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 Computer Science and Engineering (Artificial Intelligence and Machine Learning)
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 Job Training (OJT)		--	--	--	--	--	--	--	12	12
Co-curricular Courses (CC) (NSS / 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**

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Multidisciplinary Minor (MDM)	Multidisciplinary Courses	--	--	02	03	03	03	03	--	**14**
• **(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 minimum **CGPA of 7.5** without backlog courses at the end of Second semester and should have earned **42 credits** are eligible for the admission to the UG Bachelor's Degree with Honors.										**194**
Honors with Research and Multidisciplinary Minor		--	--	--	--	--	--	08	10	**18**
• **4-Years 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 minimum **CGPA of 7.5** without backlog courses at the end of 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-Years 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 minimum **CGPA of 7.5** without backlog courses at the end of 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 the program students. Only students with 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 department or 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.

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MSPM's
Deogiri Institute of Engineering and Management Studies, Chh. Sambhajinagar
(An Autonomous Institute)
Department of Computer Science and Engineering
(Artificial Intelligence and Machine Learning)

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	CK261001	BSH	Engineering Mathematics I	3	1	--	4	10	10	20	60	100	4
BSC	CK261002	BSH	Applied Science I	3	--	--	3	10	10	20	60	100	3
ESC	CK261102	CS	Programming for Problem Solving	3	--	--	3	10	10	20	60	100	3
ESC	CK261104	CE	Engineering Mechanics	2	--	--	2	10	10	20	60	100	2
#HSSM -AEC	GE261701	BSH	Modern Indian Language: Marathi	2	--	--	2	10	10	20	60 #	100	2
BSC	CK261003	BSH	Applied Science I Lab	--	--	2	2	15	15	--	20	50	1
ESC	GE261105	ME	Workshop Practices	--	--	2	2	15	15	--	20	50	1
ESC	CK261106	CS	Programming for Problem Solving 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	GE261804	BSH	PBL: Engineering Exploration Lab	--	--	2	2	15	15	--	20	50	1
LLC	GE261902	BSH	Students Club Activities	--	--	2	2	25	25	--	--	50	1
Total				**13**	**1**	**14**	**28**	--	--	-	--	**800**	**20**

SEMESTER II													
Category	Course Code	BOS	Name of the Course	Teaching Scheme				Evaluation Scheme					Credit
				L	T	PR	Total	CA-I	CA-II	MSE	ESE	Total	
BSC	CK262004	BSH	Engineering Mathematics II	3	--	--	3	10	10	20	60	100	3
BSC	CK262005	BSH	Applied Science II	3	--	--	3	10	10	20	60	100	3
ESC	GE262101	ME	Engineering Graphics	3	--	--	3	10	10	20	60	100	3
ESC	CK262107	ETC	Electronics and Electrical Fundamentals	3	--	--	3	10	10	20	60	100	3
PCC	AI262201	AI	Python Programming	2			2	10	10	20	60	100	2
#HSSM-IKS	GE262702	BSH	Indian Knowledge System	2	--	--	2	10	10	20	60 #	100	2
BSC	CK262006	BSH	Applied Science II Lab	--	--	2	2	15	15	--	20	50	1
ESC	GE262103	ME	Engineering Graphics Lab		--	2	2	15	15		20	50	1
ESC	CK262108	ETC	Electronics and Electrical Fundamentals Lab			2	2	15	15		20	50	1
SC-SEC	GE262602	BSH	Professional Development II	--	--	2	2	15	15	--	20	50	1
ELC	AI262802	AI	Do It Yourself II	--	--	2	2	25	25	--	--	AU	AU
ELC	GE262803	BSH	PBL: Design Thinking Lab	--	--	2	2	15	15	--	20	50	1
LLC	GE262901	BSH	NSS	--	--	2	2	25	25	--	--	50	1
Total				**16**		**14**	**30**	--	--	--	--	**900**	**22**

Note :

*Courses offered by CSE(AI&ML) department for other department students.

End semester Evaluation will be done at department level.

$ End semester Evaluation will be done at department level by Open Book Examination

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Course Title: Engineering Mathematics I
Course Code: CK261001 **Course Category: BSC**

Teaching Scheme	Examination Scheme	
Lectures: 03 hrs / week	CA-1	10 Marks
Tutorial: 01 hrs / week	CA-2	10 Marks
Credits: 04	MSE	20 Marks
Semester: First Year (Semester I)	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.
- Vector algebra (dot and cross product).

Course Description: This course covers essential topics in engineering mathematics, including matrices, eigenvalues, partial differentiation, vector calculus 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 eigenvalues and eigenvectors 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.
4. To develop the ability to analyze and solve engineering problems using vector calculus concepts like gradient, divergence, curl, and vector integration.

Course Outcomes:

COs	After completion of the course: Students should be able to	Bloom's Level
CO1	Recall the basic concepts related to matrices, calculus and vector analysis.	Remember (Level 1)
CO2	Compute solutions using the fundamental concepts of linear algebra, multivariable and vector calculus.	Understand (Level 2)
CO3	Solve mathematical problems based on concepts related to matrices, multivariable and vector calculus.	Apply (Level 3)
CO4	Analyze mathematical problems by identifying and applying appropriate concepts from matrices, calculus and vector analysis.	Analyze (Level 4)

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

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Course Contents		
Unit 1	**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.
Unit 2	**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.
Unit 3	**Partial Differentiation** Introduction; Partial derivatives of first and higher orders; Homogeneous functions – Euler's Theorem for functions containing two and three variables (with proofs); Total derivatives; Change of variables.	6 Hrs.
Unit 4	**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.
Unit 5	**Multiple Integrals & Applications** 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, evaluation of integral by changing to polar; Applications of multiple integrals to find area as double integral in cartesian and polar	6 Hrs.
Unit 6	**Vector Calculus** Introduction; Definition and types of vectors; Scalar and vector fields: Gradient, divergence and curl; Solenoidal and irrotational vector fields. Vector Integration: line integral, Work Done, Circulation.	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.
	Reference Books
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, George B., 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.
	Web Resources
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

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Course Title: Applied Science I **Course Code: CK261002**		**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 I)	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. The understanding of semiconductor physics forms the foundation for electronics design and analysis. Knowledge of quantum mechanics and solid-state physics is essential for modern device fabrication like MOSFETs and ICs. Laser and photonics applications are critical in fiber optics, sensors, and communication 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, enabling students to study the behavior of macroscopic & microscopic objects.
4. To impart fundamental knowledge of dielectric and superconducting materials, focusing on their properties and behavior.
5. To develop an understanding of the properties and behavior of magnetic materials and the principles of electrodynamics.

