworking techniques to develop a multifaceted understanding of engineering applications.
CLOBJ 2	Hone metalworking skills for precision machining, vital in aeronautical engineering's material handling and manufacturing processes.
CLOBJ 3	Blend theory and hands-on projects, integrating electricity generation and metalworking for holistic aeronautical engineering proficiency.
CLOBJ 4	Specialize in sustainable energy practices, emphasizing eco-friendly solutions, crucial for aeronautical engineering's environmental consciousness.
CLOBJ 5	Ready learners for versatile aeronautical challenges, ensuring adaptability and proficiency in addressing real-world issues in the field.

f. **Course Learning Outcomes:**

CLO 1	Proficient in electricity generation concepts.
CLO 2	Mastery in metal cutting, filling, and lathe operations.
CLO 3	Enhanced problem-solving and troubleshooting skills.
CLO 4	Applied knowledge in sustainable energy and metalworking industries.
CLO 5	Prepared for diverse roles in engineering and manufacturing sectors.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**4**	**2**	**-**	**-**	**40**	**-**	**60**	**100**

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a. **Course Name:** Mathematics-I
b. **Course Code:** 303191101
c. **Prerequisite:** Knowledge of Mathematics up to 12th science level
d. **Rationale**: The Mathematics I syllabus integrates fundamental calculus concepts, advanced mathematical techniques, and matrix algebra, preparing students for engineering challenges with optimized problem-solving skills.

e. **Course Learning Objective:**

CLOBJ 1	Develop a comprehensive understanding of definite and improper integrals, including the application of integration techniques to find areas and volumes in both Cartesian and Polar coordinates.
CLOBJ 2	Utilize differential equations to model and solve practical scenarios, demonstrating proficiency in various solution techniques.
CLOBJ 3	Analyse the convergence and divergence of sequences and series, employing tests such as the Alternating Series Test and Ratio Test
CLOBJ 4	Analyse matrix operations and determinants, exploring their properties and applications in solving systems of linear equations.
CLOBJ 5	Apply Fourier series for representing periodic functions, verifying Dirichlet's conditions.
CLOBJ 6	Solve optimization problems using multivariable calculus concepts, such as Lagrange's multiplier.

f. **Course Learning Outcomes:**

CLO 1	Develop understanding of fundamental mathematical concepts
CLO 2	Formulate and solve mathematical models for real-world engineering problems,
CLO 3	Integrate knowledge from different mathematical topics to analyze and solve complex engineering problems
CLO 4	Critically analyze mathematical results, interpret their engineering significance, and make informed decisions based on mathematical outcomes, fostering a deeper understanding of the subject.
CLO 5	Clearly and effectively communicate mathematical ideas, solutions, and reasoning, both in written and oral formats, demonstrating effective communication skills.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr.	Topics	W	T
1	**UNIT 1 Improper Integral & Application of Definite Integral:** Evaluation of definite and improper integrals, Beta and Gamma functions and their properties Area bounded by curves in Cartesian and Polar form, Area of a region bounded by function, Area of a region bounded by curves in Parametric form, Volume by slicing, Volume of solid by revolution.	8	5
2	**UNIT 2 First order Ordinary Differential equation:** Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications	15	9
3	**UNIT 3 Matrices:** Matrices & Determinants with Properties, Linear Independence, Rank of Matrix, System of Linear Equations, Consistency of System, Solution of system of Linear Equations by Gauss Jordan and Gauss- Elimination Method, Eigen values, Eigenvectors, Symmetric, Skew- symmetric, and orthogonal Matrices, Eigen bases, Diagonalization, Cayley Hamilton Theorem and its Applications, Diagonalization, Orthogonal Transformation, Quadratic form.	25	15
4	**UNIT 4 Sequences and Series:** Basic of Sequences, Bounded and Monotonic Sequences, Series, Convergence of sequence and series, Geometric series, P- series, Cauchy's Integral Test, Comparison Test, Alternating Series, Absolute and Conditional convergence, Ratio test, Cauchy's Root Test, Power series, Taylor's and Maclaurin's series.	17	10
5	**UNIT 5 Fourier Series:** Fourier Series of 2 periodic functions, Dirichlet's conditions for representation by a Fourier series, Fourier Series of a function of period 2 , Fourier Series of even and odd functions, Half range series.	10	6
6	**UNIT 6 Multivariable Calculus (Differentiation):** Functions of Several Variables, Limit, Continuity, Partial Derivatives, Homogeneous function, Euler's Theorem for homogeneous function, Modified Euler's Theorem, Chain Rule, Implicit function, Jacobian, Tangent plane and Normal line, Maximum and Minimum Values, Lagrange 's Multiplier, Taylor's and Maclaurin's Series for functions of two variables.	25	15

i. Text Book and Reference Book:

1. Calculus and Analytic Geometry (TextBook) | By G.B. Thomas and R.L. Finney | Addison Wesley
2. Calculus with early transcendental functions | By James Stewart | Cengage Learning
3. Higher Engineering Mathematics | By B. S. Grewal | Khanna Publications
4. Elementary Linear Algebra (TextBook) | By Howard Anton, Chris Rorres | Willy India Edition | 9th Edition
5. Advanced Engineering Mathematics (TextBook) | By Erwin Kreyszig | Willey India Education
6. A text book of Engineering Mathematics | By N.P. Bali and Manish Goyal | Laxmi Publications

a. **Course Name:** Engineering Physics-I
b. **Course Code:** 303192101
c. **Prerequisite:** Knowledge of Physics and some basic concepts in Mathematics like differentiation, integration, limit, differential equation, vector calculus up to 12thscience level.
d. **Rationale**: Knowledge of physics is essential for all Engineering branch because physics is the foundation subject of all the branches of engineering and it develops scientific temperament and analytical capability of engineering students. Comprehension of basic physics concepts enables the students to solve engineering problem logically and develop scientific approach.

e. Course Learning Objective:

CLOBJ 1	Understand and explain the elastic properties of materials. Analyze the tensile stress-strain curve and its implications for material behavior. Evaluate shear strength in both perfect and real crystals.
CLOBJ 2	Investigate thermo-electric effects and their applications. Examine the Wiedemann-Franz law and its significance. Explore phonons and their role in heat transfer. Analyze different modes of heat transfer and specific heat of solids. Compare and contrast the Einstein and Debye models for solids.
CLOBJ 3	Gain a qualitative understanding of statistical mechanics. Differentiate between Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics.
CLOBJ 4	Analyze transverse waves on a string and harmonic waves. Investigate reflection, transmission, standing waves, and eigenfrequencies.
CLOBJ 5	Explore Einstein's theory of matter-radiation interaction. Understand absorption, spontaneous, and stimulated emission of radiation. Identify characteristics and components of lasers. Classify types of lasers, including Nd:YAG Laser, CO2 Laser, and Semiconductor Diode Laser. Examine applications of lasers in various fields.
CLOBJ 6	Understand fluid flow, viscosity, and apply the continuity equation. Analyze Euler and Bernoulli's equations in fluid mechanics

f. Course Learning Outcomes:

CLO 1	Acquire a deep understanding of fundamental principles and concepts in classical mechanics, electromagnetism, thermodynamics, and modern physics.
CLO 2	Develop proficiency in applying mathematical techniques to solve physics problems
CLO 3	Gain familiarity with experimental methods, laboratory equipment, and techniques for conducting physics experiments.
CLO 4	Apply theoretical knowledge to solve a variety of physics problems
CLO 5	Integrate knowledge from different branches of physics to understand interdisciplinary phenomena and real-world applications.
CLO 6	Evaluate the appropriateness of theoretical models in explaining physical phenomena and predict outcomes.

g. Teaching Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	2	4	20	20	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.	Topics	W	T
1	UNIT- I Properties of Material Mechanical Properties: Elastic properties, Model of elastic behavior, tensile stress strain curve, shear strength of perfect and real crystals. Thermal Properties: Thermo-electric effects, Wiedemann-Franz law, Phonons, Modes of heat transfer, Specific heat of solids, Einstein and Debye Model, Qualitative idea about Maxwell-Boltzmann, Bose Einstein, Fermi-Dirac statistics	20	9
2	UNIT- II Motion in a Plane Transformation of coordinates, Newton's laws and its completeness in describing particle motion, Problems including constraints and friction, Motion of a rigid body in the plane; Rotation in the plane; Angular momentum about a point of a rigid body in planar motion	20	9
3	UNIT-III Classical Mechanics Degrees of freedom, Constraints and constraint forces, LaGrange's equations of motion, Conservation law, Euler's laws of motion, non-inertial frames of reference; Centripetal and Coriolis accelerations; Fluid Mechanics: - Flow of fluids, Viscosity, Continuity equation, Euler and Bernoulli's equations	20	9
4	UNIT´IV Waves &Vibration Transverse wave on a string, Wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, Standing waves and their Eigen frequencies, longitudinal waves and the wave equation, Acoustics waves and speed of sound, Phase velocity and group velocity	20	9
5	UNIT´V Lasers Einstein's theory of matter-radiation interaction, Absorption, Spontaneous and Stimulated Emission of Radiation, Characteristics of Laser, Components of Laser, Types of Laser: Nd:YAG Laser, CO2 Laser, Semiconductor Diode Laser, Applications of Lasers.	20	9

i. Reference Books:

1. Engineering Mechanics by MK Harbola
2. Engineering Mechanics – Dynamics by JL Meriam
3. Mechanical Vibrations by JP Den Hartog
4. University Physics by Sears AndZemansky | Pearson Pu

a. **Course Name:** Communication Skills
b. **Course Code:** 303193103
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	Students will demonstrate the ability to communicate ideas clearly and effectively
CLOBJ 2	Students will develop strategies for building positive interpersonal relationships, fostering effective collaboration and teamwork.
CLOBJ 3	Students will develop active listening skills, including the ability to comprehend, interpret, and respond appropriately to spoken messages.
CLOBJ 4	Students will exhibit proficiency in written communication, crafting clear, concise, and well-organized messages across various formats (emails, reports, memos, etc.).
CLOBJ 5	Students will develop and deliver professional presentations, incorporating effective visual aids, engaging content, and confident delivery.
CLOBJ 6	Students will understand and utilize various digital communication tools and platforms, demonstrating proficiency in virtual communication.

f. **Course Learning Outcomes:**

CLO 1	Understand the importance of creative and critical thinking.
CLO 2	Expand vocabulary with proper pronunciation.
CLO 3	Comprehend the basics of English grammar.
CLO 4	Read & write effectively for a variety of contexts.
CLO 5	Develop confidence in speaking skills.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
					CE		**Theory**	**P**	
0	**2**	**0**	**2**	-	100	-	-	-	**100**

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

h. Course Content:

Sr.	Topic	W	T
1	**Crazy Scientist**: • The students will be taught the importance of invention and innovation using some examples that changed the world theway it worked.	5%	2
2	**Phonetics**: • IPA Introduction (listening tracks) • Phonic Sounds • Pronunciation Practice including transcription	10%	4
3	**Vocabulary Building & Word Formation Process**: • Compounding, clipping, blending, derivation, creative respelling, coining and borrowing • Prefixes & suffixes, synonyms & antonyms, standard abbreviations (related activities will be provided)	10%	2
4	**Speaking Activity : Role play on Critical Thinking (Life boat)** • This activity topic gears towards making students do role play based on various scenarios. • It involves giving them a scenario and asking them to further develop the idea in a very interesting manner, then going on to enact it. • It aims to improve students' convincing skills.	**10%**	**4**
5	**Picture Description & Picture Connector** • Enable students to use vocabulary and useful expression to describe the picture. • In this class the students will be trained to form logical connections between a set of pictures which will be shared with them. • This geared towards building creativity and presentation skills.	**15%**	**2**
6	**Mine Activity: Usage of Preposition:** • Students will learn to use proper propositions by active participation in the activity.	**8%**	**2**
7	**Worksheets on Identifying Common Errors in Writing::** • Sentence structure • Punctuations • Subject-Verb Agreement • Noun-Pronoun Agreement	**12%**	**2**
8	**Reading Skills:** • The art of effective reading and its various strategies to be taught to the learners and practice exercises be given on reading comprehension.	**10%**	**2**
9	**Speech and spoken Exchanges; Extempore:** • Students will learn the correct usage of spoken language as different from the written form. It will help the students in extempore speech. • This will be done by making the students give variety of impromptu speeches in front of the class: 1 minute talk on simple topics. • To change the average speakers in the class to some of the best Orator.	**10%**	**4**
10	**Book Review:** • The learners will identify the central idea of the book, author's style and approach towards the book. • This will enable the learners to express their point of view and hone their creativity and writing skills.	**10%**	**4**

i. Reference Books:

1. Understanding and Using English Grammar Betty Azar & Stacy Hagen; Pearson Education
2. Business Correspondence and Report Writing SHARMA, R. AND MOHAN, K.
3. Communication Skills Kumar S and Lata P; New Delhi Oxford University Press
4. Technical Communication : Principles And Practice Sangeetha Sharma, Meenakshi Raman; Oxford University Press
5. Practical English Usage MICHAEL SWAN
6. A Remedial English Grammar for Foreign Student F.T. WOOD
7. On Writing Well William Zinsser; Harper Paperbacks,2006; 30th anniversary edition
8. Oxford Practice Grammar, John Eastwood; Oxford University Press

Semester 2

a. **Course Name:** Mechanics of Solids
b. **Course Code:** 303104155
c. **Prerequisite:** System of units, Laws of motion, Basic idea of force, Concept of centroid Fundamentals of stress, strain and their relationships
d. **Rationale:** Mechanics of Solids is conceptual applications of principles of mechanics in Engineering.

