Marathwada Shikshan Prasarak Mandal's

DEOGIRI INSTITUTE OF ENGINEERING AND MANAGEMENT STUDIES

(An Autonomous Institute)

Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere, Raigad | B.Tech. | M.Tech.

Affiliated to Dr. Babasaheb Ambedkar Marathwada University, CSN | MBA

Approved by AICTE/UGC-Govt. of India & DTE-Govt. of Maharashtra

Deogiri College Campus, Railway Station Road, Chhatrapati Sambhajinagar- 431 005 (M.S.)

DTE CODE : 2114 | 0240-2367567, 2367577 | www.dietms.org | director@dietms.org

Department of Mechanical Engineering

B.TECH. PROGRAM STRUCTURE (2026-30)

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	08	07	--	--	--	--	--	--	15
Engineering Science Course		07	08	--	--	--	--	--	--	15
Program Core Course (PCC)	Program Courses	--	02	10	10	10	10	12	--	54
Program Elective Course (PEC)		--	--	--	--	04	06	04	06	20
Vocational Courses (Industrial Collaboration Course)	Skill Courses	--	--	--	--	--	--	02	--	10
Skill Enhancement Course (Professional Development)		01	01	01	01	02	02	--	--	
Ability Enhancement Course (AEC -01, AEC-02) (Ex. Modern Indian Languages)	Humanities, Social Science, and Management (HSSM)	02	--	--	02	--	--	--	--	04
Entrepreneurship/Economics/ Management Courses		--	--	02	02	--	--	--	--	04
Indian Knowledge System (IKS)		--	02	--	--	--	--	--	--	02
Value Education Course (VEC) (Ex. UHV-II, Environmental Courses)		--	--	02	02	--	--	--	--	04
Constitution of India		--	--	--	--	--	AU	--	--	AU
Do It Yourself (DIY)	Experiential Learning Courses	AU	AU	01	01	01	01	01	--	05
Problem/Project-Based Learning (PBL)		01	01	01	01	01	01	01	--	07
Internship/On-the-Job Training (OJT)		--	--	--	--	--	--	--	12	12
Co-curricular Courses (CC) (NSS /Student Clubs/YOGA/ Health & Wellness)	Liberal Learning Courses	01	01	--	--	--	--	--	--	02
Open Elective (OE)		--	--	04	02	02	--	--	--	08
Total Credits (Major)		**20**	**22**	**21**	**21**	**20**	**20**	**20**	**18**	**162**
Multidisciplinary Minor (MDM)	Multidisciplinary Courses	--	--	02	03	03	03	03	--	**14**

Chairman, BoS
Mechanical Engg.

Dean Academics

Chairman
Academic Council

• **(B.E./ B.Tech. or Equivalent) in Engineering/ Technology with Multidisciplinary Minor** • **Major + MDM = 162+14 = 176 Credits**											**176**
Honors and Multidisciplinary Minor		--	--	03	03	04	04	04	--		**18**
• **4-Year bachelor's degree (B.E./ B.Tech. or Equivalent) in Engineering/ Technology - Honors and Multidisciplinary Minor** • **Major + Honors + MDM = 162+18+14 = 194 Credits** • Students with a minimum **CGPA of 7.5** without backlog courses at the end of the Second semester and should have earned **42 credits** are eligible for admission to the UG Bachelor's Degree with Honors.											**194**
Honors with Research and Multidisciplinary Minor		--	--	--	--	--	--	08	10		**18**
• **4-Year bachelor's degree (B.E./ B.Tech. or Equivalent) in Engineering/ Technology - Honors with Research and Multidisciplinary Minor** • **Major + Research MDM = 162+18+14 = 194 Credits** • Students with a minimum **CGPA of 7.5** without backlog courses at the end of the Sixth semester and should have earned **124 credits** are eligible for admission to the UG Bachelor's Degree with Research.											**194**
Double Minors (Multidisciplinary and Specialization Minors)		--	--	03	03	04	04	04	--		**18**
• **4-Year bachelor's degree (B.E./ B.Tech. or Equivalent) in Engineering/ Technology - Major Engineering Discipline with Double Minors (Multidisciplinary and Specialization Minors)** • **Major + MDM + Specialized Minor= 162+14+18 = 194 Credits** • Students with a minimum **CGPA of 7.5** without backlog courses at the end of the Second semester and should have earned **42 credits** are eligible for admission to the UG Bachelor's Degree with Double Minor.											**194**

Note:

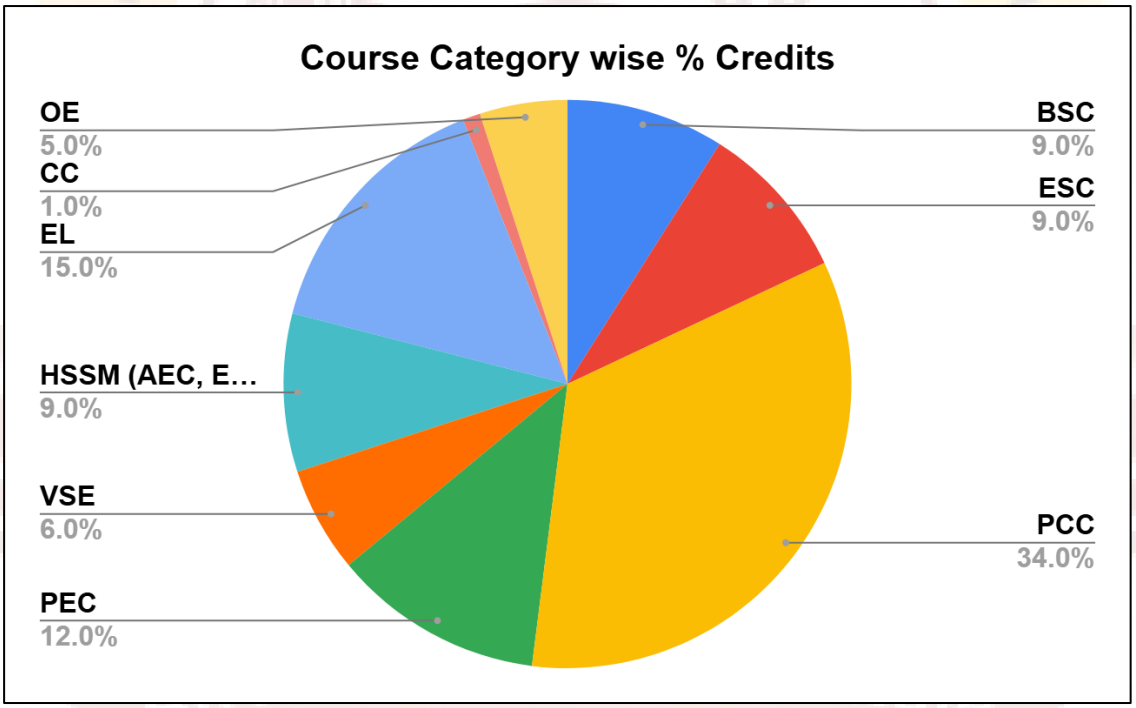
1. Multiple entry & exit criteria will be in accordance with the AICTE/UGC/DTE/NEP-2020 guidelines.
2. For Audit course (AU), participation is mandatory but not included in Grade calculations.
3. The Honors and Specialization Minor (Double Minor) offered by the program is exclusively for students of that program. Only students with a minimum CGPA of 7.5 and no backlogs at the end of the Second Semester are eligible. Students must maintain a minimum CGPA of 7.5 and remain without backlogs throughout the program. To earn the Honors and Specialization Minor (Double Minor), students must complete all the courses offered by the program.
4. Honors and Specialization Minor (Double Minor) courses shall be offered through the SWAYAM/NPTEL online learning platform. The Board of Studies (BoS) shall identify, approve, and recommend the course based on its relevance to the program curriculum, academic quality, and prevailing industry standards.

Chairman, BoS
Mechanical Engg.

Dean Academics

Chairman
Academic Council

B.Tech. in Mechanical Engineering		
Course Category	**Credits**	**% Credits**
Basic Science **(BSC)**	14	9%
Engineering Science **(ESC)**	16	9%
Program Core Courses **(PCC)**	54	34%
Program Elective Courses **(PEC)**	20	12%
Vocational & Skill Enhancement **(VSE)**	10	6%
Humanity, Social Science & Management (AEC, EM, IKS, VEC) **HSSM**	14	9%
Experiential Learning **(EL)**	24	15%
Co-Curriculum Courses **(CC)**	02	1%
Open Electives **(OE)**	08	5%
Total Credits	**162**	

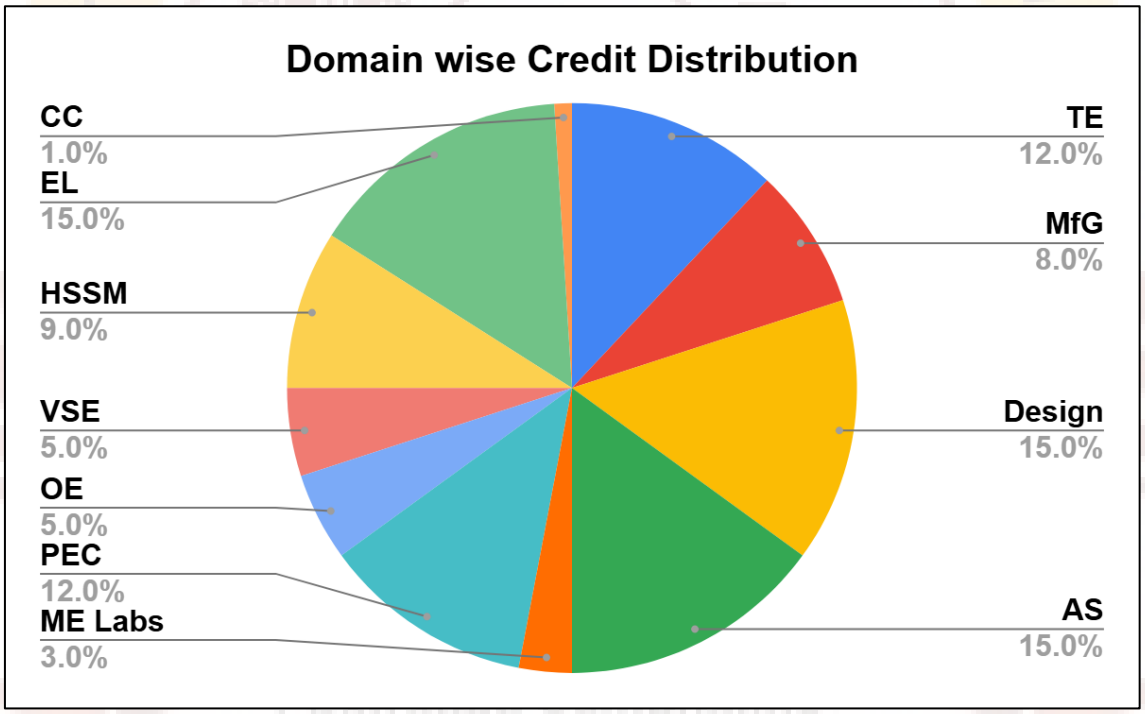


Chairman, BoS
Mechanical Engg.

Dean Academics

Chairman
Academic Council

B.Tech. in Mechanical Engineering		
Domain	**Credits**	**% Credits**
Thermal and Heat Power Engineering (**TE**)	20	12
Manufacturing Engineering (**MfG**)	13	08
Design Engineering (**Design)**	25	15
Allied Science (**AS)**	24	15
Mechanical Engineering Labs (**ME Labs)**	04	03
Program Elective Courses (**PEC**)	20	12
Open Electives (**OE)**	08	05
Vocational & Skill Enhancement (**VSE**)	08	05
Humanity, Social Science & Management (AEC, EM, IKS, VEC) **HSSM**	14	09
Experiential Learning (**EL**)	24	15
Co-Curriculum Courses (**CC**)	02	01
Total Credits	**162**	



MASTER COPY

Chairman, BoS
Mechanical Engg.

Dean Academics

Chairman
Academic Council

SEMESTER I												
Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
BSC	NT261001	BSH	Linear Algebra and Calculus	3	1		4	10	10	20	60	100	4
BSC	NT261002	BSH	Applied Science II	3			3	10	10	20	60	100	3
ESC	GE261101	ME	Engineering Graphics	3			3	10	10	20	60	100	3
ESC	NT261102	ETC	Basic Electronics and Electrical Engineering	3			3	10	10	20	60	100	3
#HSSM-AEC	GE261705	BSH	Modern Indian Language: English	2			2	10	10	20	60#	100	2
BSC	NT261003	BSH	Applied Science II Lab			2	2	15	15		20	50	1
ESC	GE261103	ME	Engineering Graphics Lab			2	2	15	15		20	50	1
SC-SEC	GE261601	BSH	Professional Development I			2	2	15	15		20	50	1
ELC	GE261801	BSH	Do It Yourself I			2	2	25	25			AU	AU
ELC	GE261803	BSH	PBL: Design Thinking Lab			2	2	15	15		20	50	1
LLC	GE261901	BSH	NSS			2	2	25	25			50	1
Total				**14**	**1**	**12**	**27**					**750**	**20**

SEMESTER II													
Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
BSC	NT262004	BSH	Multivariable Calculus	3			3	10	10	20	60	100	3
BSC	NT262005	BSH	Applied Science I	3			3	10	10	20	60	100	3
ESC	NT262104	CE	Engineering Mechanics	4			4	10	10	20	60	100	4
PCC	NT262201	ME/CE	Applied Engineering	2			2	10	10	20	60	100	2
#HSSM-IKS	GE262702	BSH	Indian Knowledge System	2			2	10	10	20	60#	100	2
BSC	NT262006	BSH	Applied Science I Lab			2	2	15	15		20	50	1
ESC	GE262105	ME	Workshop Practices			2	2	15	15		20	50	1
ESC	NT262106	CSE	Programming for Problem Solving Lab		1	4	5	30	30		40	100	3
SC-SEC	GE262602	BSH	Professional Development II			2	2	15	15		20	50	1
ELC	ME262802	ME	Do It Yourself II			2	2	25	25			AU	AU
ELC	GE262804	BSH	PBL: Engineering Exploration Lab			2	2	15	15		20	50	1
LLC	GE262902	BSH	Students Club Activities			2	2	25	25			50	1
Total				**14**	**1**	**16**	**31**					**850**	**22**

#End semester Evaluation will be done at department level.