Course Outcomes:

COs	**After completion of the course:** **Student should 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 behavior of macroscopic & microscopic objects using fundamentals of waves, optics and semiconductors.	Understand (Level 2)
CO3	Describe the properties of functional materials and the fundamentals of quantum mechanics, electromagnetism relevant to engineering systems.	Understand (Level 2)
CO4	Use fundamental principles and the laws of wave motion, optics, semiconductor physics & quantum mechanics in various engg. 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 behavior of physical systems based on wave dynamics and optical effects.	Analyze (Level 4)

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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	-	-
CO5	3	3	-	-	-	-	-	-	-	-	1	-	-
CO6	3	3	-	-	-	-	-	-	-	-	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

Course Contents		
Unit 1	**Wave Motion** **Oscillations**: Free oscillation, Damped oscillation, Forced Oscillation- Definitions, Applications. **Ultrasonic Waves**: Properties, Production of Ultrasonics waves: Magnetostriction method and Piezoelectric method, Applications **Interference**: Interference, Types of Interference, Newton's ring- Formation, derivation of diameter, Numericals.	6 Hrs
Unit 2	**Semiconductor Physics** Band theory of solids, Classification of solids, Basics of Semiconductor, Types of Semiconductors, Majority and minority charge carriers, Conductivity of Semiconductor, Compound Semiconductor, Homojunction and Heterojunction, Numericals.	6 Hrs
Unit 3	**Engineering Optics** **Lasers**: Characteristics, Absorption, spontaneous emission and stimulated emission, metastable state, population inversion, pumping, resonant cavity, He-Ne Laser, Applications of Lasers. **Optical fiber Communication**: Structure, Principle, Acceptance angle, Acceptance cone, Numerical aperture, applications of fiber optics. Fiber optic sensor, Numericals.	6 Hrs
Unit 4	**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.	6 Hrs

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Unit 5	**Physics of Functional Materials** **Dielectrics**: Capacitance-Definition, Capacitors with dielectrics, Polar and Non-polar dielectrics, Types of dielectric polarization **Superconductors**: Definition, critical magnetic field, critical temperature, Zero resistance, Meissner effect	6 Hrs
Unit 6	**Magnetic materials and Electrodynamics** **Magnetic materials:** Introduction, Properties of Diamagnetic, Paramagnetic and Ferromagnetic materials, Applications, B-H Curve. **Introduction to Electrodynamics:** Divergence, Curl**,** Gauss's law, Faraday's law, Ampere's law, Lenz's law, Maxwell Equation in differential and integral form.	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.
Sr. No	**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.
Sr. No	**Web Resources**
1.	Applied Optics, NPTEL, https://nptel.ac.in/courses/115107131
2.	Introduction to Quantum mechanics,https://nptel.ac.in/courses/115104096
3.	Concepts in Magnetism and Superconductivity, NPTEL, https://nptel.ac.in/courses/115105131

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Course Title: Programming for Problem Solving **Course Code: CK261102**		**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 Computer Literacy
- Logical Thinking and Problem-Solving Skills
- Basic Mathematics Knowledge

Course Description:

This course provides a comprehensive introduction to programming using the C language. It aims to develop problem-solving skills essential for engineering students through the design of algorithms and their implementation in C. The course begins with foundational programming concepts and progressively covers control structures, functions, arrays, strings, pointers, structures, and file handling. Emphasis is placed on writing efficient code, understanding memory management, and applying structured programming techniques.

Course Objectives:

1. To introduce fundamental programming concepts such as algorithms, flowcharts, and C program structure.
2. To develop the ability to use control flow statements, functions, and recursion for problem solving in C.
3. To enable students to work with arrays, strings, pointers, and structures for handling data efficiently.
4. To impart skills in file handling techniques for data storage, retrieval, and error handling in C
5. To apply C programming constructs to solve computational problems through practical lab sessions.

Course Outcomes:

COs	**After completion of the course: Students will be able to**	**Bloom's Level**
CO1	Recall the fundamental concepts, syntax, data types, variables, operators, expressions, and basic programming constructs of the C programming language.	Remember (Level 1)
CO2	Explain control flow statements, functions, storage classes, arrays, strings, pointers, structures, and file handling concepts in C.	Understand (Level 2)
CO3	Execute C programming constructs such as decision-making, loops, Apply functions, arrays, strings, pointers, and structures to develop programs for given problems.	Apply (Level 3)
CO4	Examine C programs using functions, arrays, strings, pointers, structures, and file handling to identify errors, program flow, memory usage, and appropriate programming approaches.	Analyze (Level 4)
CO5	Evaluate alternative C programming solutions based on correctness, efficiency, memory utilization, modularity, and appropriate use of programming constructs.	Evaluate (Level 5)
CO6	Design and develop modular C programs using functions, arrays, strings, pointers, structures, and file handling to solve real-world computational problems.	Create (Level 6)

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

Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Introduction to the Programming Language** Process. Algorithm, Pseudo code, Flow chart, Background, C Programs, Identifiers, Data Types, Variables, Constants, Input/Output, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.	6Hrs
Unit 2	**Control Flow Statements** Statements- Selection Statements (making decisions) if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping-break, continue, go to, Simple C Program examples.	6Hrs
Unit 3	**Functions and Storage Classes** Functions- Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication (call by value, call by reference), Standard functions. Storage classes, scope rules, arrays to functions, recursive functions	6Hrs
Unit 4	**Arrays and Strings** Arrays- Basic concepts, one-dimensional arrays, two multidimensional arrays, dimensional arrays, Strings Concepts, C Strings, String Input/Output functions, string manipulation functions, string/data conversion.	6Hrs
Unit 5	**Pointers and Structures** Pointers Introduction (Basic Concepts): pointers to pointers, compatibility, Pointer Applications, memory allocation functions, array of pointers, pointers to void, pointers to functions. Introduction to structures and unions: Basics of structures, structures and functions, arrays of structures, Pointers in structures.	6Hrs
Unit 6	**File Handling in C** Input and Output Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input /output functions (standard library input/output functions for files), file status functions (error handling), Positioning functions.	6Hrs