e. **Course Learning Objective:**

CLOBJ 1	Comprehend the concepts of stress, strain, and deformation in solid materials under various loading conditions, and apply this understanding to analyze structural behavior.
CLOBJ 2	Gain insight into the mechanical properties of materials such as elasticity, plasticity, and failure mechanisms, and their implications in designing resilient and safe structures.
CLOBJ 3	Analyze structural components, including beams, columns, and trusses, under different loading scenarios using principles of mechanics of solids, determining stresses, and deformations.
CLOBJ 4	Develop proficiency in constructing shear force and bending moment diagrams to understand internal forces and moments in structural elements, crucial for design and analysis.
CLOBJ 5	Calculate deflections and assess stability criteria for structural elements, recognizing critical conditions that impact structural integrity and safety.
CLOBJ 6	Apply principles of mechanics of solids to design structural elements, ensuring they meet safety standards, considering factors such as material selection, loading conditions, and design codes.

f. **Course Learning Outcomes:**

CLO 1	Apply fundamental principles of mechanics & principles of equilibrium to simple and practical problems of Engineering.
CLO 2	Determine centroid and moment of inertia of a different geometrical shape and able to understand its importance.
CLO 3	Apply principles of statics to determine reactions & internal forces in statically determinate beams.
CLO 4	Know basics of friction and its importance through simple applications.
CLO 5	Understand behavior & properties of engineering materials.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**-**	**2**	**4**	**20**	**20**	**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.	Topics	W	T
1	**INTRODUCTION:** Forces/Equilibrium of Rigid body, Scalar and vectors, system of forces, resultant force, Statics of particles. Free-body diagrams. Equilibrium of particle in two dimensions, Resultants of three or more concurrent forces, Resolution of a force into components. Rectangular components of a force. Resultants by rectangular components, Concurrent force system in space: Resolution of a force into rectangular components in space, Coplanar Non-Concurrent Force Systems, Moments about Points and Axes, Equilibrium, Non-coplanar Non-concurrent Forces.	15	5
2	**CENTROID MOMENT OF INERTIA:** Distributed forces: Centroid and center of gravity. Determination of centroid of lines and areas using integral technique, Determination of centroid of composite wires and areas, Centroid of volumes. Theorems of Pappus-Guldinus and its applications, Second moment of areas, Definition of moment of inertia. Determination of moment of areas by integration, Parallel axis theorem for Moment of Inertia. MI of composite areas, Concept of Mass moment of inertia of bodies.	15	5
3	**BEAMS:** Definitions, types of beams, types of loading, types of supports. Determination of reactions for simply, Supported and over hanging beams. Relation between distributed load, Shear force and Bending Moment, Shear force and Bending moment in beams with diagrams	20	6
4	**FRICTION:** The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Analysis of systems involving dry frictions such as ladders spheres etc., Belt Friction, Analysis of flat and v-belt.	25	8
5	**SIMPLE STRESSES & STRAINS:** Basics of stress and strain: 3-D state of stress (Concept only), Normal/axial stresses: Tensile & compressive Stresses: Shear and complementary shear Strains, Linear, shear, lateral, thermal and volumetric. Hooke's law, Elastic Constants: Modulus of elasticity, Poisson's ratio.	25	8

i. Text Book and Reference Book:

1. Statics and Dynamics Beer, F.P. and Johnston, E.R. Vector mechanics for engineers; Tata McGraw-Hill.
2. Engineering Mechanics: Statics and Dynamics J.A Desai and B.B Mistry; Popular Prakashan.
3. Engineering Mechanics: Statics and Dynamics R.C Hibbeler; Prentice Hall of India.
4. Engineering Mechanics: Statics and Dynamics S Rajsekaran; Vikas Publication.
5. Engineering Mechanics S.S. Bhavikatti and K. G. Rajashekarappa; Wiley 'Eastern Ltd.
6. Engineering Mechanics J.L. Meriam, and L.G.Kraige; John Wiley and sons, New York

a. **Course Name:** Basic Electrical Engineering
b. **Course Code:** 303106101
c. **Prerequisite:** Knowledge of Physics and Mathematics up to 12th science level
d. **Rationale:** Basic Electrical Engineering knowledge is fundamental as it provides a strong foundation for various engineering disciplines, promotes problem-solving skills, supports innovation, and opens doors to diverse career opportunities.

e. **Course Learning Objective:**

CLOBJ 1	Gain familiarity with electrical current, potential difference, power and energy, sources of electrical energy and elements of electrical circuit.
CLOBJ 2	Solve problems related to Alternating current, alternating voltage, etc, Demonstrate a clear understanding of Pure R, L C circuit and combination of RLC, Series and Parallel combination of R, L and C, etc
CLOBJ 3	Acquire knowledge of the resistor, capacitor, and inductor and their performance characteristics for series and parallel connections.
CLOBJ 4	Understand different single phase and three phase circuits.
CLOBJ 5	Demonstrate a clear understanding of the basic concepts, working principles and applications of transformer, DC machines and AC machines.
CLOBJ 6	Study the use of LT Switch Gear, Fuse, MCB, ELCB etc.