MASTER COPY

Chairman, BoS
Mechanical Engg.

Dean Academics

Deogiri Institute of Engg & Mgmt Studies Chhatrapati Sambhajinagar

Chairman
Academic Council

Course Title: Linear Algebra and Calculus **Course Code: NT261001**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Lectures:03hrs/week	CA-1	10 Marks
Tutorial:01hrs/week	CA-2	10 Marks
Credits:04	MSE	20 Marks
Semester: First Year (SemesterI)	ESE	60 Marks

Course Prerequisite:

- Basic Algebra & Trigonometry–Equations, identities, functions.
- Basics of Calculus–Derivatives and simple integration.
- Basics of Matrix–Matrix types, operations and solving simple linear systems.

Course Description: This course covers essential topics in engineering mathematics, including matrices, eigen values, partial differentiation and multiple integrals. It focuses on solving linear systems,optimization and applying calculus to real-world problems like area and volume calculation. These mathematical tools form the backbone of many engineering fields and help to develop logical problem-solving skills.

Course Objectives:

1. To develop a strong foundation in matrix algebra and its applications in solving systems of equations and introduce the concepts of eigen values and eigen vectors and their role in engineering problems.
2. To understand partial differentiation and apply it to functions of several variables.
3. To apply multiple integrals in calculating areas, volumes and other engineering-related quantities.

Course Outcomes:

COs	**After completion of the course: Students will be able to**	**Bloom's Level**
CO1	Recall the basic concepts related to matrices and calculus.	Remember (Level 1)
CO2	Compute solutions using the fundamental concepts of linear algebra and multivariable calculus.	Understand (Level 2)
CO3	Solve mathematical problems based on the concepts related to matrices and multivariable calculus.	Apply (Level3)
CO4	Analyze mathematical problems by identifying and applying appropriate concepts from matrices, partial derivatives, and multiple integrals.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2									1		
CO2	3	2									1		
CO3	3	2									1		
CO4	3	2									1		

Assessment	
CA-1 (a)	Subjective Test/Assignment/MCQ Test etc.
CA-2 (b)	Subjective Test/Assignment/MCQ Test etc.
MSE (c)	Subjective Test
ESE (d)	End Semester Examination

MASTER COPY

Deogiri Institute of Engg. & Management Studies ★ Chhatrapati Sambhajinagar

Chairman, BoS
Mechanical Engg.

Course Contents		
Unit1	**Linear Algebra-Matrices-I** Introduction; Definition and types of matrices; Matrix Operations; Rank of a matrix; Canonical form of a matrix; Normal form of a matrix; Consistency of non-homogeneous and homogeneous system of linear equations.	6 Hrs.
Unit2	**Linear Algebra-Matrices-II** Introduction; Linear dependence and independence of vectors; Eigen values and Eigen vectors; Properties of eigen values and eigen vectors (without proofs); Cayley Hamilton's theorem (without proof) and its applications; Quadratic Forms.	6 Hrs.
Unit3	**Partial Differentiation** Introduction;Partialderivativesoffirstandhigherorders;Homogeneousfunctions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.	6 Hrs.
Unit4	**Applications of Partial differentiation** Introduction; Jacobians-properties; Taylor's and Maclaurin's theorems (without proofs) for functions of two variables; Maxima and minima of functions of two variables; Lagrange's method of undetermined multipliers.	6 Hrs.
Unit5	**Multiple Integrals** Introduction; Reduction formulae for $\int_0^{\pi/2}\sin\theta d\theta$, $\int_0^{\pi/2}\cos\theta d\theta$, $\int_0^{\pi/2}\sin\theta\cos\theta d\theta$; Evaluation of Double Integrals in Cartesian and polar co-ordinates with and without limit, evaluationofintegralbychangingtopolar;TripleintegralinCartesianandpolar.	6 Hrs.
Unit6	**Applications of Multiple Integrals** Introduction; Applications of multiple integrals to find area as double integral in cartesian and polar, Surface area; volume as triple integral.	6 Hrs.

Sr. No.	Textbooks
1.	Grewal,B.S., Higher Engineering Mathematics, Khanna Publishers,2012.
2.	Ramana,B.V., Higher Engineering Mathematics ,McGraw Hill Education India,2008.
3.	Bali,N.P.,& Goyal,M.(2019).Textbook of Engineering Mathematics. Laxmi Publications,10th Edition.
	ReferenceBooks
1.	Kreyszig, Erwin, Advanced Engineering Mathematics, Wiley India,2007.
2.	Jain,R.K., and Iyengar,S.R.K., Engineering Mathematics Vol.1&2,Narosa Publishing House, 2002.
3.	Dass,H.K., Advanced Engineering Mathematics, S.Chand Publishing, 2010.
4.	Thomas, GeorgeB., and Finney, R.L., Calculus and Analytic Geometry, Pearson,2010.
5.	Singh, Ravish & Bhatt, Mukul, Engineering Mathematics:A Tutorial Approach, McGraw Hill Education India, 2017.
	WebResources
1.	Matrix Analysis with Applications, NPTEL,https://nptel.ac.in/courses/111107112
2.	Calculus–II,NPTEL, https://nptel.ac.in/courses/111104125
3.	Engineering Mathematics–I, NPTEL,https://nptel.ac.in/courses/111105121

Chairman, BoS
Mechanical Engg.

Course Title: Applied Science II **Course Code: NT261002**	**Course Category: BSC**	
Teaching Scheme	**Examination Scheme**	
Lectures: 03 Hours/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite: Chemistry course at secondary and higher secondary level.

Course Description: Chemistry is the backbone of all Engineering disciplines. Chemistry is not just important in Engineering, it's essential. Chemistry is an imperative part of every degree program in Engineering & Technology. This course is generally incorporated in the first-year syllabus of Bachelor of Technology degree in Engineering, and it is structured in a manner that its different theoretical concepts are studied along with their practical applications. This course cover topics like Water technology, Fuels and Electrochemical energy sources, High polymers, Corrosion and its control, Lubricants and Environmental chemistry along with practical laboratory experiments. The goal is to help students to understand the chemical principles behind various engineering materials, processes, and systems.

Course Objectives:

1. To understand the technology involved in analysis and improving quality of water.
2. To Study the various energy sources and alternative fuels with respect to their characteristics and applications.
3. To understand the properties and applications of various engineering materials, such as polymers.
4. To Understand Corrosion mechanisms and methods of prevention for corrosion control.
5. To study the mechanism, classification and properties of lubricants.
6. To examine the chemical aspects of environmental issues, such as air and water pollution, and pollution control.

Course Outcomes:

COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	**Recall** the basic concepts of water treatment, fuels, electrochemical energy sources, polymers, corrosion, lubricants, and pollution control.	Remember (Level 1)
CO2	**Describe** the principles and processes involved in water softening, coal analysis, polymer preparation, corrosion mechanisms, lubricants, and pollution control.	Understand (Level 2)
CO3	**Interpret** the concepts and processes involved in water treatment, fuels and electrochemical energy sources, high polymers, corrosion, lubricants, and environmental chemistry.	Understand (Level 2)
CO4	**Calculate** the total hardness of water based on the compounds responsible for water hardness.	Apply (Level 3)
CO5	**Apply** fundamental principles of chemistry to perform experiments related to volumetric analysis, physical property measurements, corrosion, and polymers for skill development.	Apply (Level 3)
CO6	**Examine** experimental data and interpret the results to draw appropriate conclusions related to engineering chemistry concepts.	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2											
CO2	3	2											
CO3	3	2											
CO4	3	2											
CO5	3	3											
CO6	3	3											

Chairman, BoS
Mechanical Engg.

Assessment	
CA-1 (a)	Subjective Test / Assignment / Open book test / PowerPoint Presentation etc.
CA-2 (b)	Subjective Test / Assignment / Open book test /Presentation etc.
MSE (c)	Subjective Test
ESE (d)	End Semester Examination
Practical (e)	Practical Performance and viva examination

Course Contents		
Unit 1	**Water Technology** Introduction, Hardness, types of Hardness, Disadvantages of hard water for domestic and industrial use, Numerical based on hardness, determination of hardness of water by EDTA method, Water softening methods: Zeolite method and Ion Exchange method.	6 Hrs.
Unit 2	**Fuels and Electrochemical Energy Sources** Introduction, Classification of fuels, Calorific value, higher calorific value (HCV) & Lower calorific value (LCV), Characteristics of good fuels, Analysis of Coal: Proximate analysis, Refining of crude oil, Introduction to Biomass and hydrogen fuel. Rechargeable batteries: Lithium-ion battery, Fuel Cell: H_2-O_2 Fuel cell.	6 Hrs.
Unit 3	**High Polymers** Introduction, Polymerization and its types, thermo softening and thermosetting plastics, preparation, properties, and uses of: Polymethyl methacrylate (PMMA), Urea formaldehyde resin, Styrene –butadiene rubber, conducting polymers its types and applications, Introduction to polymer materials for 3-D printing.	6 Hrs.
Unit 4	**Corrosion and its Control** Introduction, types of corrosion- Chemical and Electrochemical corrosion, mechanism of electrochemical corrosion, factors influencing rate of corrosion, Prevention of corrosion by galvanizing, tinning and cathodic protection method.	6 Hrs.
Unit 5	**Lubricants** Introduction, Classification of lubricants, Mechanism of lubrication, properties of lubricants- Viscosity and viscosity index, surface tension, flash point and fire point, cloud point and pour point, acid value and saponification number.	6 Hrs.
Unit 6	**Environmental Chemistry** Introduction, Air pollution: Types of air pollutants, Control of air pollution, Water pollution: sources of water pollution and its control, determination of dissolved oxygen in water by Iodometric/Winkler's method.	6 Hrs.

Sr. No.	Textbooks
1.	Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi, 1992.
2.	S. S. Dara, Text Book of Engineering Chemistry, S. Chand & Co, New Delhi.
3.	Bhal &Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
.	C. Parmeshwara Murthy, C.V. Agarwal, Andra Naidu, Textbook of Engineering Chemistry, BS Publications, Hyderabad.
	Reference Books
1.	Shikha Agarwal, Engineering Chemistry- Fundamentals & applications, Cambridge Publishers - 2015.
3.	O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
3.	V. R. Gowarikar, Polymer Science, New Age International Publication.

Chairman, BoS
Mechanical Engg.

Course Title: Engineering Graphics **Course Code: GE261101**	**Course Category: ESC**	
Teaching Scheme	**Examination Scheme**	
Lectures:03 hrs./ week	CA-1	10 Marks
Tutorial: --	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Knowledge of Geometry (Linear and angular), Coordinate Geometry.
- Basic Mathematics.

Course Description: Engineering Graphics is a basic course for all undergraduate engineering programs. This course is introduced to provide basic understanding of the fundamentals of Engineering Drawing, mainly visualization, graphic theory, standards and conventions of drawing, the tools of drawing and use of drawing in engineering applications. A picture speaks thousands of words. A message conveyed by a picture is much more effective than a message conveyed by words. The human being used the language of drawing to convey their ideas, thoughts, feelings, emotions since before the start of civilization. With development in science and technology humans felt the need for standardized drawing that it could be understood universally. This standardized technical language was then termed as Engineering Drawing.

Course Objectives:

1. To know and understand the concepts of Projection of Points, Lines, Planes, Solids, and Development of Surfaces.
2. To construct 2D and 3D views of objects.
3. To communicate effectively in Engineering Environment

Course Outcomes:

COs	**After completion of the course, Students will be able to:**	**Bloom's Level**
CO1	**Familiarize** the geometrical fundamental concepts, BIS standard, drafting tools and theory of projection for construction of different geometries and engineering objects.	Remember (Level 1)
CO2	**Interpret** the importance of reference planes while drawing the front view and top view in the projection of points, and lines.	Understand (Level 2)
CO3	**Demonstrate** projection of planes, solids, and development of surfaces using standard engineering drawing principles.	Understand (Level 2)
CO4	**Apply** the principles of orthographic and isometric projection to create and interpret engineering drawings for accurate visualization and representation of three-dimensional objects.	Apply (Level3)
CO5	**Apply** BIS standards, type of lines, dimensioning techniques, and drafting tools to draw the projections of points, lines, planes, solids, and develop the surfaces using standard drawing conventions.	Apply (Level 3)
CO6	**Analyze** the multi-views to identify hidden and visible features and spatial relationship.	Analyze (Level 4)

CO-PO Mapping

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2	3								1				
CO3	3	1							1				
CO4	3	1							1				
CO5	3	1							1				
CO6	3	1							1				

Chairman, BoS
Mechanical Engg.