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Sr. No.	Textbooks
1.	Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India Edition.
	Reference Books
1.	Yashwant Kanitkar, Let Us C, PHI
2.	Balguruswamy, Programming in C, PHI.
	Web Resources
1.	Problem Solving through Programming in C, https://nptel.ac.in/courses/106105171

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Course Title: Engineering Mechanics **Course Code: CK261104**		**Course Category: ESC**
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:

- 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: Students will be able to**	**Bloom's Level**
CO1	Recognize different fundamentals of Engineering Mechanics	Remember (Level 1)
CO2	Discuss effect of forces on rigid body / particle in statics and dynamics considering C.G. & M.I.	Understand (Level 2)
CO3	Solve problems on rigid bodies/particles subjected to various with and without consideration of forces in static and dynamic conditions.	Apply (Level 3)
CO4	Examine beam reactions, frictional effects and composite areas under equilibrium conditions.	Analyze (Level4)

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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	-	-	-	-	-	-	-	-	-	-	-
CO4	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

Course Contents		
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, Moment, Couple and Varignon's Theorem and Problems	4 Hrs
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 kind, Types of Loads and types of Support numerical on beam reaction.	4 Hrs
Unit 3	**Center of Gravity** Centroid, Center of Mass and Center of Gravity, Center of Gravity of Flat Plate and Centroid of an Area, Numerical on Centroid of Composite Area.	4 Hrs
Unit 4	**Moment of Inertia** Moment of Inertia of Rigid Body, Area moment of Inertia, Mass Moment of Inertia, Perpendicular Axis Theorem, Parallel Axis Theorem, Radius of Gyration. Numerical based on Moment of Inertia of Composite Area.	4 Hrs
Unit 5	**Kinematic of Rigid Body in Linear Motion** 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	4 Hrs
Unit 6	**Kinetic of Particle/ Rigid Body** Introduction to Kinetics, Impact and Numerical on Same, Work, Energy, Power and Numerical on same.	4 Hrs

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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

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Course Title: Modern Indian Language: Marathi **Course Code:**	**Course Category: HSSM-AEC**	
Teaching Scheme	**Examination Scheme**	
व्याख्याने (Lectures): ०२ तास/आठवडा (02 hrs / week)	CA-1	10 Marks
ट्युटोरियल (Tutorial): -	CA-2	10 Marks
श्रेयांक (Credits): 02	MSE	20 Marks
सत्र (Semester):	ESE	60 Marks

Course Prerequisite: देवनागरी लिपी वाचण्याचे आणि लिहिण्याचे प्राथमिक ज्ञान

Course Description:

हा अभ्यासक्रम सर्व शाखांच्या अभियंत्यांना मराठी भाषेचे व्यावहारिक आणि उद्योगाभिमुख ज्ञान प्रदान करण्यासाठी तयार करण्यात आला आहे. यामध्ये विद्यार्थी मराठी भाषेचा इतिहास आणि व्याकरणाचा भक्कम पाया रचतील आणि त्यानंतर आकलन कौशल्ये व शब्दसंपत्ती वाढवण्यावर लक्ष केंद्रित करतील. हा अभ्यासक्रम प्रामुख्याने व्यावसायिक उपयोजनावर भर देतो, ज्यामध्ये अधिकृत पत्रव्यवहार, इतिवृत्त लेखन आणि अचूक पारिभाषिक व प्रशासकीय संज्ञांचा वापर शिकवला जाईल. याव्यतिरिक्त, तांत्रिक संकल्पनांचे अचूक संप्रेषण सुनिश्चित करण्यासाठी विद्यार्थी इंग्रजी आणि मराठी या दोन्ही भाषांमधील भाषांतर कौशल्ये विकसित करतील. सरतेशेवटी, हा अभ्यासक्रम भावी अभियंत्यांना स्थानिक उद्योग, कॉर्पोरेट क्षेत्र आणि शासकीय कार्यालयांमध्ये आत्मविश्वासाने आणि प्रभावीपणे संवाद साधण्यास सक्षम बनवतो.

Course Objectives:

1. विद्यार्थ्यांना मराठी भाषेचा उगम, विकास, देवनागरी लिपी आणि विविध साहित्य प्रकारांची ओळख करून देणे.
2. विद्यार्थ्यांना मराठी व्याकरणाचे मूलभूत नियम, शुद्धलेखन आणि अचूक वाक्यरचना यांचे सखोल ज्ञान देणे.
3. विद्यार्थ्यांची शब्दसंपत्ती वाढवणे आणि दैनंदिन तसेच व्यावसायिक संवादात वाक्प्रचार व म्हणींचा योग्य वापर करण्यास शिकवणे.
4. विद्यार्थ्यांमध्ये तांत्रिक आणि प्रशासकीय उताऱ्यांचे वाचन, विश्लेषण आणि अचूक आकलन करण्याची क्षमता विकसित करणे.
5. विद्यार्थ्यांना कार्यालयीन कामकाज, पत्रव्यवहार आणि अभियांत्रिकी क्षेत्रात वापरल्या जाणाऱ्या पारिभाषिक संज्ञांचे व्यावहारिक प्रशिक्षण देणे.
6. विद्यार्थ्यांना भाषांतराची तत्त्वे आणि पद्धती समजावून सांगणे आणि इंग्रजी-मराठी भाषांतराचा (विशेषतः तांत्रिक संदर्भात) सराव करून घेणे.