f. **Course Learning Outcomes:**

CLO 1	Understand electrical current, potential difference, power and energy, sources of electrical energy and elements of electrical circuit.
CLO 2	Solve basic electrical circuit problems using various laws and theorems
CLO 3	Understand the role of resistor, capacitor and inductor and their performance characteristics for series and parallel connections.
CLO 4	Discuss three phase-balanced circuits.
CLO 5	Understanding the basic concepts and working principles of transformers, DC machines and AC machines.
CLO 6	Acquire knowledge about electrical installations

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**-**	**2**	**4**	**20**	**20**	**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	**DC Circuits** Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, Mesh and Node analysis, Simplifications of networks using series and parallel combinations and star-delta conversions. Superposition, Thevenin and Norton Theorems.	**22%**	**10**
2	**AC Circuits** Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors, examples based on theory. Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage- current phasor diagrams and waveforms. Development of the concept of reactance, the study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and R-L-C circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, the concept of active, reactive and apparent power and power factor, examples based on theory. Concept of three-phase supply and phase sequence. Voltages, currents and power relations three-phase have balanced star- connected loads and delta-connected loads along with phasor diagrams, Power and power factor measurement in balanced three-phase circuits (one, two and three wattmeter methods), examples based on theory	**33%**	**15**
3	**Transformers** Magnetic effect of an electric current, right-hand thumb rule, Concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships, comparison between electrical and magnetic parameters. Fleming's left- hand rule. self and mutual inductance, Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.	**20%**	**9**
4	**Electrical Machines** Construction, working and application of DC Motor and Generator. Generation of 3 phase rotating magnetic fields, Construction and working of a three-phase and Single phase induction motor and its types. Construction and working of Synchronous generator.	**15%**	**7**
5	**Electrical Installations** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries.	**10%**	**4**

i. Text Book and Reference Book:

1. Electrical Engineering Fundamentals, By V. D. Toro, Prentice Hall India, Pub. Year 1989
2. Basic Electrical Engineering, By D. C. Kulshreshtha, McGraw Hill, Pub. Year 2009
3. Fundamentals of Electrical Engineering, By Leonard S. Bobrow, Oxford University Press, Pub. Year 1996
4. Electrical and Electronics Technology, By E. Hughes Pearson, Pub. Year 2010
5. Basic Electrical Engineering, By D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, Pub. Year, 2010
6. A textbook of Electrical Technology Volume 1&2, By B. L. Theraja, S. Chand Publicatio

a. **Course Name:** Elements of Mechanical Engineering
b. **Course Code:** 303109102
c. **Prerequisite:** Knowledge of Physics and Mathematics up to 12th science level
d. **Rationale:** Elements of Mechanical Engineering Course Provide students with a comprehensive foundation in the fundamental principles and concepts that form the backbone of mechanical engineering for various Engineering disciplines.
e. **Course Learning Objective:**

CLOBJ 1	Identify and basic mechanical components such as gears, bearings, Pumps, Compressor, boiler, I.C Engines.
CLOBJ 2	Understand various laws and behaviour of fluid at different conditions.
CLOBJ 3	Illustrate the operational mechanisms through diagrams, models, or practical demonstrations.
CLOBJ 4	Demonstrate construction and working principles of diverse mechanical devices, such as engines, pumps, and compressors.
CLOBJ 5	Evaluate basic problems related to I.C engine, pumps, compressors and fluids.
CLOBJ 6	Analyse and discuss the interactions and relationships between various mechanical elements within a system

f. **Course Learning Outcomes:**

CLO 1	Identify basic mechanical components and their functions.
CLO 2	Understand basic Properties and behaviour of various fluids.
CLO 3	Understand Construction and working of various mechanical devices
CLO 4	Apply fundamental principles to solve basic mechanical engineering problems