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignment
CA-2 (b)	Subjective Test/Course Project/Assignment
MSE (c)	Subjective Test
ESE (d)	End Semester Examination
Practical (e)	Viva exam

Course Contents		
Unit 1	**Introduction to Engineering Drawing & Geometrical Construction** Importance of Engineering Graphics, Scope and Applications, Basic Geometrical Construction: Line Bisection; Angle Bisector; Dividing a Line into an Equal Number of Parts. Drawing Standards: IS/BIS and SP-46, Drawing Instruments, Sheet Layout, Lettering, Types of Lines, Aligned and Unidirectional Method of Dimensioning, Drawing of a Polygon: General Method; Arc Method; Inscribed Circle Method; Pentagon by the Special Methods; Diagonal Method; and Inscribed Circle Method.	6Hrs
Unit 2	**Projection of Points & Orthographic Projection** Principle of Projection, Quadrant System, Reference Planes, and Reference Line. Point situated in different quadrants, Methods of Projection: Orthographic; Isometric; Oblique; and Perspective Projection, Symbols of First angle and Third angle, Difference between First angle and Third angle Method of Projection.	6Hrs
Unit 3	**Projection of Straight Lines** Various Positions of Straight Line with Respect to Reference Planes, Line Inclined to One Plane and Inclined to Both the Reference Planes (First Quadrant Only), Traces of Lines.	6Hrs
Unit 4	**Projection of Planes** Types of Planes: Simple Plane; Composite Plane, Various Positions of Planes with Respect to Reference Planes, Planes Inclined to One Reference Plane; Planes Inclined to Both Reference Planes. (Apparent Angle Concept)	6Hrs
Unit 5	**Projection of Solids and Development of Surfaces** Types of Solids: Cone, Cylinder, Pyramid, and Prisms, Various Positions of Solids, Projection of Solid with Axis Inclined to One Reference Plane only. Introduction to Development of Surfaces, Method of Development- Parallel Line, Radial Line, Triangulation, and Approximate Method, Development of Cylinder, Cone, Pyramid, and Prism.	6Hrs
Unit 6	**Isometric Projection** Isometric Projection, Isometric Axis, Isometric Lines, Isometric Planes, Isometric Scale and the Different between Isometric Drawing / View and Isometric Projection.	6Hrs

Chairman, BoS
Mechanical Engg.

Sr.No.	Textbooks
1.	K. Venugopal & V. Prabhuraja, A Textbook of Engineering Graphics, New Age International (P) Limited 1st t Edition
2.	P.H. Jain. A Textbook of Engineering Graphics, Soham Publication, 5th Edition
	Reference Books
1.	N.D. Bhatt, Engineering Drawing, Charotar Publication, 50th Edition
2	Dhananjay A. Jolhe, Engineering Drawing, Mc Graw Hill 19th Edition
	Web Resources
1.	Engineering Graphics, NPTEL, https://nptel.ac.in/courses/105104148
2.	Engineering/Architectural Graphics https://www.youtube.com/watch?v=VrU73IwRyc4&list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz

Chairman, BoS
Mechanical Engg.

Course Title: Basic Electronics and Electrical Engineering **Course Code: NT261102**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Basic Laws and Theorems in Physics.
- Basics of Electricity & Magnetism.
- Basic concepts of current, voltage, resistance, power etc.
- Basic knowledge of Algebra & Trigonometry

Course Description: The Basics of Electrical and Electronics Engineering are foundational to understanding modern technology. The course focuses on Study of current, voltage, power, and energy in circuits. Understanding concepts like Ohm's Law, Kirchhoff's laws, series and parallel circuits, etc. Understanding of how materials like silicon and germanium can be used to control the flow of current & Semiconductor's devices are central to electronics. Focuses on systems that use discrete signals, such as logic gates, binary arithmetic. Study the importance of Transducers and instruments in various industries, enabling the measurement, control, and monitoring of physical systems.

Course Objectives:

1. To recall the fundamental concepts related to DC and AC circuits, electrical machines, diodes, digital electronics, transducers and measuring instruments.
2. To explain the principles, operations, and characteristics of electrical and electronic components, circuits, machines, and instruments.
3. To utilize electrical and electronic principles for working out circuit problems and to simplify digital circuits.
4. To examine electrical circuits & digital circuits using appropriate laws and theorems.

Course Outcomes:

COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	**Recall** the fundamental concepts related to DC and AC circuits, electrical machines, diodes, digital electronics, transducers and measuring instruments.	Remember (Level 1)
CO2	**Explain** the principles, operations, and characteristics of electrical and electronic components, circuits, machines, and instruments.	Understand (Level 2)
CO3	**Utilize** electrical and electronic principles for working out circuit problems and to simplify digital circuits.	Apply (Level 3)
CO4	**Examine** electrical circuits & digital circuits using appropriate laws and theorems.	Analyze (Level 4)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

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

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test
ESE(d)	End-Semester Exam

Course Contents		
Unit 1	**Elementary Concept & DC Circuits** Circuit Components: Active and Passive Components, Basic Concepts: EMF, Current, Ohm 's Law, Ideal & practical voltage & Current sources & Relation between Voltage, Current & Power. DC Circuits: Kirchhoff's Laws (KCL & KVL), Superposition & Thevenin's Theorem	6Hrs
Unit 2	**AC Fundamentals & Transformer** AC Signal Parameters: Waveforms, Average value, RMS Value, Instantaneous value, active power, reactive power and apparent power, power factor. Pure R, L, C. circuit, AC series Circuits: R-L, R- C & R- L-C (Simple problems only). Single Phase Transformer: Faraday's Law of EMI, Len'z Law, Self and Mutual Induction Construction and working, EMF Equation, Losses, Efficiency, Regulation	6Hrs
Unit 3	**Electrical Machines** DC Motors: Construction & Working principle, Types: DC Series & Shunt Motor, Characteristics of DC Motor and Applications. AC Motor: Construction & Working principle of Single-Phase Induction Motor, Types: Capacitor Start I.M., Capacitor Start Capacitor Run I.M. and Applications, Construction & Working principle of Three-Phase Induction Motor and its types. Special Purpose Motors: Stepper Motor, Servo Motor and BLDC & Introduction to Synchronous motor.	6Hrs
Unit 4	**Diodes and its Applications** Basics of Semiconductor: Types of Semiconductors-intrinsic & Extrinsic PN Junction diode: Formation of PN Junction, Biasing of PN Junction diode, V-I characteristics, Principle of avalanche breakdown. Rectifier: Need of Rectifiers, Half Wave, Full Wave Center Tapped & Full Wave Bridge Rectifier. Filters & Voltage Regulation: Capacitor Filter, LC Filter and CLC/π-Filter. Zener Diode as Voltage Regulator, Linear IC Voltage Regulators- 78XX & 79XX, Block diagram of a regulated dc power supply.	6Hrs

Chairman, BoS
Mechanical Engg.

Unit 5	**Basics of Digital Electronics** Number Systems: Types of Number systems: Binary, Octal, Decimal & Hexadecimal and their conversions, 1"s and 2"s Complements, Binary Arithmetic (Addition, Subtraction Multiplication & Division). Basic Logic Gates: AND, OR & NOT Universal Gates: NAND & NOR Derived Gates: XOR & XNOR & Boolean Algebra	6Hrs
Unit 6	**Transducers & Instruments** Introduction to Transducers: - Definition and Classification of Transducers, Basic operation of Transducers like RTD, Thermocouple, Thermistor, Displacement Sensor (LVDT), Load cells, Photo Sensor, Piezo-electric sensor, Mass Air Flow Sensor, Flow Meter, Strain gauges. Introduction to Relay, Functional elements of an instrument, Block diagram & working of: Function Generator and Digital Storage Oscilloscope.	6Hrs

Sr. No.	Textbooks
1.	V. K. Mehta, Rohit Mehta "Principles of Electronics" S. Chand Publications.
2.	B. L. Theraja, Electrical Technology Volume - I, S. Chand.
3.	A.K. Sawhney, Puneet Sawhney "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, New Delhi, 2015
	Reference Books
1.	Millman Halkias: Electronic Devices and Circuits, McGraw-Hill Publication, 2000.
2.	Donald Neaman, Electronic Circuit Analysis and Design, McGraw-Hill Publication, 3rd Edition
3.	V. N. Mittal and Arvind Mittal, Basic Electrical Engineering, McGraw-Hill Publication.
4.	R.P. Jain. "Modern Digital Electronics"
5.	H.S. Kalsi, "Electronic Instrumentation" Tata McGraw-Hill New Delhi,2010
6.	B. L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand, 2006
	Web Resources
1.	Basic Electrical Engineering, NPTEL, https://nptel.ac.in/courses/122106025
2.	Basic Electronics Engineering, NPTEL, https://nptel.ac.in/courses/122106025
3.	Digital Electronics, NPTEL, https://nptel.ac.in/courses/106108099
4.	Instruments & Transducers, NPTEL, https://nptel.ac.in/courses/108102191

Chairman, BoS
Mechanical Engg.

Course Title: Modern Indian Language: English **Course Code: GE261705**		**Course Category: HSSM-AEC**
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 02	MSE	20 Marks
Semester: First Year (Semester I)	ESE	60 Marks

Course Prerequisite:

- Basic knowledge of English grammar and vocabulary.
- Ability to read and comprehend simple English texts.
- Willingness to actively participate in listening, speaking, reading, and writing activities.

Course Description: This course aims to develop foundational communication skills in English, essential for academic, professional, and personal contexts. It introduces students to the core concepts of communication, including verbal, non-verbal, and written forms.

Course Objectives:

1. To recall key concepts of English grammar, phonetics, vocabulary, and basic language structures
2. To understand the use of language in various contexts—academic, professional, and everyday
3. communication
4. To apply correct grammar, pronunciation, and vocabulary in spoken and written English
5. To create well-structured and purpose-driven written texts such as reports, letters, and emails

Course Outcomes:

COs	**After completion of the course: Students will be able to**	**Bloom's Level**
CO1	**Recall** and recognize grammatical forms, sentence structures, phonetic symbols, and vocabulary items	Remember (Level 1)
CO2	**Interpret** and explain the function of language in comprehension, speech, and writing	Understand (Level 2)
CO3	**Apply** language skills—grammar, phonetics, and vocabulary in oral communication and writing tasks	Apply (Level 3)
CO4	**Compose** clear, grammatically accurate, and well-formatted texts for academic and professional purposes	Analyze (Level 4)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1							2	2	2		2			
CO2							2	1	2		2			
CO3							2	2	3		3			
CO4							2	2	3		3			

Chairman, BoS
Mechanical Engg.

Assessment	
CA-1 (a)	Group Discussion
CA-2 (b)	Business writing assessment.
MSE (c)	Subjective Test
ESE(d)	Exam administered by the respective department

Course Contents		
Unit 1	**Communication and Communication Processes** Introduction to Communication, Process & elements involved in Communication, Forms and functions of Communication, Barriers to Communication and overcoming them.	4 hrs.
Unit 2	**Listening Skill & Reading Skill** Listening Skills: Importance of Listening, Types of Listening, Barriers to Listening. Reading Skills: Introduction to Reading, Types of Readers and Reading, Barriers to Reading, Strategies for Reading, Comprehension.	3 hrs.
Unit 3	**Verbal & Non-verbal Communication** Use of Language in Spoken Communication, Appropriate Use of Non-verbal Communication, Principles and Practice of Group Discussion, Public Speaking, Interview Techniques, Presentation Skills.	5 hrs.
Unit 4	**Study of Sounds in English** Introduction to phonetics, Study of Speech Organs, Study of Phonemic Script, Articulation of Different Sounds in English.	4 hrs.
Unit 5	**English Grammar** Grammar: Forms of Tenses, Articles, Prepositions, Use of Auxiliaries and Modal Auxiliaries, Synonyms and Antonyms, Common Errors in English language.	4 hrs.
Unit 6	**Writing Skills** Features of Good Language, Writing Emails, Technical Reports: Report Writing: Format, Structure and Types. Letter Writing: Types & Layouts, Letters and Job Application and Resume.	4 hrs.

Sr. No.	Textbooks
1.	Mohd. Ashraf Rizvi, Communication Skills for Engineers, Tata McGraw Hill
2.	M.S. Rao, Effective Communication Skills, Himalaya Publishing House
	Reference Books
1.	Wren & Martin, English Grammar and Composition, S. Chand Publishing
2.	Dr. T. Balasubramanian, A Course in Phonetics and Spoken English, Foundation Books
3.	Meenakshi Raman & Sangeeta Sharma, Technical Communication, Oxford University Press

Chairman, BoS
Mechanical Engg.

	Web Resources
1.	https://tinyurl.com/vv953ryp
2	Soft Skills, NPTEL, https://nptel.ac.in/courses/109107121
3	https://www.coursera.org/specializations/people-and-soft-skills-for-professional-success

Chairman, BoS
Mechanical Engg.

Course Title: Applied Science II Lab **Course Code: NT261003**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Titration method.
- Concept of normality and morality.
- Theory of acid and bases.

Course Description: An Engineering Chemistry Lab course provides students with practical experience in applying chemical principles to engineering problems. It aims to build a solid foundation in chemistry laboratory techniques and analytical methods, enabling students to conduct experiments, analyze data, and draw conclusions relevant to various engineering fields. The main objective of Engineering Chemistry Laboratory is to furnish the conceptual understanding of the basic principles involved in chemical analysis. Most of the experiments are correlated to theoretical concepts. This course lays the foundation of certain basic concepts and skills that can be repeatedly employed by the students in their future endeavors. This course also helps to improve the scientific temper of the students to conduct the various experiments.

Course Objectives:

1. To help students understand the chemical principles behind various engineering materials, processes, and systems.
2. To develop experimental skills and to acquire insight into societal and environmental issues.
3. To help the students procure conceptual clarity of engineering chemistry through laboratory experiments.

Note: The Course Outcomes (COs) and the corresponding CO-PO mapping for this laboratory course are aligned with and detailed in the respective Theory Course Syllabus.

Assessment	
CA-I (a)	Performance of Evaluation of Experiments/Activities (Sr.No. 1 to 4)
CA-II (b)	Performance of Evaluation of Experiments/Activities (Sr. No. 4 to 8)
ESE (c)	Practical performance and viva examination

Sr. No.	**List of Experiments/Activities**
1	Determination of the hardness of water by the EDTA method.
2	Preparation of Urea –formaldehyde resin.
3	To study the factors influencing the rate of corrosion.
4	To determine the acid value of a given oil sample.
5	To determine the surface tension of a given liquid by the drops number method.
6	To determine the viscosity of a given liquid by Ostwald's viscometer.
7	To determine the dissolved oxygen in a water sample by Winkler's method.
8	To determine normality and strength of given acid solution conductometrically (Strong Acid vs. strong Base)

Chairman, BoS
Mechanical Engg.