Course Outcomes:

COs	अभ्यासक्रम पूर्ण झाल्यानंतर विद्यार्थी सक्षम असतील (**After completion of the course: Students will be able to)**	**Bloom's Level**
CO1	मराठीचा इतिहास आणि विकास, मराठी व्याकरण, शब्दसंपत्ती आणि भाषासमृद्धी, आकलन कौशल्ये, व्यावहारिक आणि उपयोजित मराठी आणि भाषांतर कौशल्ये यांच्याशी संबंधित मूलभूत तथ्ये, माहिती, नियम आणि मानकांचे स्मरण करणे.	स्मरण Remember (Level 1)
CO2	मराठीचा इतिहास आणि विकास, मराठी व्याकरण, शब्दसंपत्ती आणि भाषासमृद्धी, आकलन कौशल्ये, व्यावहारिक आणि उपयोजित मराठी आणि भाषांतर कौशल्ये यांच्याशी संबंधित विविध संकल्पना, रचना, आशय आणि कार्यपद्धती स्पष्ट करणे.	समज Understand (Level 2)

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CO3	मराठीचा इतिहास आणि विकास, मराठी व्याकरण, शब्दसंपत्ती आणि भाषासमृद्धी, आकलन कौशल्ये, व्यावहारिक आणि उपयोजित मराठी आणि भाषांतर कौशल्ये यांमधील शिकलेल्या नियमांचे, तत्त्वांचे आणि कौशल्यांचे प्रत्यक्ष कामकाजात उपयोजन करणे.	उपयोजन Apply (Level 3)
CO4	मराठीचा इतिहास आणि विकास, मराठी व्याकरण, शब्दसंपत्ती आणि भाषासमृद्धी, आकलन कौशल्ये, व्यावहारिक आणि उपयोजित मराठी आणि भाषांतर कौशल्ये यांच्याशी संबंधित विविध भाषिक घटक, रचना, साहित्याचा आशय आणि माहितीचे पृथक्करण व विश्लेषण करणे.	विश्लेषण Analyze (Level 4)

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

Assessment	
CA-1 (a)	**वर्णनात्मक चाचणी / गृहपाठ / बहुपर्यायी प्रश्न चाचणी इत्यादी. (**Subjective Test / Assignment / MCQ Test etc.)
CA-2 (b)	**वर्णनात्मक चाचणी / गृहपाठ / बहुपर्यायी प्रश्न चाचणी इत्यादी. (**Subjective Test / Assignment / MCQ Test etc.)
MSE (c)	**वर्णनात्मक चाचणी (**Subjective Test)
ESE (d)	अंतिम सत्र मूल्यमापन विभागीय स्तरावर केले जाईल.(End semester Evaluation will be done at department level.)

Course Contents		
Unit 1	**मराठीचा इतिहास आणि विकास (History and Literature of Marathi)** मराठी भाषेचा उगम (Origin of Marathi Language), मराठी भाषेचा विकास (Development of Marathi Language), विविध मराठी साहित्य प्रकारांचा परिचय (Introduction to Various Marathi Literary Forms), प्रसिद्ध मराठी साहित्यिक (Famous Marathi Authors), निवडक साहित्यकृतींचा परिचय (Introduction to Selected Literary Works).	4 Hrs.
Unit 2	**मराठी व्याकरण (Marathi Grammar)** मराठी वर्णमाला (Marathi Alphabet), शब्दांच्या जाती (Parts of Speech), काळांचे प्रकार (Types of Tenses), अचूक वाक्यरचना (Correct Sentence Formation), शुद्धलेखनाचे नियम (Rules of Orthography/Spelling), विरामचिन्हांचा योग्य वापर (Proper Use of Punctuation).	4 Hrs.

Unit 3	**शब्दसंपत्ती आणि भाषासमृद्धी (Vocabulary Building)** समानार्थी शब्द (Synonyms), विरुद्धार्थी शब्द (Antonyms), शब्दांची उत्पत्ती: तत्सम, तद्भव, देशी शब्द (Word Origin), शुद्ध आणि अशुद्ध शब्दांची ओळख व दुरुस्ती (Identifying and Correcting Spelling Errors), दैनंदिन संवादात म्हणींचा वापर (Use of Proverbs in Daily Communication), वाक्प्रचारांचा वापर (Use of Idioms).	4 Hrs.
Unit 4	**आकलन कौशल्ये (Reading & Comprehension)** दिलेल्या उताऱ्याचे वाचन, विश्लेषण आणि त्यावरील प्रश्नांची अचूक उत्तरे लिहिणे (Reading, Analysis, and Answering Questions on a Given Passage), तांत्रिक किंवा प्रशासकीय उताऱ्यांचे वाचन आणि सारांश लेखन (Reading technical or administrative passages in Marathi and summarizing them).	4 Hrs.
Unit 5	**व्यावहारिक आणि उपयोजित मराठी (Practical & Applied Marathi)** औपचारिक पत्रे (Formal Letters), इतिवृत्त लेखन (Meeting Minutes Writing), पारिभाषिक संज्ञा (Technical Terminology), अभियांत्रिकी कामात वापरले जाणारे इंग्रजी-मराठी शब्द (English-Marathi Words Used in Engineering Work), प्रशासकीय कामात वापरले जाणारे इंग्रजी-मराठी शब्द (English-Marathi Words Used in Administrative Work).	4 Hrs.
Unit 6	**भाषांतर कौशल्ये (Translation Skills)** भाषांतराची तत्त्वे (Principles of Translation), भाषांतराच्या पद्धती (Methods of Translation), शब्दशः भाषांतर (Literal Translation), आशयनिष्ठ भाषांतर (Contextual/Sense Translation), मराठीतून इंग्रजीत भाषांतर (Marathi to English Translation), इंग्रजीतून मराठीत भाषांतर (English to Marathi Translation).	4 Hrs.

Sr. No.	Textbooks
1.	मो. रा. वाळिंबे, सुगम मराठी व्याकरण व लेखन, नितीन प्रकाशन.
2.	डॉ. ल. रा. नसिराबादकर, व्यावहारिक मराठी, फडके प्रकाशन.
	Reference Books
1.	यास्मिन शेख, मराठी लेखन मार्गदर्शिका, पद्मगंधा प्रकाशन.
2.	डॉ. स्नेहल तावरे, व्यावहारिक मराठी, स्नेहवर्धन प्रकाशन.
3.	भाषा संचालनालय, शासन व्यवहार कोश, महाराष्ट्र शासन.
4.	डॉ. कल्याण काळे, डॉ. अंजली सोमण, भाषांतर मीमांसा, प्रतिमा प्रकाशन
5.	अ. ना. देशपांडे, मराठी साहित्याचा इतिहास (खंड १ आणि २), व्हीनस प्रकाशन.
6.	शब्दकोश आणि शास्त्रीय व तांत्रिक परिभाषा कोश, महाराष्ट्र राज्य साहित्य आणि संस्कृती मंडळ.
7.	कृ. पां. कुलकर्णी, मराठी भाषा: उद्गम व विकास, मेहता पब्लिशिंग हाऊस.
	Web Resources