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**-**	**2**	**4**	**20**	**20**	**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	**Basics of Thermodynamics** Prime Movers - Meaning and Classification; Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Internal Energy, Enthalpy, Specific Volume; Thermodynamics – Definition: Change of State, Path, Process, Cycle, Thermodynamic systems, Statement of Zeroth Law, First Law and Second Law of Thermodynamics and its Applications.	**10%**	**5**
2	**Properties of Gases** Gas Laws, Boyle's law, Charles law, Combined gas law; Gas Constant, Relation between Cp and Cv Constant Volume Process; Constant Pressure Process; Isothermal Process; Adiabatic Process; Poly-tropic Process. Examples based on above topics.	**15%**	**6**
3	**Properties of Steam** Types of Steam and Steam formation; Specific Enthalpy; Specific Volume; Dryness Fraction of Steam; Measurement of Dryness Fraction; Steam Table. Examples based on above topics.	**15%**	**6**
4	**Heat Engines** Definition of Heat Engine; Classification of Heat Engine; Carnot Cycle, Rankine Cycle, Otto Cycle and Diesel Cycle. **Internal Combustion Engines:** Two Stroke Petrol and Diesel Engine; Four Stroke Petrol and Diesel Engine; Measurement of Indicated Power and Brake Power: Numerical on calculation of Mechanical, Thermal and Volumetric Efficiency. Examples based on above topics	**20%**	**10**
5	**Energy Conversion Devices Steam Generators:** Definition and Classification; Cochran, Lancashire, Locomotive, Babcock and Wilcox Boiler: Construction and Working; Boiler Mounting and Accessories. **Refrigeration and Air Conditioning:** Meaning of Refrigeration; Vapor Compression Refrigeration Cycle; Vapor Absorption Refrigeration Cycle; Air conditioning; Window Air Conditioning and Split Air Conditioning.	**20%**	**5**
6	**Pumps And Air Compressors Pumps** Definition, Classification and Application of Pumps; Types and Operation of Rotary pump, Reciprocating Pump, Centrifugal Pump. **Air Compressors** Definition, Classification and Application of Compressors; Types and Operation of Rotary and Reciprocating Air Compressor.	**10%**	**5**

7	**Motion And Power Transmission Devices** Shaft and Axle; Belt Drive; Chain Drive; Friction Drive; Gear Drive; Clutch, Coupling and Brake.	**5%**	**3**
8	**Conventional And Non-Conventional Energy Sources** Introduction and Classification of Energy Sources; Conventional Energy Sources E.g. Solid, Liquid, Gaseous and Nuclear fuels; Calorific Value of Fuels; Non-Conventional Energy Sources E.g. Solar Energy, Wind Energy, Hydro Power, Biomass and Biomass Energy; Comparison of Conventional & Non-Conventional Energy Sources.	**5%**	**3**

i. Text Book and Reference Book:

1. "Elements of Mechanical Engineering", By S.B. Mathur, S. Domkundwar, Dhanpat Rai & Sons Publications.
2. "Thermal Engineering, By R.K Rajput", Laxmi Publications.
3. "Thermal Science and Engineering", By Dr. D. S. Kumar, S. K. Kataria and sons Publishers.
4. "Basic Mechanical Engineering", By T. S. Rajan, Wiley Eastern Ltd
5. "Fundamental of Mechanical Engineering", By G. S. Sawhney, PHI Publication New Delhi.

a. **Course Name:** Engineering Workshop
b. **Course Code:** 303158152
c. **Prerequisite:** Basic knowledge of riveting techniques, safety protocols, material properties, and understanding of joint design principles.
d. **Rationale:** Equip learners with diverse riveting techniques, from manual to pneumatic, fostering hands-on skills in joint formation, repair, inspection, and removal. The exercises bridge theoretical knowledge with practical application in structural assembly and maintenance.

e. **Course Learning Objective:**

CLOBJ 1	Master manual and pneumatic riveting techniques.
CLOBJ 2	Develop practical skills in joint formation and repair.
CLOBJ 3	Integrate theoretical knowledge with hands-on applications.
CLOBJ 4	Enhance proficiency in structural assembly and maintenance processes.
CLOBJ 5	Foster competence in identifying and addressing riveting challenges.
CLOBJ 6	Master manual and pneumatic riveting techniques.

f. **Course Learning Outcomes:**

CLO 1	Execute precise solid riveting using hand tools.
CLO 2	Employ pneumatic guns effectively for solid riveting applications.
CLO 3	Demonstrate proficiency in blind riveting for diverse joint formations.
CLO 4	Perform successful patch repairs on structures using riveting techniques.
CLO 5	Conduct thorough inspections, identifying and addressing riveting issues promptly.
CLO 6	Execute precise solid riveting using hand tools.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**2**	**1**	**-**	**-**	**40**	**-**	**60**	**100**

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

h. Course Content:

Sr. No.	Content
1	Carry out solid riveting by hand tool and form desired joint
2	Carry out solid riveting by pneumatic gun and form desired joint
3	Carry out blind riveting and form desired joint
4	Perform simple patch repairing of structure by riveting
5	Inspection of riveted joints and identify probable causes
6	Removal of solid and blind rivets

i. Text Book and Reference Book:

1. FAA AMP General Handbook
2. FAA AMP Airframe Vol-I

a. **Course Name:** Electrical Fundamentals - II
b. **Course Code:** 303158154
c. **Prerequisite:** Basic understanding of electrical circuits, safety protocols, knowledge of transformer and motor components.
d. **Rationale:** Involves hands-on learning of transformer construction, minimizing eddy current losses through core lamination. It extends to dismantling, inspecting, assembling, and testing both AC generator and induction motor, fostering a comprehensive understanding of electrical equipment operation and maintenance.