Sr. No.	Reference Books
1.	A. Sethi, Systematic experiments in Chemistry, New Age International Publication, New Delhi.
2.	A. I. Vogel, Practical Inorganic Chemistry, ELBS Publication.
3.	S. S. Dara, Practical in Engineering Chemistry, S. Chand and Co, New Delhi.

Chairman, BoS
Mechanical Engg.

Course Title: Engineering Graphics Lab **Course Code:GE261103**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Knowledge of Geometry (Linear and angular), Coordinate Geometry.
- Basic Mathematics.

Course Description: Engineering Graphics is a basic course for all undergraduate engineering programs. This course is introduced to provide a basic understanding of the fundamentals of Engineering Drawing, mainly visualization, graphic theory, standards and conventions of drawing, the tools of drawing, and the use of drawing in engineering applications. A picture speaks a thousand words. A message conveyed by a picture is much more effective than a message conveyed by words. Human beings have used the language of drawing to convey their ideas, thoughts, feelings, and emotions since before the start of civilization. With the development of science and technology, humans felt the need for standardized drawing so that it could be understood universally. This standardized language was then termed as Engineering Drawing.

Course Objectives:

1. To Know and Understand the Concepts of Projection of Points, Lines, Planes, Solids, and Development of Surfaces.
2. To Construct 2D and 3D views of objects.
3. To communicate effectively in an Engineering Environment

Note: The Course Outcomes (COs) and the corresponding CO-PO mapping for this laboratory course are aligned with and detailed in the respective Theory Course Syllabus.

Assessment	
CA-I (a)	Based on Practical: Sr. No. 01 to 05
CA-II (b)	Based on Practical: Sr. No. 06 to 10
ESE (c)	Viva exam

Sr. No.	**List of Experiments**
1	Lettering, Numbering and dimensioning.
2	Geometrical Construction.
3	Projections of Points.
4	Orthographic Projections- (First Angle Method)
5	Orthographic Projections- (Third Angle Method)
6	Projections of Lines.
7	Projections of Planes.
8	Projections of Solids.

Chairman, BoS
Mechanical Engg.

9	Development of Surfaces.
10	Isometric Projections.

Sr.No.	Textbooks
1.	K. Venugopal & V. Prabhuraja, A Textbook of Engineering Graphics, New Age International (P) Limited 1st t Edition
2.	P.H. Jain. A Textbook of Engineering Graphics, Soham Publication, 5th Edition
	Reference Books
1.	N.D. Bhatt, Engineering Drawing, Charotar Publication, 50th Edition
2	Dhananjay A. Jolhe, Engineering Drawing, Mc Graw Hill 19th Edition
	Web Resources
1.	Engineering Graphics, NPTEL, https://nptel.ac.in/courses/105104148
2.	Engineering/Architectural Graphics https://www.youtube.com/watch?v=VrU73IwRyc4&list=PLLy_2iUCG87Bw9XPfEF3r3EW5UlAOv8iz

Chairman, BoS
Mechanical Engg.

Course Title: Professional Development I **Course Code: GE261601**		**Course Category: SC-SEC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks

Course Prerequisite:

- Willingness to participate actively in oral and group communication tasks.
- Basic understanding of English language (reading, writing, speaking).

Course Description: This course is designed to develop essential professional and interpersonal skills in students through interactive and activity-based learning. It emphasizes spoken English, confidence building, and real-world communication situations such as introductions, interviews, debates, and presentations. Through practical exposure to public speaking, storytelling, group discussions, and more, students will enhance their communication abilities and become effective, confident speakers capable of navigating academic and professional environments.

Course Objectives:

1. To help students recall essential terminology, formats, and structures used in oral communication.
2. To familiarize students with the foundational principles of effective oral communication in academic and professional settings.
3. To provide students with opportunities to practice and apply communication strategies through structured speaking activities.
4. To develop students' ability to design and deliver creative and context-appropriate oral communication tasks.

Course Outcomes:

COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	**Recall** key concepts and techniques involved in basic oral communication tasks.	Remember (Level 1)
CO2	**Explain** the principles and techniques of effective oral communication in personal, academic, and professional contexts.	Understand (Level 2)
CO3	**Apply** appropriate speaking strategies in activities such as group discussions, interviews, and presentations.	Apply (Level 3)
CO4	**Design** and deliver structured oral communication tasks using appropriate style, tone, and language.	Create (Level 6)

CO-PO Mapping

CO-PO Mapping														
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1							2	2	3		2			
CO2							2	2	3		2			
CO3							1	3	3		2			
CO4							1	3	3		3			

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Based on activities: Sr. No. 01 to 05
CA-II (b)	Based on activities: Sr. No. 06 to 10
ESE (c)	Viva exam / Activity Evaluation

Sr. No.	List of Activities
1	Self-Introduction Practice
2	Know Your Friend
3	Elocution
4	Extempore Speaking
5	Public Speaking
6	Group Discussion (GD)
7	Debate Participation
8	Interview Techniques
9	Presentation Skills
10	Storytelling

Sr. No.	Textbooks
1.	Mohd. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press
	Reference Books
1.	Krishna Mohan & Meera Banerji, Developing Communication Skills, Macmillan India
2.	Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press
	Web Resources
1.	https://www.coursera.org/specializations/professional-skills-for-the-workplace
2.	https://www.coursera.org/learn/emotional-intelligence-in-leadership-1
3.	https://www.coursera.org/learn/managing-professional-work-teams

Chairman, BoS
Mechanical Engg.

Course Title: Do It Yourself I **Course Code: GE261801**		**Course Category: ELC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: AU	CA-II	25 Marks
Semester: First Year (Semester I)	ESE	AU
Course Prerequisite: None. An open mind and willingness to work individually and in a diverse team is essential.		
Course Description: This hands-on, introductory laboratory course exposes engineering students to the core ecosystems of modern engineering: Digital Fabrication, Robotics & Automation, Artificial Intelligence, and Internet of Things (IoT). Students transition from passive consumers of technology to active creators by learning to safely navigate real-world laboratory tools, software environments, and physical hardware. Through micro-projects, troubleshooting tasks, and an intensive capstone tinkering challenge, students develop cross-disciplinary engineering design thinking, spatial visualization, and technical collaborative skills vital for succeeding in advanced core engineering streams.		
Course Objectives: 1. Develop hands-on skills in digital fabrication and rapid prototyping using modern MakerSpace technologies. 2. Develop and assemble basic electronic circuits and design simple PCB layouts. 3. Build and program basic robotic and IoT-based systems for real-world applications. 4. Apply fundamental Artificial Intelligence and computer vision techniques to practical problems. 5. Integrate multidisciplinary technologies to develop functional prototypes through a hands-on, problem-solving approach.		

Course Outcomes:

COs	After completion of the course: Students will be able to	Bloom's Level
CO1	**Describe and Demonstrate** safety practices in a rapid prototyping laboratory to ensure safe working conditions.	Understand (Level 2)
CO2	**Develop** simple components using CAD, slicing, and digital fabrication techniques for rapid prototyping.	Apply (Level 3)
CO3	**Execute** spatial digitization, reverse engineering, and subtractive manufacturing operations for product replication.	Apply (Level 3)
CO4	**Examine and Perform** basic programming, sensor interfacing, robotics, IoT, artificial intelligence, and computer vision applications.	Analyze (Level 4)
CO5	**Synthesize** multidisciplinary hardware, electronics, and digital technologies to develop functional prototypes within defined constraints.	Create (Level 6)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping:

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

Assessment	
CA-I (a)	Performance and Evaluation of Activities
CA-II (b)	Performance and Evaluation of Activities
ESE (c)	Practical exam: **Level 1 Certification**

Sr. No.	List of Activities
1.	To familiarize with Maker Space facilities and safety practices.
2.	To create a basic 3D-printed component by using FDM Single Nozzle 3D Printer
3.	To fabricate a component using laser engraving machine.
4.	To scan and reverse engineer a physical component with 3D Scanner
5.	To explore VR-based CAD applications.
6.	To build and program a mobile robot using robotic kit
7.	To interact with a humanoid robot and understand the functionality
8.	To develop a basic AI classification model with AI-techable machine
9.	To perform basic image processing using OpenCV.
10.	To develop an IoT-based weather monitoring system.
11.	To develop an IoT-based home automation system.
12.	To assemble electronic circuits using soldering techniques.
13.	To design a basic PCB layout using a software

Chairman, BoS
Mechanical Engg.

Sr.No.	Textbooks
1.	Randy H. Shih, Parametric Modeling with Autodesk Fusion 360, SDC Publications (2021).
2.	Chee Kai Chua **and** Kah Fai Leong, 3D Printing **and** Additive Manufacturing: Principles **and** Applications, World Scientific Publishing (2017).
3.	Edward Ashford Lee and Sanjit Arunkumar Seshia, Introduction to Embedded Systems: A Cyber-Physical Systems Approach, MIT Press (2022).
	Reference Books
1.	Mark Geddes, Arduino Project Handbook: 25 Practical Projects for Beginners, No Starch Press (2016).
2.	Joseph Howse and Joe Minichino, Learning OpenCV 4 Computer Vision with Python 3, Packt Publishing (2019).
3.	Arshdeep Bahgaand Vijay Madisetti, Internet of Things: A Hands-On Approach, Universities Press (2014).
	Web Resources
1.	Inkscape Open-Source Vector Learning Portal — Tutorials for Scalable Vector Graphics (.svg) Creation. URL: https://inkscape.org/learn/
2.	Fundamentals of Additive Manufacturing Technologies, IIT Guwahati, Prof. Sajan Kapil. https://nptel.ac.in/courses/112103306
3.	Introduction to 3D Printing with Metals by Prof. Chinedum Chi Okwudire, University of Michigan,https://www.coursera.org/learn/introduction-to-3d-printing-with-metalsmodules.
4.	Wokwi Online Hardware Simulator — Cloud-Based Emulation Platform for Wiring and Debugging ESP32, Arduino, and Sensor Configurations Before Physical Assembly. https://wokwi.com/
5.	Blynk IoT Platform Documentation — API Integration Architectures for Mobile-To-Hardware Automation Widgets. URL: https://docs.blynk.io/

Chairman, BoS
Mechanical Engg.

Course Title: PBL: Design Thinking Lab **Course Code: GE261803**		**Course Category: ELC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester I)	ESE	20 Marks
Course Prerequisite: None. An open mind and willingness to work in diverse teams is essential.		
Course Description: The course introduces the students of engineering to the practices and principles of Design Thinking tool as a powerful method for the issues related to the society. The pedagogy used for the course content delivery is through various hands-on activities, real time case studies and collaborative projects. With this pedagogy students will learn to apply the steps of design thinking i.e. Empathy, Problem Defining, Ideation, Prototyping and Testing in a systematic manner. The framework of course emphasizes the students to use stakeholder-centred approach to identify the pressing issues the community faces. The course is merged with Engineering Design Process, with the various tools and techniques students will generate the impactful solutions. The course is inclined to culminates the team-based projects align with United Nations Sustainable Development Goals (SDGs).		
Course Objectives: 1. Introduce students of engineering to the concept and process of Design Thinking approach. 2. Introduce the students to the United Nations Sustainable Development Goals (SDGs). 3. Encourage the students to identify the real-world social challenges. 4. Culminate the empathy-driven skills among the students for identifying the critical issues and solving the real-world social problems. 5. To foster creativity, problem-solving skills and teamwork.		

Course Outcomes:		
COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	**Describe** the steps of the design thinking approach to solve the problems.	Remember (Level 1)
CO2	**Identify** the real-world social-based problems (SDGs align) and use an empathetic approach (Tools/Techniques) to generate user-centered insights.	Understand (Level 2)
CO3	**Formulate** a clear problem statement (SMART) from the client/user/designer point of view.	Apply (Level 3)
CO4	**Generate**, evaluate, and select multiple innovative feasible ideas with structured brainstorming techniques through teamwork.	Analyze (Level 4)
CO5	**Develop** a low-cost, lower to medium fidelity prototype (Physical/Digital) to communicate the ideas and test through the potential user feedback.	Create (Level 6)

CO-PO Mapping:

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	1	2		1		2					3		
CO2	1	2	1	1		1					3		
CO3		1	2					1			3		
CO4		1	2	2	1			1	1		3		
CO5	2	2	1		3	1		2	3	1	3		

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Identify the problems faced by the society/ community (SDG Align). Empathize with the design thinking approach. Synthesize with empathy map. Identify the constraints and enlist the objectives as a designer point of view. Take the decision to prioritize the objectives with the multi-criteria decision matrix. Define the problem statement with SMART Technique.
CA-II (b)	Ideate the solution for the defined problem/challenge. Use principle of decomposition and generate multiple ideas with Brainwriting Techniques. Select and filter the ideas. Use Feasibility-Impact and Morphological chart for the evaluation of generated solutions.Develop and test the Prototype (Digital/Poster).
ESE (c)	Assigned task Completion

Sr. No.	List of Experiments/Activities	Hours
1.	To explore the process of Design Thinking through case studies aligned with Sustainable Development Goals (SDG's).	2 Hrs
2.	To understand the various problem framing techniques for social challenges.	2 Hrs
3.	To conduct the empathy research and synthesize with empathy map.	4 Hrs
4.	To formulate the Point of View (PoV) statement for the design challenge through empathy map and multi-criteria decision-making techniques.	4 Hrs
5.	To apply the divergent & convergent thinking techniques for generation and evaluation of ideas.	2 Hrs
6.	To build low to medium fidelity prototype to represent the ideas.	4 Hrs
7.	To test and iterate the designed prototype using the structured test plans.	2 Hrs

Sr. No.	Text Books
1.	Nigel Cross, Design Thinking- Understanding How Designers Think and Work, Bloomsbury Publisher, 2nd Edition.
2.	Chandramouli Subramanian, Thiyagarajan Paramasivan and Sankaran Venkataramani Design Thinking: A Hands-on Approach, Orient Blackswan, 1st Edition, 2024.
	Reference Books
1.	Ann Saterbak & Mattew Wettergreen, Introduction to Engineering Design Workbook, Springer Nature Switzerland AG, 1st Edition, 2022.
	Web Resources
1.	UNDP Sustainable Development Goals & Design Thinking, https://www.undp.org/sustainable-development-goals
2.	Design Thinking: A Primer, NPTEL https://www.youtube.com/watch?v=AamBSYPJlcA

Chairman, BoS
Mechanical Engg.