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1.	महाराष्ट्र शासन, भाषा संचालनालय (Directorate of Languages, Govt. of Maharashtra): https://languages.maharashtra.gov.in
2.	राज्य मराठी विकास संस्था (RMVS): https://rmvs.maharashtra.gov.in
3.	मराठी विश्वकोश (Marathi Vishwakosh): https://marathivishwakosh.org
4.	भारत वाणी (Bharatavani Portal): https://bharatavani.in
5.	महाराष्ट्र राज्य साहित्य आणि संस्कृती मंडळ: https://sahitya.marathi.gov.in

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Course Title: Applied Science I Lab **Course Code: CK261003**		**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 I)	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. 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. The understanding of semiconductor physics forms the foundation for electronics design and analysis. The Knowledge of quantum mechanics and solid-state physics is essential for modern device fabrication like MOSFETs and ICs. Laser and photonics applications are critical in fiber optics, sensors and communication 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, enabling students to study the behaviour of macroscopic & microscopic objects.
4. To impart fundamental knowledge of dielectric and superconducting materials, focusing on their properties and behaviour.
5. To develop an understanding of the properties and behaviour of magnetic materials and the principles of electrodynamics.

Course Outcomes: Course outcomes of laboratory are mentioned in theory course outcome.

Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 5 to 8

Sr. No.	**List of Experiments**	**Hours**
1	**Newton's rings**-Determination of radius of curvature of Plano convex lens /wavelength of light	2 Hrs.
2	**Laser-**Determination of wavelength of He-Ne laser light	2 Hrs.
3	**G.M. Counter -** Determination of operating voltage of G.M. tube	2 Hrs.
4	**Ultrasonic interferometer-**Determination of velocity of ultrasonic waves in different liquids.	2 Hrs.

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5	**Crystal Plane** – Study of planes with the help of models related Miller Indices.	2 Hrs.
6	**Fiber optics**-To determine the numerical aperture and acceptance angle of an optical fiber	2 Hrs.
7	**Energy Band Gap**-Measurement of Band gap energy of semiconductors	2 Hrs.
8	**Four Probe Method** - Determination of resistivity of semiconductor.	2 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

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Course Title: Workshop Practices **Course Code: CK261104**		**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:

- Students should possess fundamental knowledge of basic science and mathematics from secondary education.
- Basic understanding of tools, safety protocols, and workshop processes.
- Basic understanding of measurement, marking, material handling, and elementary fabrication.

Course Description: This course introduces first-year engineering students of circuit branches (CSE, AI/ML, E&TC) to interdisciplinary workshop practices integrating electronics, mechanical fabrication, and safety. Students will gain hands-on experience in handling tools, following safety protocols, and fabricating support systems like racks, casings, and stands using fitting, carpentry, and sheet metal techniques. The course also includes foundational soldering skills necessary for circuit prototyping, enabling students to bridge physical hardware with digital systems.

Course Objectives:

1. To inculcate awareness of workshop safety norms, including PPE, ESD protection, and safe handling practices.
2. To train students in measuring, marking, and assembling metal brackets and peripheral mounting frames.
3. To develop carpentry skills for fabricating ergonomic stands and enclosures used in IT labs and smart systems.
4. To introduce sheet metal operations for constructing functional CPU or device casings.
5. To impart soldering techniques through the creation of basic circuits and hands-on hardware integration.

Course Outcomes:

COs	**After completion of the course: Students 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)

CO-PO Mapping

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

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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

Sr. No.	List of Experiments	Hours
1	Introduction to safety rules, PPE (gloves, goggles, anti-static wristbands), first aid awareness, and correct storage/handling of tools and hardware.	2 Hrs.
2	To fabricate support brackets or racks for peripherals using metalwork techniques.	4 Hrs.
3	To construct a stable and ergonomic stand for laptops or desktop units using carpentry tools.	4 Hrs.
4	To fabricate an enclosure for electronic circuits such as CPUs or switches.	4 Hrs.
5	To understand and practice basic soldering techniques by assembling a simple circuit.	4 Hrs.

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
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

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Course Title: Programming for Problem Solving Lab **Course Code: CK261106**		**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:

- Basic Computer Literacy
- Logical Thinking and Problem-Solving Skills
- Basic Mathematics Knowledge

Course Description: This course provides a comprehensive introduction to programming using the C language. It aims to develop problem-solving skills essential for engineering students through the design of algorithms and their implementation in C. The course begins with foundational programming concepts and progressively covers control structures, functions, arrays, strings, pointers, structures, and file handling. Emphasis is placed on writing efficient code, understanding memory management, and applying structured programming techniques.

Course Objectives:

1. To introduce fundamental programming concepts such as algorithms, flowcharts, and C program structure.
2. To develop the ability to use control flow statements, functions, and recursion for problem-solving in C.
3. To enable students to work with arrays, strings, pointers, and structures for handling data efficiently.
4. To impart skills in file handling techniques for data storage, retrieval, and error handling in C
5. To apply C programming constructs to solve computational problems through practical lab sessions.

Course Outcomes:

COs	**After completion of the course: Students will be able to**	**Bloom's Level**
CO1	Recall basic concepts of programming in C language.	Remember (Level 1)
CO2	Explain C programming elements and file-handling concepts	Understand (Level 2)
CO3	Use the C programming elements to develop efficient C programs and perform input/output operations in file.	Apply (Level 3)
CO4	Analyze program logic, memory usage, and file operations in C to ensure correctness and optimize performance.	Analyze (Level 4)

CO-PO Mapping

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

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Assessment	
CA-I (a)	Based on Practical: Sr. No. 01 to 04
CA-II (b)	Based on Practical: Sr. No. 04 to 08

Sr. No.	List of Experiments	Hours
1	Write a C program to declare and initialize variables of different data types and display their sizes.	2 Hrs
2	Implement arithmetic, relational, and logical operations in C programs and display the results.	2 Hrs
3	Write a program to demonstrate the use of conditional expressions and explain the order of evaluation.	2 Hrs
4	Create a C program to perform bitwise operations on integer variables and	2 Hrs
5	Develop a C program to demonstrate the use of assignment operators and evaluate expressions involving them.	2 Hrs
6	Write a C program to implement various control flow statements such as if-else, switch-case, and loops, to solve a given problem.	2 Hrs
7	Create a function in C to calculate the factorial of a given number and display the result.	2 Hrs
8	Write a program to find the sum of digits of a number using recursion.	2 Hrs