e. **Course Learning Objective:**

CLOBJ 1	Build transformers with minimized eddy current losses through lamination.
CLOBJ 2	Develop skills in dismantling, inspecting, and assembling AC generators.
CLOBJ 3	Gain proficiency in testing AC generators for optimal performance.
CLOBJ 4	Acquire expertise in dismantling, inspecting, and assembling AC induction motors.
CLOBJ 5	Master the testing procedures for ensuring AC induction motor functionality.

f. **Course Learning Outcomes:**

CLO 1	Construct step-down transformers with reduced eddy current losses.
CLO 2	Demonstrate competence in dismantling and inspecting AC generators.
CLO 3	Showcase proficiency in assembling AC generators for efficient operation.
CLO 4	Conduct thorough testing of AC generators to validate performance.
CLO 5	Skillfully dismantle, inspect, assemble, and test AC induction motors.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**4**	**2**	**-**	**-**	**40**	**-**	**60**	**100**

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

h. Course Content:

Sr. No.	Content
1	Fabricate a simple step-down transformer and perform core lamination to reduce eddy current loss
2	Dismantling of AC generator
3	Inspect AC generator
4	Assembling of AC generator
5	Testing of AC generator
6	Dismantling of AC induction motor
7	Inspect AC induction motor
8	Assembling of AC induction motor
9	Testing of AC induction motor

i. Text Book and Reference Book:

1. Electrical Technology Vol-1 and Vol02 by BL Thereja
2. Aircraft Electricity and Electronics by Thomos K Eismin

a. **Course Name:** Maintenance Practices – II Materials and Process - I
b. **Course Code:** 303158156
c. **Prerequisite:** Understanding of tools and technical drawings comprehension, understanding of aircraft maintenance procedures.
d. **Rationale:** Encompass essential aircraft maintenance skills, ensuring structural integrity and electrical reliability. Proficiency in drilling, fitting, testing, and various procedures is crucial for safe and efficient aircraft operation, complying with aviation standards and guidelines.

e. **Course Learning Objective:**

CLOBJ 1	Acquire proficiency in essential aircraft maintenance skills.
CLOBJ 2	Master the techniques of drilling and fitting in aviation contexts.
CLOBJ 3	Demonstrate expertise in electrical testing and bonding procedures.
CLOBJ 4	Develop competency in wire and cable-related tasks for aircraft.
CLOBJ 5	Ensure adherence to aviation standards and guidelines in all procedures.

f. **Course Learning Outcomes:**

CLO 1	Execute precise and secure push and loose fittings on provided pieces.
CLO 2	Verify and adjust clearances using thickness/filler gauges effectively.
CLO 3	Conduct insulation and continuity tests on electrically bonded structures accurately.
CLO 4	Inspect, maintain, and troubleshoot aircraft wiring, wire looms, and connectors.
CLO 5	Demonstrate proficiency in crimping with a hydraulic crimping machine and conduct secure joint testing.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**6**	**3**	**-**	**-**	**40**	**-**	**60**	**100**

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

h. **Course Content:**

Sr. No.	**Content**
1	Carry out drilling on two given piece and make a push type fitting and loose fitting for bolt
2	Check clearances using thickness/filler gauge and its adjustment
3	Insulation and continuity test of electrically bonded structure.

4	Inspect aircraft wiring and wire loom
5	Crimping of lugs buy hydraulic crimping machine and test crimped joint for security
6	Removal and installation of wire clamp
7	Perform wire shielding
8	Clean wire connectors/sockets
9	Perform tube bending and flaring
10	Fabricate a simple tubing circuit
11	Pressure testing of formed tubing joints
12	Removal and Cleaning of bearing
13	Lubricate bearing according to AMM and installation of bearing
14	Inspect control cable for broken strands and external and internal corrosion
15	Service/lubricate control cable and pulley
16	Perform cable swaging and load proof testing of formed cable joints
17	Control cable tension adjustment and turnbuckle wire locking

i. Text Book and Reference Book:

1. General Engineering by Lalit Gupta
2. Aircraft Electricity and Electronics by Thomos K Eismin

a. **Course Name:** Project - II
b. **Course Code:** 303158158
c. **Prerequisite:** Understanding electromagnetic principles, circuit theory, and mechanical components is essential.
d. **Rationale:** Involves constructing AC and DC generators to illustrate fundamental principles, promote hands-on learning, and deepen comprehension of electrical generation, fostering practical skills essential for engineering students.