Course Title: NSS **Course Code: GE261901**		**Course Category: LLC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: 01	CA-II	25 Marks
Semester: First Year (Semester I)	ESE	-

Course Prerequisite:

- Basic Awareness of Social Issues.
- Interest in Community Service.
- Willingness to Engage in Extracurricular Activities.
- Basic Communication Skills.

Course Description: The **National Service Scheme (NSS)** is a flagship program of the Government of India, designed to promote voluntary community service among students. The program aims to foster a sense of social responsibility, leadership, and civic engagement among youth, particularly within educational institutions. NSS provides students with opportunities to participate in meaningful activities that address real-world community challenges, helping them develop both personally and professionally.

Course Objectives:

1. Promote Social Responsibility and Civic Engagement.
2. Develop Leadership Skills.
3. Enhance Awareness of Social Issues.
4. Foster Youth Empowerment.
5. Engage in Community Development Activities.
6. Build a Spirit of National Integration.

Course Outcomes:

COs	**After completion of the course: Student will be able to**	**Bloom's Level**
CO1	**Recall** the aims, objectives, and core values of the National Service Scheme in relation to various activities in NSS.	Remember (Level 1)
CO2	**Identify** the role of youth in community development and their responsibilities in promoting social welfare.	Understand (Level 2)

CO-PO Mapping

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1						3	3	1	2	1	2		
CO2						3	3	2	3	2	2		

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Based on Activities 01 to 06
CA-II (b)	Based on Activities 07 to 12

Sr. No.	List of Activities
1	**Introduction, Aims and Objectives of NSS:** Report writing on understanding the social impact of NSS.
2	**Youth & Community:** Debate on role of youth in society and their responsibility toward community development.
3	**Importance and Role of Youth Leadership:** Presenting the role model and the leadership qualities of the role model which influence them.
4	**Importance and Role of Youth Leadership:** Group activity to understand the importance of leadership and how to apply it in real life scenarios.
5	**Health, Hygiene and Diseases:** Case study on hygiene in rural India.
6	**Needs and Meaning of Socio-Economic Survey:** Poster making on water conservation awareness
7	**Needs and Meaning of Socio-Economic Survey:** Survey on road safety awareness.
8	**Needs and Meaning of Socio-Economic Survey:** Presentation on Swachh Bharat Abhiyan.
9	**Environment and Energy Conservation Concepts:** Survey based on Environmental awareness.
10	**Environment and Energy Conservation Concepts:** Essay competition Renewable Energy.
11	**Disaster Management:** Survey preparedness to face any disaster.
12	**National Integration:** Stage activity of students group on fostering awareness of unity in diversity.

Sr. No.	Reference Books
1.	Gurmeet Hans, Case Materials as training aid for field workers, National Library of Australia, 1996.
2.	Ram Ahuja, Social Problems in India, Rawat Publications, 2012
	Web Resources
1.	www.nss.gov.in
2.	https://nss.gov.in/sites/default/files/manualNss2006.pdf

Chairman, BoS
Mechanical Engg.

Course Title: Multivariable Calculus **Course Code: NT262004**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Lectures:03hrs./week	CA-1	10Marks
Tutorial:-----	CA-2	10Marks
Credits: 03	MSE	20Marks
Semester: First Year (Semester II)	ESE	60Marks

Course Prerequisite:

- Basic Calculus: Understanding of differentiation and integration, including higher-order derivatives and integrals.
- Elementary Differential Equations: A foundational understanding of simple ordinary differential equations (ODEs), including first-order equations and basic solution techniques.
- Multivariable Calculus: Familiarity with partial derivatives and multiple integrals, which is essential for vector calculus and partial differential equations.

Course Description: This course covers the study of differential equations and vector calculus with applications in engineering. It focuses on solving first-order and higher-order ordinary differential equations (ODEs), including exact linear, Bernoulli's equations and applying shortcut methods for linear equations with constant coefficients. The course also introduces partial differential equations (PDEs) and their solution techniques. Students will learn vector calculus concepts such as gradient, divergence, curl and apply vector integral theorems like Green's, Gauss' and Stokes' theorems. The course emphasizes practical applications in mechanical, electrical and civil engineering providing the mathematical tools needed to solve real-world engineering problems.

Course Objectives:

1. To solve first-order and higher-order differential equations, including exact, linear and Bernoulli's equations with engineering applications.
2. To learn methods for solving linear differential equations with constant coefficients using shortcut techniques.
3. To apply linear differential equations to real-world mechanical and civil engineering problems and solve partial differential equations using techniques like separation of variables.
4. To understand and apply vector calculus concepts (gradient, divergence, curl) in physical fields.
5. To use vector integral theorems (Green's, Gauss', and Stokes') for solving engineering and physics problems.

Course Outcomes:

COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	Recall the concepts of vector calculus and techniques for solving the differential equations.	Remember (Level 1)
CO2	Compute the solution of mathematical problems related to differential and vector calculus.	Understand (Level 2)
CO3	Solve the mathematical problems involving differential equations and vector operations.	Apply (Level3)
CO4	Analyze ordinary and partial differential equations and vector calculus concepts to solve engineering problems using appropriate analytical techniques.	Analyze (Level 4)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2									1		
CO2	3	2									1		
CO3	3	2									1		
CO4	3	2									1		

Assessment	
CA-1 (a)	Subjective Test/Assignment / MCQ Test etc.
CA-2 (b)	Subjective Test/Assignment/MCQ Test etc.
MSE (c)	Subjective Test
ESE (d)	End Semester Examination

Course Contents		
Unit1	**Ordinary Differential Equations of First Order and First Degree and Their Applications** Introduction; Exact differential equations; Linear equations; Reducible to linear equations (Bernoulli's equation); Applications to orthogonal trajectories, mechanical engineering and electrical engineering.	6 Hrs.
Unit2	**Linear Differential Equations with Constant Coefficients** Introduction; complementary function, particular integral; Rules for finding complementaryfunctionsandparticularintegrals(ShortcutMethods–TypeI$X=e^{ax}/\ k\ /a^x$,Type II$X=\sin ax/\sin(ax+b)$,Type III$X=\sinh ax/\sinh(ax+b)$,Type IV $X=x^m$(polynomialin x), Type V$X=e^{ax}V$, Type VI$X=xV$(where V is function of x only).	6 Hrs.
Unit3	**Applications of Linear Differential Equations with Constant Coefficients** Introduction; Cauchy's homogeneous linear equations; Legendre's linear equations; applications to mechanical engineering and civil engineering.	6 Hrs.
Unit4	**Partial Differential Equations** Introduction; Formation of Partial differential equations by eliminating arbitrary constants and arbitrary functions, Direct Integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables.	6 Hrs.
Unit5	**Vector Differential Calculus** Introduction; Definition and types of vectors; Scalar point function and vector point function: Gradient, divergence and curl; Solenoidal and irrotational vector fields (Conservative field).	6 Hrs.
Unit6	**Vector Integral Calculus** Introduction; Vector Integration & its application: line integral, Work done, Circulation; Green's theorem, Gauss' divergence theorem and Stokes' theorem (without proofs).	6 Hrs.

Chairman, BoS
Mechanical Engg.

Sr.No.	Textbooks
1.	Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 2012.
2.	Ramana, B.V., Higher Engineering Mathematics, McGraw Hill Education India, 2008.
3.	Bali,N.P., & Goyal,M.(2019).ATextbook of Engineering Mathematics Laxmi Publications,10th Edition.
	Reference Books
1.	Kreyszig, Erwin, Advanced Engineering Mathematics, Wiley India,2 007.
2.	Jain,R.K., and Iyengar, S.R.K., Engineering Mathematics Vol.1&2, Narosa Publishing House, 2002.
3.	Dass,H.K., Advanced Engineering Mathematics, S.Chand Publishing,2010.
4.	Thomas, GeorgeB., and Finney,R.L., Calculus and Analytic Geometry, Pearson,2010.
5.	Singh, Ravish, and Bhatt, Mukul, Engineering Mathematics: A Tutorial Approach, McGraw Hill Education India, 2017.
	Web Resources
1.	Differential Equations for Engineers, https://nptel.ac.in/courses/111106100
2.	Advanced Calculus for Engineers, https://nptel.ac.in/courses/111105160
3.	Advanced Engineering Mathematics, https://nptel.ac.in/courses/111107119

Chairman, BoS
Mechanical Engg.

Course Title: Applied Science I **Course Code: NT262005**	**Course Category: BSC**	
Teaching Scheme	**Examination Scheme**	
Lectures: 03 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 03	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Basic knowledge of secondary and higher Physics
- Basic knowledge of algebra and trigonometry

Course Description: Physics is the backbone of all engineering disciplines. Physics is not just important in engineering, it's essential. It empowers engineers to understand the world, design with precision, innovate responsibly, and build solutions that improve lives. In structural analysis Physics is used in calculating stress, strain, and load distribution in buildings and bridges. In Soil Mechanics Physics is used for Understanding pressure and fluid flow through soils. In Earthquake Engineering Physics wave propagation is used to design earthquake-resistant structures. In Traffic and Water Flow Models, Physics is used for Applying fluid dynamics in drainage and water systems.

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concepts to resolve many Engineering and Technological problems.
2. To study the fundamentals of wave motion and optics.
3. To introduce the fundamental principles of quantum mechanics and nuclear physics, enabling students to study the behaviour of macroscopic & microscopic objects.
4. To provide a fundamental understanding of crystal structures and the principles of X-ray generation and diffraction.
5. To understand and study the Physics principles behind the development of engineering materials.

Course Outcomes:

COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	**Recall** the fundamental principles, laws and basic concepts of classical Physics and modern Physics.	Remember (Level 1)
CO2	**Interpret** the behaviour of macroscopic & microscopic objects using fundamentals of wave motion, Optics, quantum mechanics, crystal structure & electromagnetic waves.	Understand (Level 2)
CO3	**Describe** the properties of functional materials and the essentials of nuclear physics used in engineering systems.	Understand (Level 2)
CO4	**Use** fundamental principles and the laws of physical optics, crystallography and quantum mechanics in various engineering applications.	Apply (Level 3)
CO5	**Apply** fundamental principles of physics to perform experiments on optics, nuclear physics and material science for skill development through hands-on practice.	Apply (Level 3)
CO6	**Examine** the experimental behaviour of physical systems based on wave dynamics and optical effects.	Analyze (Level 4)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2											
CO2	3	2											
CO3	3	2											
CO4	2	1											
CO5	3	2									1		
CO6	2	1									1		

Assessment	
CA-1 (a)	Subjective Test / Assignment /PowerPoint Presentation etc.
CA-2 (b)	Subjective Test /Model Making / Assignment / Presentation etc.
MSE (c)	Subjective Test
ESE (d)	End-Semester Examination
Practical (e)	Practical Performance and viva examination

Course Contents		
Unit 1	**Wave Motion** **Oscillations**: Free oscillation, damped oscillation, Forced Oscillation-Definitions, Applications. **Acoustics**: Introduction, Reflection of sound (reverberation and echo), absorption coefficient, Acoustical planning of building and factors affecting architectural acoustics of building. **Ultrasonic Waves**: Properties, Production of Ultrasonics waves: Magnetostriction method and Piezoelectric method, Applications, Numerical.	6 Hrs
Unit 2	**Engineering Optics** **Interference**: Interference, Types of Interference, Newton's ring- Formation, derivation of diameter. **Lasers**: Characteristics, Absorption, spontaneous emission and stimulated emission; metastable state, population inversion, pumping, resonant cavity, He-Ne Laser, Applications of Lasers **Optical fiber**: Structure, Principle, Acceptance angle, Acceptance cone, Numerical aperture, applications of fiber optics. Numerical**.**	6 Hrs
Unit 3	**Quantum Mechanics & Nuclear Physics** **Quantum Mechanics**: De-Broglie hypothesis of matter waves, Heisenberg's uncertainty principle, Schrodinger's time-dependent wave equation, Schrodinger's time-independent wave equation, Introduction to quantum computing (bits & qubits), Numericals. **Nuclear Physics**: Nuclear Fission & Fusion, Properties of α, β and γ rays, Geiger Muller Counter	6 Hrs

Chairman, BoS
Mechanical Engg.