Sr.No.	Textbooks
1.	Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India Edition.
	Reference Books
1.	Yashwant Kanitkar, Let Us C, PHI
2.	Balguruswamy, Programming in C, PHI.
	Web Resources
1.	Problem Solving through Programming in C, https://nptel.ac.in/courses/106105171

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Course Title: Professional Development I **Course Code: GE251601**		**Course Category:VSE**
Teaching Scheme	**Examination Scheme (As Applicable)**	
Practicals/Sessions: 02 Hours/Week	CA-I	15 Marks
	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:

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

Course Outcomes:

COs	**After completion of the course: Student should 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)

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

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

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

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

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Course Title: Do It Yourself I **Course Code: GE261804**		**Course Category: EL**
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	-
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)

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

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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 Experiments/Activities**	**Hours**
1.	To familiarize with Maker Space facilities and safety practices.	2 Hrs
2.	To create a basic 3D-printed component by using FDM Single Nozzle 3D Printer	2 Hrs
3.	To fabricate a component using laser engraving machine.	2 Hrs
4.	To scan and reverse engineer a physical component with 3D Scanner	2 Hrs
5.	To explore VR-based CAD applications.	2 Hrs
6.	To build and program a mobile robot using robotic kit	2 Hrs
7.	To interact with a humanoid robot and understand the functionality	2 Hrs
8.	To develop a basic AI classification model with AI-teachable machine	2 Hrs
9.	To perform basic image processing using OpenCV.	2 Hrs
10.	To develop an IoT-based weather monitoring system.	2 Hrs
11.	To develop an IoT-based home automation system.	2 Hrs
12.	To assemble electronic circuits using soldering techniques.	2 Hrs
13.	To design a basic PCB layout using a software	2 Hrs

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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/

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Course Title: PBL: Engineering Exploration Lab **Course Code: GE261803**		**Course Category: EL**
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: 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 programming 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: Students 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	-	-

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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.

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

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

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Course Title: Students Club Activities **Course Code: GE261902**		**Course Category: CC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
	CA-II	25 Marks
Semester: First Year (Semester I)	ESE	-
Course Prerequisite: None		
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	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	-	-	-	-	-	2	2	-	-	-	-	-	-
CO2	-	-	-	-	-	1	-	2	-	2	-	-	-
CO3	-	-	-	-	-	-	-	3	2	3	-	-	-
CO4	-	-	-	-	-	-	2	-	3	3	-	-	-

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Assessment	
CA-I (a)	Based on evaluation and participation in the first five activities.
CA-II (b)	Based on evaluation and participation in the subsequent five 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.

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Course Title: Engineering Mathematics II **Course Code: CK262004**		**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 Calculus: Knowledge of differentiation, integration and their applications in solving basic mathematical problems.
- Algebra: Proficiency in solving linear and quadratic equations, understanding polynomials and working with basic mathematical operations.
- Trigonometry: Understanding trigonometric functions, identities and their applications, including knowledge of sine, cosine, and tangent functions.

Course Description: This course provides an introduction to the fundamental concepts of ordinary differential equations, complex numbers and Fourier analysis. Topics include first-order differential equations, linear differential equations with constant coefficients, applications in engineering, complex number theory, Fourier series and Fourier transforms. The course emphasizes problem-solving techniques used in mechanical, civil and electrical engineering applications. Students will develop the skills necessary to apply mathematical methods to real-world engineering problems.

Course Objectives:

1. To introduce methods for solving first-order differential equations and their applications in engineering.
2. To understand and solve linear differential equations with constant coefficients.
3. To apply linear differential equations to engineering problems in mechanical and civil engineering.
4. To study complex numbers, their properties, and applications in engineering.
5. To learn Fourier series expansion and its application to periodic functions.
6. To understand Fourier transforms and their use in analyzing functions in engineering applications.

Course Outcomes:

COs	**After completion of the course: students will be able to**	**Bloom's Level**
CO1	Recall the concepts related to ordinary differential equations, imaginary numbers and Fourier analysis.	Remember (Level 1)
CO2	Compute the mathematical problems based on the fundamental concepts of differential calculus, complex numbers, Fourier analysis.	Understand (Level 2)
CO3	Apply the appropriate techniques from ordinary differential equations, complex numbers and Fourier analysis to solve mathematical problems in engineering	Apply (Level 3)
CO4	Analyze the concepts of differential calculus, complex quantities and Fourier analysis involving in engineering problems across various domains.	Analyze (Level 4)

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	--	--

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Assessment	
CA-1 (a)	Subjective Test / Assignment/ MCQ Test etc.
CA-2 (b)	Subjective Test / Assignment/ MCQ Test etc.
MSE (c)	Subjective Test

Course Contents		
Unit 1	**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.
Unit 2	**Linear Differential Equations with Constant Coefficients** Introduction; complementary function, particular integral; Rules for finding complementary functions and particular integrals (Shortcut Methods – Type I $X = e^{ax}/k/a^x$, Type II $X = \sin ax/\sin(ax+b)$, Type III $X = \sinh ax/\sinh(ax+b)$, Type IV $X = x^m$ polynomial in x, Type V $X = e^{ax}V$, Type VI $X = xV$ (where V is function of x only).	6 Hrs.
Unit 3	**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.
Unit 4	**Complex Numbers** Introduction; Definition and geometrical representation; De-Moivre's theorem (without proof); Roots of complex numbers by using De-Moivre's theorem; Relations between circular and hyperbolic functions; Logarithm of Complex quantities	6 Hrs.
Unit 5	**Fourier Series** Introduction; Introductory remarks- Euler's formulae; Conditions for Fourier series expansion - Dirichlet's conditions; Functions having points of discontinuity; Change of interval; Odd and even functions - expansions of odd and even periodic functions; Half -range series.	6 Hrs.
Unit 6	**Fourier Transform** Introduction; Definitions – integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms; Properties of Fourier transforms; Inverse Fourier Transform	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). A Textbook of Engineering Mathematics. Laxmi Publications, 10th Edition.
	Reference Books
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, George B., 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.