e. **Course Learning Objective:**

CLOBJ 1	Demonstrate AC and DC generator construction for foundational understanding.
CLOBJ 2	Foster hands-on learning to deepen comprehension of electrical generation principles.
CLOBJ 3	Enhance practical skills crucial for future engineers in generator projects.
CLOBJ 4	Promote collaborative teamwork among engineering students during construction activities.
CLOBJ 5	Empower students with real-world insights for future engineering challenges.

f. **Course Learning Outcomes:**

CLO 1	Enhanced understanding of electrical generation principles through practical experimentation.
CLO 2	Cultivated hands-on skills vital for future engineers in generator construction.
CLO 3	Strengthened theoretical knowledge by applying concepts in real-world generator projects.
CLO 4	Fostered a collaborative learning environment, promoting teamwork among engineering students.
CLO 5	Empowered students with practical insights, preparing them for real-world engineering challenges.

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
-	**-**	**4**	**2**	**-**	**-**	**40**	**-**	**60**	**100**

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

a. **Course Name:** Mathematics-II
b. **Course Code:** 303191151
c. **Prerequisite:** Knowledge of Mathematics up to 12th science level
d. **Rationale**: The Mathematics I syllabus integrates fundamental calculus concepts, advanced mathematical techniques, and vector calculus, preparing students for engineering challenges with optimized problem-solving skills.

e. **Course Learning Objective:**

CLOBJ 1	Define and identify ordinary differential equations of higher order. Classify ODEs based on homogeneity and linearity. Solve homogeneous linear ODEs of higher order with constant coefficients, and variable coefficients.
CLOBJ 2	Solve homogeneous linear ODEs of higher order with constant coefficients, variable coefficients
CLOBJ 3	Apply the Method of Undetermined Coefficients to solve nonhomogeneous ODEs. Utilize the Solution by Variation of Parameters for solving nonhomogeneous ODEs. Explore applications of ODEs in real-world scenarios.
CLOBJ 4	Understand power series solutions for ordinary points and regular singular points. Explore properties and applications of Legendre polynomials and Bessel functions.
CLOBJ 5	Define Laplace transform and its inverse. Understand the linearity property of Laplace transforms. Solve ordinary differential equations using Laplace transforms.
CLOBJ 6	Define Fourier Integral and its applications. Explore Fourier Cosine and Sine Integrals.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate the ability to translate physical or engineering problems into mathematical equations and solve them.
CLO 2	Develop analytical and critical thinking skills through the process of solving complex mathematical problems.
CLO 3	Understand and interpret mathematical solutions in the context of the given problems.
CLO 4	Communicate mathematical concepts and solutions clearly and effectively, both in written and verbal forms.
CLO 5	Present mathematical arguments and solutions in a logical and organized manner.
CLO 6	Lay a solid foundation for more advanced courses in mathematics and related disciplines.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr.	Topics	W	T
1	UNIT 1 Higher order ordinary differential equations: Ordinary differential equations of higher orders, Homogeneous Linear ODEs of Higher Order, Homogeneous Linear ODEs with Constant Coefficients, Euler–Cauchy equations, Nonhomogeneous ODEs, Method of Undetermined Coefficients, Solution by Variation of Parameters, Applications	8	5
2	UNIT 2 Power Series: Power series solutions at ordinary point and regular singular point; Legendre polynomials, Bessel functions of the first kind and their property	15	9
3	UNIT 3 Laplace Transform: Laplace Transform and inverse Laplace transform, Linearity, First Shifting Theorem (s-Shifting), Transforms of Derivatives and Integrals, ODEs, UNIT Step Function (Heaviside Function), Second Shifting Theorem (t-Shifting), Laplace transform of periodic functions, Short Impulses, Dirac's Delta Function, Convolution, Integral Equations, Differentiation and Integration of Transforms, Solution of ordinary differential equation by Laplace transform	25	15
4	UNIT 4 Fourier Integral: Fourier Integral, Fourier Cosine Integral and Fourier Sine Integral	17	10
5	UNIT 5 Vector Calculus: Gradient of scalar field, Directional Derivative, Divergence and curl of Vector field, Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.	10	6
6	UNIT 6 Multivariable Calculus (Integration): Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Triple integrals (Cartesian)	25	15

i. Text Book and Reference Book:

1. Calculus and Analytic Geometry (TextBook) | By G.B. Thomas and R.L. Finney | Addison Wesley
2. Calculus with early transcendental functions | By James Stewart | Cengage Learning
3. Higher Engineering Mathematics | By B. S. Grewal | Khanna Publications
4. Elementary Linear Algebra (TextBook) | By Howard Anton, Chris Rorres | Willy India Edition | 9th Edition
5. Advanced Engineering Mathematics (TextBook) | By Erwin Kreyszig | Willey India Education
6. A text book of Engineering Mathematics | By N.P. Bali and Manish Goyal | Laxmi Publications