Unit 4	**Crystal Structure and X-rays** **Crystal Structure**: Fundamental concepts (lattice, basis, unit cell, crystal systems), Cubic structure: Number of atoms per unit cell, atomic radius, co-ordination number, packing fraction, Miller indices, Relation between ρ and a **X-rays**: Introduction to X-ray, X-ray diffraction, Explanation of Line and Continuous Spectrum of X-ray, Applications, Numerical.	6 Hrs
Unit 5	**Newtonian Mechanics & Electromagnetism** **Newtonian Mechanics**: Newtons laws of motion, Velocity, Work, Power, Energy- Law of conservation of Energy, Kinetic Energy, Potential Energy, Strain Energy. **Introduction to Electromagnetic theory**: Motion of electron in electric field, motion of electron in magnetic field, Motion of electron in cross field, Numericals.	6 Hrs
Unit 6	**Physics of Advanced Materials** **Magnetic materials**: Introduction, Properties of Diamagnetic, Paramagnetic and Ferromagnetic materials, Applications, B-H Curve. **Superconductors**: Definition, critical magnetic field, critical temperature, Zero resistance, Meissner effect, Type I and Type II Superconductors.	6 Hrs

Sr. No.	Textbooks
1.	R.K. Gaur and S. L. Gupta, Engineering Physics Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
2.	M.N. Avadhanulu and P.G. Kshirsagar, Engineering Physics, S. Chand and Company LTD.
	Reference Books
1.	Ajoy Ghatak, Optics, MacGraw Hill Education (India) Pvt. Ltd.
2.	Charles Kittel, Introduction to solid state physics. John Willey and Sons
3.	A.J. Dekker, Solid State Physics McMillan India –Limited.
4.	Halliday, Fundamentals of physics Electricity and Magnetism, Wiley India, 2011
5.	Beiser A; Mahajan S, Concept of Modern Physics, Tata McGraw-Hill Publishing Company Limited.
	Web Resources
1.	Applied Optics, NPTEL, https://nptel.ac.in/courses/115107131
2.	Fundamentals of Engineering Physics, https://nptel.ac.in/courses/122103011
3.	Concepts in Magnetism & Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

Chairman, BoS
Mechanical Engg.

Course Title: Engineering Mechanics **Course Code: NT262104**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Lectures:04hrs/week	CA-1	10 Marks
Tutorial:-----	CA-2	10 Marks
Credits:04	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Fundamental of Physics
- Basics of Trigonometry, Geometry and Mathematical Rules and Regulation

Course Description: Engineering Mechanics is the branch of Physics which deals with the study of the effect of force system acting on a particle or a rigid body which may be at rest or in motion with consideration of different laws, principle, theorem and mathematical rules and regulation.
Engineering Mechanics is considered a basic subject for engineering students irrespective of branches, study of this subject helps develop the thinking, analytical ability and imaginative skill of the student.
Engineering Mechanics is the basic subject which supports many other subjects like Strength of Materials, Theory of Machines, Kinetics of Machines, Dynamics of Machines, Fluid Mechanics, Fluid Machines, Machine Design, Tool Design, etc. to apply the engineering concept for manufacturing of various products and projects such as automobile, aircrafts, electric motors, robots, construction of roadways, railways, bridges, dams, power transmission towers, projectile of missiles, satellites and many more.

Course Objectives:

1. To study the resolving forces and moments for a given force system
2. To locate Centre of gravity and Moment of Inertia of plane surfaces
3. To describe fundamental Laws and Conditions of static and dynamic equilibrium for given force system.
4. To compute the different motion characteristics of a body/particle with and without considering force causing motion

Course Outcomes:

COs	**After completion of the course:** **Student will be able to**	**Bloom's Level**
CO1	**Recognize** different fundamentals of Engineering Mechanics.	Remember (Level1)
CO2	**Discuss** effect of forces on rigid body/particle in statics and dynamics considering C.G.&M.I.	Understand (Level2)
CO3	**Solve** problems on rigid bodies/particle subjected to various forces in static and dynamic conditions.	Apply (Level3)
CO4	**Examine** beam reactions, frictional effects, truss behavior and composite areas under equilibrium conditions.	Analyze (Level4)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

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

Assessment	
CA-1(a)	Subjective Test/Course Project/Assignments/Presentation
CA-2(b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test
ESE (d)	End-Semester Examination

CourseContents		
Unit 1	**Introduction to Engineering Mechanics and Force System** Importance of Engineering Mechanics, Definition, Scope and applications, Fundamental Concepts and Different Newton's Laws, Force and Characteristics of Force, Force System and its Classification, Composition of forces, resolution of forces and resultant. Problem on Resultant Force. Principle of Transmissibility, Principle of Superposition, Law of Triangle, Law of Polygon, Law of Parallelogram of Forces and Problem on Same, Moment, Couple and Varignon's Theorem and Problems	6Hrs
Unit 2	**Equilibrium of Rigid Bodies** Definition of Equilibrium and Conditions of Equilibrium 2D and 3D, Free Body Diagram and Procedure for same. Lami's Theorem, Numerical on Rope and Cylinder kind, Types of Loads and types of Support, Numerical on Beam Reaction.	6Hrs
Unit 3	**Truss and Friction** Introduction and Types of Trusses, Assumption for Perfect Truss, Different methods of Analysis of Truss, Numerical on Method of Joints and Method of Section, Introduction to Friction and Mechanism of Same, Limiting Frictional Force and Laws of Friction, Angle of Friction, Angle of Repose and Cone of Friction, Numerical on Block Friction, Numerical on ladder Friction and Numerical on Wedge Friction.	6Hrs

Chairman, BoS
Mechanical Engg.

Unit 4	**Center of Gravity and Moment of Inertia** Centroid, Center of Mass and Center of Gravity, Center of Gravity of Flat Plate and Centroid of an Area, Centroid of Triangular Area and Semicircular Area, Numerical on Centroid of Composite Area, Moment of Inertia of Rigid Body, Area moment of Inertia, Mass Moment of Inertia. Perpendicular Axis Theorem, Parallel Axis Theorem, Radius of Gyration, Moment of Inertia of Some Standard Geometrical Shapes, Numerical based on Moment of Inertia of Composite Area	6Hrs
Unit 5	**Kinematic of Particle/Rigid Body** Introduction to Dynamics and Kinematic, Motion and Types of Motion, Linear Motion and Numerical on Same, Variable Motion and Numerical on Same, Projectile Motion and Numerical on Same, Curvilinear Motion and Numerical on Same, Rotational Motion and Numerical on Same	6Hrs
Unit 6	**Kinetic of Particle/Rigid Body** Introduction to Kinetics, Impact and Numerical on Same, Impulse, Momentum and Numerical on Same, Work, Energy, Power and Numerical on same, D'Alembert's Principle and Numerical on Same.	6Hrs

Sr. No.	TextBooks
1.	S. Timoshenko, D. H. Young, Engineering Mechanics, McGraw Hill, 1995.
2.	Tayal A. K., Engineering Mechanics, Umesh Publications, 2010.
3.	Bhavikatti S. S., Rajashekarappa K. G., Engineering Mechanics‖, New Age International Publications, 2nd Edition.
4.	Beer, Johnston, Vector Mechanics for Engineers‖, Vol. 1: Statics and Vol. 2: Dynamics, McGraw Hill Company Publication, 7th edition, 1995
	Reference Books
1.	Irving H. Shames, Engineering Mechanics Statics and Dynamics, Pearson Educations, Fourth edition, 2003.
2.	McLean, Nelson, Engineering Mechanics Schaum's outline series, McGraw Hill Book Company, N. Delhi, Publication
3.	Singer F. L., Engineering Mechanics -Statics & Dynamics, Harper and Row Pub. York
4.	Junnarkar S.B., and Shah, H.J., Applied Mechanics, Charotar Publication House Anand
	Web Resources
1.	Engineering Mechanics, https://nptel.ac.in/courses/112106286
2.	Engineering Mechanics by K Ramesh, https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLyqSpQzTE6M_MEUdn1IzTMB2yZgP1NLfs

Chairman, BoS
Mechanical Engg.

Course Title: Applied Engineering **Course Code: NT262201**		**Course Category: PCC**
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 02	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks

Course Prerequisite:

- Basic Laws of Physics.
- Basic Knowledge of construction materials (cement, steel, concrete, etc)

Course Description: This course provides foundational knowledge of core concepts and applications in Mechanical and Civil Engineering. It introduces students to essential topics such as thermodynamics, automotive systems, jet propulsion, power plants, and construction principles. Emphasis is placed on real-world engineering practices, emerging technologies, and interdisciplinary innovation. Students will gain insights into professional roles, safety standards, and the use of basic civil and mechanical engineering tools and instruments. The course aims to develop practical understanding and prepare students for diverse career paths in engineering.

Course Objectives:

1. To recall the roles, applications, various domains, current trends, different laws of thermodynamics, basics of I.C. engine and workplace safety and different measuring instruments in mechanical engineering.
2. To know the Hydraulic Structures, Types of Dams, Different barrages, Irrigation methods, Water Treatment Plant.
3. To understand different manufacturing processes, design thinking process, I.C. engine, jet propulsion and different power plants.
4. To summarize building materials, components and planning

Course Outcomes:

COs	**After completion of the course: Students will be able to**	**Bloom's Level**
CO1	**Recall** the fundamental principles and scope of Mechanical & Civil engineering, properties and uses of building materials and basics of hydraulics.	Remember (Level 1)
CO2	**Explain** the basics of thermodynamics, components of building and building plan layout, working and components of I.C. Engines, principles of jet propulsion systems and power plants.	Understand (Level 2)
CO3	**Illustrate** the performance of ideal and actual thermodynamic cycles such as Carnot, Otto, Diesel and Rankine.	Apply (Level 3)
CO4	**Apply** the principles of civil engineering materials, building planning, and hydraulics to select suitable construction materials, prepare basic building layouts, and identify appropriate hydraulic structures, irrigation methods, and water treatment processes.	Apply (Level 3)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

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

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test
ESE (d)	End Semester Examination

Course Contents		
Unit 1	**An Insight into Mechanical Engineering** Introduction to Mechanical Engineering and roles of mechanical engineer, Revolutionary innovations and applications of mechanical engineering in various disciplines, Various domains of mechanical engineering and carrier paths, Current trends and future scope in mechanical engineering, Introduction to new product development (Design Thinking Process) and basic manufacturing processes, Workplace safety.	4Hrs
Unit 2	**Basic Thermodynamics and Automotive Systems** Introduction to thermodynamics, types of systems, Zeroth, first and Second law of thermodynamics with simple examples pertaining to respective branches, Basic terminology of I.C. Engine. Working of 2 and 4 strokes (Petrol and Diesel engine), Automotive system (Engine, transmission, steering system and brake systems), New technology in automobile industry (Electric vehicle, Hydrogen power vehicles working principle and parts)	4Hrs
Unit 3	**Jet Propulsion and Power Plant Engineering** Jet engine working principle and different parts, Aircraft system (Flight control system and landing gear system), Introduction to power plant engineering, working principle, block diagram and components (Steam power plant, nuclear power plant and Gas turbine power Plant)	4Hrs
Unit 4	**Introduction to Civil Engineering and Building Materials** Various Branches, role of civil engineer in various branches, Engineering properties and uses of materials: Soil, bricks, timber, stones, sand, aggregates, cement, steel, bitumen, glass, Mortar, Concrete, FRP, composite materials.	4Hrs

Chairman, BoS
Mechanical Engg.

Unit 5	**Building Planning and Its Components** Principles of planning, Component of building and its functions, Foundation and superstructure, plinth, walls, lintels, beams, columns, Slabs, roofs, staircases, floors, doors, windows, sills, Study of Building plans, Ventilation, Typical building layout.	4Hrs
Unit 6	**Introduction to Hydraulics** Basic Introduction of Hydraulic Structures, Types of Dams, Different barrages, Irrigation methods, Water Treatment Plant	4Hrs

Sr. No.	Textbooks
1.	P.K. Nag, Engineering Thermodynamics, Tata Mc-Graw-Hill Publication
2.	Domkundwar and Arora, Engineering Thermodynamics, Dhanpat Rai Publication
3.	Mathur and Sharma, Internal Combustion Engine Dhanpat Rai Publication
4.	G.K. Hiraskar, Basic Civil Engineering, Dhanpat Rai Publications in 2004
5.	Anurag Kandya, Elements of Civil Engineering, Charotar Publishing House Pvt. Limited, 2003
	Reference Books
1.	Jonathan Adam Wickert and Kemper Lewis, An introduction to Mechanical Engineering, Thomson Publication
2.	Jack D. Mattingly, Elements of Gas Turbine Propulsion, Tata Mc-Graw-Hill Publication
3.	P.K. Nag, Power Plant Engineering, Tata Mc-Graw-Hill Publication
4.	Arora S. P. and Bindra S.P.,Building Construction, Dhanpat Rai and Sons, Delhi.
5.	Garg S.K. Water Resources Engineering, Volume I, Khanna Publishers, New Delhi
	Web Resources
1.	Basic Thermodynamics: Classical and Statistical Approaches, NPTEL, https://nptel.ac.in/courses/104106107
2.	Basics of Mechanical Engineering, https://nptel.ac.in/courses/112104526
3.	Introduction to Civil Engineering Profession, NPTEL, https://nptel.ac.in/courses/105106201

Chairman, BoS
Mechanical Engg.

Course Title: Indian Knowledge System **Course Code: GE262702**		**Course Category: HSSM-IKS**
Teaching Scheme	**Examination Scheme**	
Lectures: 02 hrs/ week	CA-1	10 Marks
Tutorial: -----	CA-2	10 Marks
Credits: 02	MSE	20 Marks
Semester: First Year (Semester II)	ESE	60 Marks
Course Prerequisite: None		

Course Description:

This course provides a comprehensive overview of the Indian Knowledge System (IKS) by exploring the scientific and technological contributions of ancient and modern India across various domains. It covers the foundations of IKS with a focus on mathematics, astronomy, architecture, metallurgy, textiles, and agriculture. The course aims to foster awareness of India's intellectual heritage and its relevance to contemporary science and engineering. It encourages learners to critically appreciate the interdisciplinary nature and global impact of traditional Indian knowledge.

Course Objectives:

1. To understand the foundational concepts and necessity of the Indian Knowledge System.
2. To identify key historical contributions of Indian scholars in mathematics, astronomy, architecture, metallurgy, textiles, and agriculture.
3. To interpret the scientific principles and techniques underlying traditional Indian practices.
4. To analyze the relevance of IKS in modern scientific and technological contexts.
5. To appreciate the global influence and sustainability of Indian innovations throughout history.