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	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

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Course Title: Applied Science II **Course Code: CK262005**		**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: 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, High polymers, Corrosion and its control, Electrochemical Energy Systems and Instrumental methods of Analysis 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 conventional fuels, their determination and analysis.
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 basic concepts of Electrochemical Energy Systems and to build awareness about batteries.
6. To familiarize students with instrumental methods for qualitative and quantitative analysis.

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, polymers, corrosion, electrochemical energy systems, and instrumental methods of analysis.	Remember (Level 1)
CO2	Describe the principles and processes involved in water softening, coal analysis, polymer preparation, corrosion mechanisms, electrochemical energy systems, and instrumental methods of analysis.	Understand (Level 2)
CO3	Interpret the concepts and processes involved in water treatment, fuels and electrochemical energy sources, high polymers, corrosion, and instrumental methods of analysis.	Understand (Level 2)
CO4	Calculate the total hardness of water based on the compounds responsible for water hardness, calorific value for fuel efficiency, conductance of electrolyte, and cell constant.	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)

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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	-	-	-	-	-	-	-	-	-	-	-

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

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** Introduction, Classification of fuels, Calorific value, higher calorific value (HCV) & Lower calorific value (LCV), Characteristics of good fuels, Determination of calorific value of fuel by Bomb calorimeter, Numerical based on bomb Calorimeter. Analysis of Coal: Proximate analysis, Refining of crude oil.	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, Introduction to chemical etching.	6 Hrs.

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Unit 5	**Electrochemical Energy Systems** Introduction, Basic concepts- Specific resistance, specific conductance, equivalent conductance, molar conductance, cell constant, Numerical based on specific conductance, equivalent conductance, molar conductance and cell constant, Conductometric titrations, Reference electrode- glass electrode, Batteries: classification, lithium-ion battery, Fuel cell: Methanol-oxygen fuel cell.	6 Hrs.
Unit 6	**Instrumental Methods of Analysis** Introduction, Lambert-beer's law, Principle, working and instrumentation of: Ultraviolet (UV) - visible spectroscopy, Flame photometry, Infra-red (IR) spectroscopy, pH metry, Chromatography: Classification, Thin layer chromatography.	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.
4.	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.
2.	Gurdeep Chatwal & S. Anand, Instrumental methods of Chemical Analysis, Himalaya Publishing, New Delhi.
3.	O. G. Palanna, Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
4.	V. R. Gowarikar, Polymer Science, New Age International Publication.

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Course Title: Electronics and Electrical Fundamentals **Course Code: GE262106**		**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 II)	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 & Semiconductors 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 (Level1)
CO2	**Explain** the principles, operations, and characteristics of electrical and electronic components, circuits, machines, and instruments.	Understand (Level2)
CO3	**Apply** electrical and electronic principles to solve basic DC and AC circuit problems, transformer-related calculations, and digital logic problems.	Apply (Level3)
CO4	**Measure and verify** the performance and characteristics of electrical and electronic circuits, components, and devices using appropriate laboratory instruments and experimental techniques.	Apply (Level3)
CO5	**Analyze** electrical and electronic circuits using appropriate laws, theorems, device characteristics, waveforms, and Boolean algebra.	Analyze (Level4)

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CO6	**Analyze and interpret** experimental observations and measured results of electrical and electronic circuits and compare them with theoretical values.	Analyze (Level4)

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

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).	6 Hrs
Unit 2	**AC Fundamentals &Transformer** AC Signal Parameters: Waveforms, Average value, RMS Value, Instantaneous p, 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, Lenz's Law, Self and Mutual Induction, Construction and working, EMF Equation.	6 Hrs
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 and BLDC.	6 Hrs

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Unit 4	**Diodes and their Applications** Basics of semiconductors: 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 Centre 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	6 Hrs
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, Basic Logic Gates: AND, OR & NOT, Universal Gates: NAND & NOR, Derived Gates: XOR & XNOR & Boolean Algebra	6 Hrs
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.	6 Hrs

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

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Course Title: Python Programming **Course Code: AI262201**		**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 Computer Literacy
- Logical Thinking and Problem-Solving Skills
- Basic Mathematics Knowledge

Course Description: This course introduces Python programming, covering its syntax, control statements, functions, and core data structures. It also focuses on object-oriented principles to develop efficient programs. Learners will further explore libraries like NumPy, Pandas, Matplotlib, and Plotly for numerical computing, data processing, and visualization..

Course Objectives:

1. To introduce the fundamental concepts and programming constructs of Python.
2. To develop problem-solving skills using control flow, functions, and modular programming.
3. To familiarize students with Python data structures and basic object-oriented programming concepts.
4. To introduce Python libraries for numerical computation, data manipulation, and visualization.
5. To enable students to apply Python programming concepts to solve computational and data- oriented problems.

Course Outcomes:

COs	**After completion of the course:** **Students will be able to**	**Bloom's Level**
CO1	Recall fundamental Python programming concepts, including variables, data types, operators, input/output, and type conversion, to develop basic programs.	Remember (Level 1)
CO2	Describe the control flow and function constructs to develop modular, reusable, and efficient solutions to computational problems .	Understand (Level 2)
CO3	Implement solutions using Python data structures and basic object-oriented programming concepts for real-world problem solving.	Apply (Level 3)
CO4	Analyze Python libraries such as NumPy, Pandas, Matplotlib, and Plotly for basic numerical computation, data manipulation, and visualization.	Analyze (Level 4)

CO-PO Mapping

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

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Assessment	
CA-1 (a)	Subjective Test/Course Project/Assignments/Presentation
CA-2 (b)	Subjective Test/Course Project/Assignments/Presentation
MSE (c)	Subjective Test