Course Outcomes:

COs	**After completion of the course, Students will be able to**	**Bloom's Level**
CO1	**Recall** key concepts, terminologies, historical developments, and contributions in Indian Mathematics, Astronomy, Architecture, Metallurgy, Textiles, and Agriculture.	Remember (Level 1)
CO2	**Explain** the principles, methods, and scientific basis of Indian Knowledge Systems in various domains such as mathematics, astronomy, architecture, metallurgy, textiles, and agriculture.	Understand (Level 2)
CO3	**Use** traditional Indian scientific and technological methods to address contemporary or theoretical problems in relevant fields.	Apply (Level 3)
CO4	**Examine** the relevance, strengths, and limitations of Indian Knowledge Systems in addressing contemporary scientific, environmental, technological, and societal challenges.	Analyze (Level 4)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

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

Assessment	
CA-1 (a)	Subjective Test / Open-book test / etc.
CA-2 (b)	Model Making / Assignment / Presentation / etc.
MSE (c)	Subjective Test
ESE (d)	Exam administered by the respective Department

Course Contents		
Unit 1	**Indian Mathematics** Necessity of Indian Knowledge System, Defining Indian Knowledge System, Contributions of Indian Mathematicians, Historical Evidence and features of Indian Numerical Number System, The Idea of Zero and Infinity, Decimal System, Representation of Large Numbers, Global Spread and Adoption of Indian Numericals, Arithmetic (Square of a Number, Square Root, Series and Propagation), Geometry (Simple Constructions from Sulba-Sutras, e.g., Right Angle Triangle, The Value of Pi), Trigonometry and Algebra in IKS, Modern Indian Contributions to Mathematics	4 Hrs
Unit 2	**Indian Astronomy** Historical Development of Indian Astronomy, Astronomy for Timekeeping, Solar and Lunar Motions, The Celestial Coordinate System, Various Regional Indian Calendar Systems, Planetary Model of Aryabhata and Nilakantha, Astronomical Instruments, Various Royal Endeavors for Astronomy (e.g., Jaisingh's Jantar Mantar), Modern Indian Contributions to Astronomy	4 Hrs
Unit 3	**Indian Architecture and Town Planning** Sthapatya-Veda and Vastu-Shastra, Historical Features of Indian Town Planning, Water Management and Drainage Systems, Town Planning of Harappan Cities, Temple Architecture, Features and Examples of Cave, Rock Cut, Nagara, Dravida, Kalinga, Vesara, Deccan, Rajput, Mughal, Indo-Saracenic Architecture Styles, Modern Indian Contributions to Architecture and Town Planning	4 Hrs
Unit 4	**Indian Metallurgy** Ancient Mining and Ore Extraction Technologies, Mining and Manufacture of Zinc, Copper and its Alloys, Silver, Gold, Mercury and Lead, Iron Extraction from Biotite, Steel Manufacturing, Global Influence of Wootz Steel, Wax Casting, Modern Indian Contributions to Metallurgy	4 Hrs
Unit 5	**Indian Textile** Textile Traditions in Ancient India, The Variety and Diversity of Indian Textiles, Types of Fabrics and Materials, Cotton and Silk, Weaving Techniques and Looms, Dyeing Process and Natural Colors, Major Textile Centers, Significance of Indian Textile in Historical Global Trade, Fall of Indian Textile in Colonial Era, Modern Indian Contributions to Textile	4 Hrs

Chairman, BoS
Mechanical Engg.

Unit 6	**Indian Agriculture** Importance of Agriculture in Ancient India, Traditional Crops (Grains, Fruits, Vegetables Spices), Significance of Indian Agricultural Products in Historical Global Trade, Significance of Agriculture and Irrigation for the Indian Kings, The Ery System of South India, Traditional Farming Techniques (Land Preparation, Sowing Techniques, Weeding and Pest Management, Harvesting and Storage), Irrigation Techniques and Rainwater Harvesting, Modern Indian Contributions to Agriculture	4 Hrs

Sr. No.	Textbooks
1.	D. M. Bose, S. N. Sen and B. V. Subbarayappa, Eds., A Concise History of Science in India, 2nd Ed., Universities Press, Hyderabad, 2010.
2.	B. Mahadevan, Nagendra Pavana, Vinayak Rajat Bhat, Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning, 2022
3.	Kapil Kapoor, Awadhesh Kumar Singh, Indian Knowledge Systems, D.K. Print World Ltd; First Edition (15 October 2005)
4.	Bhag Chand Chauhan, IKS: The Knowledge system of Bharata, Garuda Prakashan (13 March 2023)
5.	Science in India: A Historical Perspective by B V Subbarayappa, Rupa & Co (2013)
	Reference Books
1.	G. G. Joseph, Indian Mathematics Engaging the World from Ancient to Modern Times, World Scientific, London, 2016
2.	History of Astronomy: A Handbook, Edited by K. Ramasubramanian, Aniket Sule, andbMayank Vahia, SandHI, IIT Bombay, and T.I.F.R. Mumbai, 2016.
3.	History of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishna Mission Institute of Culture, Kolkata (2014).
4.	Christopher Tadgell, History of Architecture in India, Architecture Design and Technology Press (1990)
5.	Bindia Thapar, Introduction to Indian Architecture, Periplus Asian Architecture Series
	Web Resources
1.	Indian Knowledge System Division, Ministry of Education, Government of India, https://iksindia.org/lectures-and-videos.php

Chairman, BoS
Mechanical Engg.

Course Title: Applied Science I Lab **Course Code: NT262006**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Practical's/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Awareness of common lab equipment like Vernier calipers, micrometers etc.
- Knowledge of physical quantities, units and measurement techniques.
- Ability to interpret and plot graphs.

Course Description: Physics is the backbone of all engineering disciplines. It empowers engineers to understand the world, design with precision, innovate responsibly and build solutions that improve lives. In structural analysis Physics is used in calculating stress, strain, and load distribution in buildings and bridges. In Soil Mechanics Physics is used for Understanding pressure and fluid flow through soils. In Earthquake Engineering Physics wave propagation is used to design earthquake- resistant structures. In Traffic and Water Flow Models, Physics is used for Applying fluid dynamics in drainage and water systems.

Course Objectives:

1. To provide a firm grounding in the basic physics principles and concepts to resolve many Engineering and Technological problems.
2. To understand and study the Physics principles behind the development of engineering materials.

Note: The Course Outcomes (COs) and the corresponding CO-PO mapping for this laboratory course are aligned with and detailed in the respective Theory Course Syllabus.

Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 5 to 8
ESE (c)	Practical Performance and viva examination

Sr. No.	**List of Experiments**
1	**Newton 's rings** - Determination of the radius of curvature of Plano-convex lens /wavelength of light
2	**Laser** - Determination of the wavelength of He-Ne laser light
3	**G.M. Counter** - Determination of operating voltage of G.M. tube
4	**Ultrasonic interferometer**-Determination of the velocity of ultrasonic waves in different liquids.
5	**Crystal Plane** – Study of planes with the help of models related to Miller Indices.
6	**Fiber optics**- To determine the numerical aperture and acceptance angle of an optical fiber
7	**Torsional Pendulum:** To determine the elastic constant of the wire(Y) and rigidity modulus(η) of a given metal wire by using the Torsional Pendulum. (Searle's method)
8	**Hysteresis Loop**-B - H Curve Experiment

Chairman, BoS
Mechanical Engg.

Sr. No.	Textbooks
1.	R.K. Gaur and S. L. Gupta, Engineering Physics Dhanpat Rai Publications Pvt. Ltd.-New Delhi.
2.	M.N. Avadhanulu and P.G. Kshirsagar, Engineering Physics, S. Chand and Company LTD.
	Reference Books
1.	Ajoy Ghatak, Optics, MacGraw Hill Education (India) Pvt. Ltd.
2.	Charles Kittel, Introduction to solid state physics. John Willey and Sons
3.	A.J. Dekker, Solid State Physics McMillan India –Limited.
4.	Halliday, Fundamentals of physics Electricity and Magnetism, Wiley India, 2011
5.	Beiser A; Mahajan S, Concept of Modern Physics, Tata McGraw-Hill Publishing Company Limited.
	Web Resources
1.	Applied Optics, NPTEL, https://nptel.ac.in/courses/115107131
2.	Fundamentals of Engineering Physics, https://nptel.ac.in/courses/122103011
3.	Concepts in Magnetism & Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

Chairman, BoS
Mechanical Engg.

Course Title: Workshop Practices **Course Code: GE262105**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Students should possess fundamental knowledge of basic science and mathematics from secondary education and must demonstrate an interest in understanding tools, safety protocols, and workshop processes. They should be ready to engage in hands-on learning involving measurement, marking, material handling, and elementary fabrication using standard workshop tools and equipment.

Course Description: This course is designed to equip first-year engineering students from non-circuit branches with foundational skills in workshop practices essential for real-world engineering applications. Emphasis is placed on safety protocols, correct use of personal protective equipment (PPE), and the handling of common tools and materials. Through hands-on experience in fitting, carpentry, sheet metal, and plumbing operations, students will learn to measure, mark, cut, assemble, and evaluate basic engineering components. The course builds practical competence and fosters an understanding of how mechanical and civil structures are fabricated and assembled in industrial and construction environments.

Course Objectives:

1. To inculcate safety consciousness through knowledge and demonstration of Personal Protective Equipment (PPE) and workshop hazard protocols.
2. To train students in accurate measurement, marking, and metalworking skills using standard fitting tools.
3. To develop competency in fundamental carpentry skills required for basic construction joints.
4. To impart sheet metal fabrication techniques essential for creating basic utility components.
5. To introduce practical plumbing operations including cutting, threading, and layout for basic pipework systems.

Course Outcomes:

COs	**After completion of the course:** **Student will be able to**	**Bloom's Level**
CO1	**Recall** fundamental workshop safety guidelines, correct use of personal protective equipment (PPE), basic first aid awareness, and safe handling and storage of tools and materials.	Remember (Level 1)
CO2	**Explain** the objectives, principles, and standard procedures of basic workshop processes such as measuring, cutting, joining, assembling, and finishing.	Understand (Level 2)
CO3	**Apply** foundational fabrication and assembly skills to create simple functional products or structures using appropriate tools, equipment, and techniques.	Apply (Level 3)
CO4	**Analyze** fabricated components and assembled circuits for dimensional accuracy, functionality, safety, and quality, and identify suitable corrective measures.	Analyze (Level 3)

Chairman, BoS
Mechanical Engg.

CO-PO Mapping

CO-PO Mapping													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO 1**	**PSO 2**
CO1	2	1			2			2	1				
CO2	2	2	1		2			1	1	1			
CO3	2	2	3	1	3			1	2	1	1		
CO4	2	3	2	2	2			2	1	1			

Assessment	
CA-I (a)	Based on 02 Practical's from 01 to 05
CA-II (b)	Based on 03 Practical's from 01 to 05
ESE (c)	Practical exam and Viva exam

Sr. No.	List of Experiments
1	Familiarization with PPE, first aid protocols, fire safety, signage and safe Handling /storage of tools.
2	To prepare a precise rectangular piece from mild steel using standard fitting tools.
3	To make a half-lap wood joint, commonly used in structural frames.
4	To fabricate a basic utility item such as a toolbox or duct cover.
5	To cut and thread pipes for joining in fluid systems.

Sr. No.	Textbooks
1.	S. K. Hajra Choudhury, A. K. Hajra Choudhury, Elements of Workshop Technology Vol. I & II, Media Promoters & Publishers Pvt. Ltd.
2.	R. K. Rajput, Workshop Technology, Laxmi Publications.
3.	P. N. Rao, Manufacturing Processes Vol. I, Tata McGraw-Hill Education
4.	W. A. J. Chapman, Workshop Technology, CBS Publishers
5.	Santiram Kal, Basic Electronics: Devices, Circuits, and Applications, PHI Learning
	Reference Books
1.	P. N. Rao, Manufacturing Technology: Foundry, Forming, and Welding
2.	K. Venkat Reddy, Workshop Practice Manual, BS Publications

Chairman, BoS
Mechanical Engg.

3.	P. C. Sharma, Production Technology (Manufacturing Processes), S. Chand Publications
4.	K. C. John, Mechanical Workshop Practice, PHI Learning
5.	B. S. Raghuwanshi, Workshop Practice, Dhanpat Rai & Sons
	Web Resources
1.	Free IIT-level video lectures on workshop practices and manufacturing processes, NPTEL – Manufacturing Processes I & II
2.	MIT OpenCourseWare – Manufacturing Processes, High-quality lectures and lab demonstrations
3.	Mechstuff – Engineering Workshop Practices, Blog-style resources with diagrams and practical tips.
4.	SparkFun Soldering Tutorials, Beginner-friendly soldering and PCB tutorials

Chairman, BoS
Mechanical Engg.

Course Title: Programming for Problem Solving Lab **Course Code: NT262106**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 04 Hours/Week		
Tutorials: 01 Hours/Week	CA-I	30 Marks
Credits: 03	CA-II	30 Marks
Semester: First Year (Semester II)	ESE	40 Marks

Course Prerequisite: Students should have basic computer literacy and a fundamental understanding of Class XII mathematics, including arithmetic, algebra, and elementary functions.

Course Description: This course introduces students to the fundamentals of programming and computational problem-solving using Python. Students will learn to analyze problems and develop solutions using algorithms, flowcharts, and pseudocode before implementing them through Python programs. The course covers essential programming concepts such as variables, data types, operators, decision-making, loops, functions, data structures, strings, and file handling. It also introduces debugging, exception handling, and techniques for developing reliable and robust programs. Through hands-on practical exercises, students will apply Python to basic mathematical, numerical, and Mechanical Engineering problems and gain introductory exposure to NumPy, Matplotlib, Pandas, and scientific computing.

Course Objectives:

1. Develop computational thinking and problem-solving skills by analyzing problems and representing solutions using algorithms, flowcharts, and pseudocode.
2. Apply fundamental Python programming concepts such as variables, data types, operators, decision-making, loops, functions, and data structures to solve computational problems.
3. Use Python for basic engineering computation and data handling through file processing, NumPy, Matplotlib, Pandas, and introductory scientific and numerical computing.
4. Develop reliable and structured Python applications using debugging, exception handling, object-oriented programing and integrated programing techniques to solve simple mechanical engg. problems.

Course Outcomes:

COs	After completion of the course, Students will be able to	Bloom's Level
CO1	**Understand** the fundamental concepts of Python programming, including variables, data types, operators, control structures, functions, and basic data structures.	Understand (Level 1)
CO2	**Explain** problem-solving approaches, debugging techniques, exception handling, file handling, and basic object-oriented programming concepts using Python.	Understand (Level 2)
CO3	**Apply** Python programming concepts and scientific computing libraries such as NumPy and Matplotlib to solve basic numerical and engineering problems.	Apply (Level 3)
CO4	**Analyze** engineering problems and select appropriate Python programming constructs, data structures, and computational techniques to develop and evaluate solutions.	Analyze (Level 4)

CO-PO Mapping:

CO-PO Mapping

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

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Performance & Evaluation of Practical
CA-II (b)	Performance & Evaluation of Practical
ESE (c)	Practical Performance and Viva exam

	List of Tutorials
1.	Foundations of Computing & Problem Solving
2.	Datatype, Variables & Expression
3.	Control Flow: Decisions
4.	Control Flow: Repetition
5.	Functions & Modular Thinking
6.	Data Structures for Organizing Information: List, Tuple, Set, Dictionary
7.	File I/O & Data Handling
8.	Errors, Debugging & Robust Programs: Exception Handling
9.	Introduction to Scientific & Numerical Computing
10.	Object-Oriented Programming

Sr. No.	List of Experiments
1.	To set up the Python programming environment and implement basic Python programs using input and output operations.
2.	To implement basic problem-solving techniques using algorithms, flowcharts, and pseudocode and translate them into Python programs.
3.	To implement programs using variables, constants, data types, and type conversion in Python.
4.	To implement arithmetic, relational, logical, and assignment operators and evaluate Python expressions.
5.	To implement decision-making programs using if, if-else, and if-elif-else statements.
6.	To implement programs using nested and compound conditional statements for solving real-world problems.
7.	To implement iterative programs using for loops and range() for solving numerical problems..
8.	To implement programs using while loops, nested loops, and loop-control statements.
9.	To implement user-defined functions using parameters, arguments, default arguments, and return values.
10.	To implement modular programs using functions, scope, and basic recursion.
11	To implement programs using Lists and Tuples for storing and processing collections of data.

Chairman, BoS
Mechanical Engg.

12	To implement programs using Sets and Dictionaries for organizing and managing data.
13	To implement string processing operations such as indexing, slicing, searching, splitting, and formatting.
14	To implement file handling operations for reading, writing, appending, and processing structured data.
15	To identify, trace, and debug syntax, logical, and runtime errors in Python programs.
16	To implement exception handling and input validation using try, except, else, finally, and raise.
17	To implement numerical computations using NumPy arrays, indexing, slicing, and vectorized operations.
18	To implement data analysis using Pandas Data Frames and visualize the results using Matplotlib.
19	To implement object-oriented programs using classes, objects, attributes, methods, and constructors.
20	To implement an integrated Python application using functions, data structures, file handling, exception handling, scientific libraries, and object-oriented programming concepts.

Sr. No.	Textbooks
1.	Cay S. Horstmann and Rance D. Necaise, Python for Everyone, 3rd Edition, Wiley India, 2024, ISBN: 9789357465304.
2.	David E. Clough and Steven C. Chapra, Introduction to Engineering and Scientific Computing with Python, 1st Edition, CRC Press, 2023, ISBN: 9781032188942.
	Reference Books
1.	Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 3rd Edition, O'Reilly Media.
2.	Charles Severance, Python for Everybody: Exploring Data in Python 3, CreateSpace Independent Publishing Platform
	Web Resources
1.	http://www.python.org http://www.w3schools.com/python http://www.geeksforgeeks.org/python-programming-language

Chairman, BoS
Mechanical Engg.

Course Title: Professional Development II **Course Code: GE262602**		**Course Category: SC-SEC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Completion or familiarity with Professional Development I
- Basic proficiency in English and willingness to develop professional skills further.

Course Description: This course advances students' professional competencies by focusing on leadership, teamwork, time and goal management, and advanced communication techniques. The practical activities foster self-awareness, effective collaboration, critical thinking, and written communication skills essential for academic and career success.

Course Objectives:

1. To help students recall essential terms, concepts, and components of leadership, time management, teamwork, and professional communication.
2. To help students understand key concepts of personal effectiveness, leadership, and communication in professional settings.
3. To enable students to apply practical skills in teamwork, time management, goal setting, and professional communication.
4. To encourage students to create structured and effective oral and written communication tailored to professional needs.

Course Outcomes:

COs	**After completion of the course, Students will be able to**	**Bloom's Level**
CO1	**Recall** key terminology, concepts, and components related to leadership, time management, teamwork, and professional communication.	Remember (Level 1)
CO2	**Explain** fundamental principles of leadership, time management, teamwork, and effective communication.	Understand (Level 2)
CO3	**Apply** essential professional skills such as role playing, presentation, email writing, and rapid reading in real-life scenarios.	Apply (Level 3)
CO4	**Create** structured written and spoken communication outputs such as essays, emails, and presentations for professional contexts.	Create (Level 6)

CO-PO Mapping

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

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Based on Activities: Sr. No. 01 to 05
CA-II (b)	Based on Activities: Sr. No. 06 to 10
ESE (c)	Viva exam

Sr. No.	List of Activities
1	SWOT Analysis
2	Goal Setting
3	Time Management
4	Leadership Skills
5	Teamwork
6	Presentation Techniques
7	Email Writing
8	Rapid Reading Session
9	Introduction to Phonemic Symbols
10	Practice & Exercise on Articulation of speech sounds

Sr. No.	Textbooks
1.	Mohd. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press
	Reference Books
1.	Krishna Mohan & Meera Banerji, Developing Communication Skills, Macmillan India
2.	Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press
	Web Resources
1.	https://www.coursera.org/specializations/professional-skills-for-the-workplace
2.	https://www.coursera.org/learn/emotional-intelligence-in-leadership-1
3.	https://www.coursera.org/learn/managing-professional-work-teams

Chairman, BoS
Mechanical Engg.

Course Title: Do It Yourself II **Course Code: GE262802**		**Course Category: ELC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: AU	CA-II	25 Marks
Semester: First Year (Semester II)	ESE	AU
Course Prerequisite: Do It Yourself – I.		
DIY II is program specific and will be conducted with multidisciplinary approach in the MAKERSPACE Lab.		

Chairman, BoS
Mechanical Engg.

Course Title: PBL: Engineering Exploration Lab **Course Code: GE262804**		**Course Category: ELC**
Teaching Scheme	**Examination Scheme**	
Practical/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15 Marks
Semester: First Year (Semester II)	ESE	20 Marks
Course Prerequisite: None. An open mind and willingness to work in diverse teams is essential.		
Course Description: This course introduces students to the fundamentals of platform-based development using Arduino microcontrollers, basic electronics, sensor-actuator interfacing, and simple mechanical mechanisms. Through a hands-on, project-based approach, students explore embedded systems, basic programming logic, and circuit building while integrating sensors and actuators with wireless communication modules. Additionally, the course familiarizes students with real-world mechanical linkages and their applications. By the end of the course, students will be able to build and troubleshoot simple, intelligent physical systems by combining electronics, programming, and mechanical design elements.		
Course Objectives: 1. To understand the basics of embedded systems and microcontrollers. 2. To develop skills in Arduino programs and circuit interfacing. 3. To integrate sensors, actuators, and communication modules in simple projects. 4. To foster creativity, problem-solving, and teamwork through practical engineering challenges.		

Course Outcomes:

COs	**After completion of the course, Student will be able to**	**Bloom's Level**
CO1	**Recall** and identify basic components of embedded systems and Arduino hardware platforms.	Remember (Level 1)
CO2	**Explain** the functionality of Arduino software platforms and basic electronic components.	Understand (Level 2)
CO3	**Construct** and test simple Arduino circuits using LEDs, switches, and sensors.	Apply (Level 3)
CO4	**Analyze** and troubleshoot embedded system circuits and Arduino programs for faults.	Analyze (Level 4)
CO5	**Design** and develop a complete embedded system integrating sensors, actuators, and communication modules for a specific application.	Create (Level 6)

CO-PO Mapping:

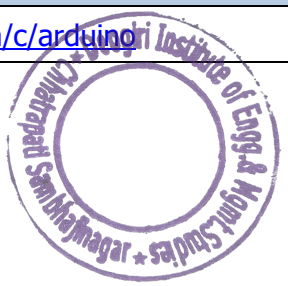
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	1			2	3	1			2	2	3		
CO2	2	2		1	3				2	2	3		
CO3	2	2	2	-	3				3	2	3		
CO4	2	2	3	1	3				3	2	3		
CO5	3	3	3	2	3				3	3	3		

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Design and implement a basic embedded system application using Arduino by interfacing multiple analog and digital sensors. Display and analyze the sensor outputs using the Serial Monitor.
CA-II (b)	Design and implement an embedded system using Arduino that takes multiple sensors inputs and provides different types of outputs, with the final results displayed on an LCD.
ESE (c)	Activity performance

Sr. No.	List of Activities
1.	Introduction to Digital I/O and Arduino IDE Basics.
2.	To control the LED brightness using a potentiometer
3.	Automatic Night Lamp Using LDR
4.	Read Sensor Values and control outputs based on conditions using the temperature sensor LM35.
5.	Distance Measurement Using Ultrasonic Sensor
6.	Analog Position Tracker Using Arduino and Servo.
7.	Displaying Real-Time Sensor Data on 16x2 LCD Display.
8.	DC Motor Control Using L298N Motor Driver
9.	Home Automation System Using Relay
10.	Controlling LED Using HC-05 Bluetooth Module
11.	Building an IoT-Based Weather Station Using NodeMCU

Sr. No.	Textbooks
1.	FOSSEE Team-IIT Bombay, Microcontroller Programming with Arduino and Python, Shroff Publisher, 1st Edition, 2024.
	Reference Books
1.	John Boxall, Arduino Workshop-A Hands-on Introduction with 65 Projects, No Starch Press, 2nd Edition**.**
2.	Tony Neal, Arduino - An A-to-Z Introduction to Arduino for Complete Newbies", Notion Press, 1st Edition.
	Web Resources
1.	Arduino Playlist by Arduino, https://www.youtube.com/c/arduino



Chairman, BoS
Mechanical Engg.

Course Title: Students Club Activities **Course Code: GE262902**		**Course Category: LLC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: 01	CA-II	25 Marks
Semester:	ESE	-
Course Prerequisite: Active Membership in Any Institute-Approved Student Club		
Course Description: This co-curricular course provides a professional platform for students to foster leadership, teamwork, and specialized domain skills through active engagement in Institute-approved student clubs. Designed as a flexible workplace simulation, the curriculum accommodates diverse student roles by focusing on the core competencies of organizing and/or participating in campus-wide technical, cultural, or social initiatives. Students learn to navigate peer-to-peer collaboration, manage timelines, and achieve targeted outcomes, turning active extracurricular involvement into verifiable workplace readiness and project management experience.		
Course Objectives: 1. To instruct students in the governance, compliance guidelines, and operational frameworks of managed student organizations. 2. To train students in the practical workflows of event planning, resource optimization, task execution, or technical skill application. 3. To facilitate hands-on experience in cross-functional collaboration, communication, and risk mitigation through live club initiatives. 4. To establish professional documentation habits through the evaluation of outcomes, logbooks, and structured activity reporting.		

Course Outcomes:		
COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	**Interpret** the institutional governance, compliance workflows, and safety frameworks required by the Student Affairs Department to run or join campus initiatives.	Understand (Level 2)
CO2	**Apply** specialized domain-specific skills (whether technical, creative, or social) to deliver structured project milestones or performances within a club ecosystem.	Apply (Level 3)
CO3	**Collaborate** within professional peer hierarchies, managing shared resources, event timelines, and stakeholder communication to execute club objectives.	Apply (Level 3)
CO4	**Formulate** comprehensive, data-driven post-activity portfolios including financial logs, attendance metrics, and official reports	Create (Level 6)

CO-PO Mapping:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO 1	PSO 2
CO1						2	2						
CO2						1		2		2			
CO3								3	2	3			
CO4							2		3	3			

Chairman, BoS
Mechanical Engg.

Assessment	
CA-I (a)	Organization and/or participation in the Club Activities
CA-II (b)	Organization and/or participation in the Club Activities

Students Club Activities
Students are expected to maintain active membership in at least one Institute-approved student club, engaging in initiatives that can range from regular weekly sessions to major one-off events. These club activities can span diverse domains, including technical workshops, cultural performances, and social responsibility campaigns. To ensure academic and administrative compliance, all events must be formally approved by the Student Affairs Department and secure all other necessary institutional permissions before execution. Throughout the semester, students must successfully organize and/or participate in these scheduled club activities to develop real-world leadership and teamwork skills. To receive academic credit for the course, students are required to submit verifiable proof of their involvement when requested. This documentation may include official event reports, attendance records, completion certificates, or activity logbooks, providing clear evidence of their direct contributions.

Chairman, BoS
Mechanical Engg.