Course Contents		
Unit 1	**Introduction to Python Programming** Features of Python, History and versions of Python, Applications of Python, Installation of Python IDE, Indentation and Comments in Python, Input and Output Statements, Keywords, Identifiers, Literals, Variables and Data Types, Type Conversion, Operators and Expressions.	4Hrs
Unit 2	**Control Flow Statements** Decision-making Statements: if, if-else, if-elif-else, Nested Conditional Statements. Iterative Statements: for loop, while loop, Nested Loops, range() function. Jump Statements: break, continue, pass. Problem solving using control flow statements.	4Hrs
Unit 3	**Functions in Python** Introduction to Functions, Defining and Calling Functions, Parameters and Arguments, Return Statement, Positional and Keyword Arguments, Default Arguments, Variable-Length Arguments, Scope of Variables, Lambda Functions, Recursive Functions, Modular Programming and Code Reusability.	4Hrs
Unit 4	**Data Structures in Python** Lists: Creating and Accessing Lists, List Methods (append(), insert(), pop(), remove(), sort(), etc.), List Comprehension, Slicing and Iteration. Tuples: Tuple Characteristics and Usage, Tuple Packing and Unpacking, Immutable Nature of Tuples. Sets: Properties of Sets, Set Operations – Union, Intersection and Difference, Removing Duplicates using Sets. Dictionaries: Dictionary Methods (keys(), values(), items(), get(), pop(), etc.), Dictionary Comprehension, Nested Dictionaries.	4Hrs
Unit 5	**Basic Object-Oriented Programming** Introduction to Object-Oriented Programming, Classes and Objects, Attributes and Methods, Constructors and Destructors in Python, Data Abstraction, Encapsulation, Creating simple class-based Python programs.	4Hrs
Unit 6	**Introduction to Popular Libraries** NumPy: Introduction, Arrays, Creating and Accessing Arrays, Basic Numerical Operations. Pandas: Series, DataFrame, Creating and Accessing DataFrames, Basic Data Manipulation. Matplotlib: Introduction to Data Visualization, Line Plot, Bar Chart, Scatter Plot. Plotly: Introduction to Interactive Data Visualization, Basic Interactive Charts.	4Hrs

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Sr. No.	Textbooks
1.	Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India Edition.
2.	Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press.
	Reference Books
1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, O'Reilly Media
2.	Wesley J. Chun, "Core Python Programming", Prentice Hall
	Web Resources
1.	The Joy of Computing using Python, https://nptel.ac.in/courses/106106182

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Course Title: Indian Knowledge System **Course Code: GE262702**		**Course Category: 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)

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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

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

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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
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, and Mayank 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

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Course Title: Applied Science II Lab **Course Code: CK262006**		**Course Category: BSC**
Teaching Scheme	**Examination Scheme**	
Practical's/Sessions: 02 Hours/Week	CA-I	15 Marks
Credits: 01	CA-II	15Marks
Semester: First Year (Semester II)	ESE	20 Marks

Course Prerequisite:

- Titration method.
- Concept of normality, molarity 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 endeavours. This course also helps to improve the scientific temper of the students to conduct the various experiments.

Course Objectives:

1. To help students to 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 know the students to procure conceptual clarity of engineering chemistry through laboratory Experiments.

Course Outcomes : Course outcomes of laboratory are mentioned in theory course outcome

Assessment	
CA-I (a)	Based on practical: Sr. No. 1 to 4
CA-II (b)	Based on practical: Sr. No. 4 to 8

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Sr. No.	List of Experiments	Hours
1	Determination of hardness of water by EDTA method.	2 Hrs.
2	Determination of chloride content in water sample by Mohr's method.	2 Hrs.
3	Preparation of Urea –formaldehyde resin.	2 Hrs.
4	To study the factors influencing the rate of corrosion.	2 Hrs.
5	To determine normality and strength of given acid solution conductometrically (Strong Acid vs. strong Base).	2 Hrs.
6	To determine normality and strength of given acid solution pH metrically (Weak Acid vs. strong Base).	2 Hrs.
7	To determine acid value of the oil sample.	2 Hrs.
8	To determine viscosity of given liquid by Ostwald's viscometer.	2 Hrs.

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.

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Course Title: Engineering Graphics Lab **Course Code: GE262103**		**Course Category: ESC**
Teaching Scheme	**Examination Scheme**	
Practical's/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

Course Outcomes : Course outcomes of laboratory are mentioned in theory course outcome

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

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

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Sr. No.	Textbooks
1.	K. Venugopal & V. Prabhuraja, A Textbook of Engineering Graphics, New Age International (P) Limited 1st 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

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Course Title: Electronics & Electrical Fundamentals Lab **Course Code: CK262108**		**Course Category: PCC**
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:

- Basic knowledge of electrical quantities, circuit elements, and electronic components.
- Understanding of voltage, current, resistance, power, and semiconductor devices.

Course Description:

The Basic Electrical & Electronics Engineering Laboratory provides practical exposure to fundamental electrical measurement techniques, electrical Basic Laws, transformers, resonance circuits, and basic electronic devices. The laboratory enables students to test electrical equipment, verify network theorems, analyze resonance circuits, and understand the characteristics of semiconductor devices. Through experimentation, students gain practical knowledge of electrical and electronic systems used in engineering applications.

Course Objectives:

1. To familiarize students with the verification of fundamental Laws (KVL&KCL)
2. To develop practical skills in testing, measurement, and troubleshooting of electrical circuits.
3. To study the operation and characteristics of electrical lighting systems and semiconductor devices.
4. To verify fundamental electrical network theorems through experimentation.
5. To understand the performance of resonance circuits and transformers.
6. To develop competency in handling laboratory instruments and electrical equipment safely.

Course Outcomes (COs) :Course Outcomes 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 Actual conduction of First 6 Experiments.
CA-II (b)	Based on Actual conduction of next 6 Experiments.
ESE (c)	Practical examination and oral.

Sr.No.	**List of Experiments**	**Hours**
1.	Measurement and testing of various electronic components using a multimeter.	2 Hours
2.	Verification of KCL Theorem..	2 Hours
3.	Verification of KVL Theorem.	2 Hours
4.	To calculate an efficiency of a transformer.	2 Hours
5.	To calculate the Regulation of a transformer.	2 Hours
6.	To perform a load test on the transformer.	2 Hours
7.	Pl	2 Hours
8.	To Re	2 Hours

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9.	To verify input and output waveforms of Filters	2 Hours
10.	Study Zener Diode as a Voltage Regulator.	2 Hours
11.	Design and develop a regulated DC power supply using IC 78xx & 79xx	2 Hours
12.	Study of Digital Multimeter, DSO & Function Generator.	2 Hours

Web Resourses	
V Lab for EE	1) Virtual Labs – IIT Kharagpur 2) Virtual Labs – IIT Roorkee 3) Virtual Labs – Electrical Engineering Experiments

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Course Title: Professional Development II **Course Code: GE262602**		**Course Category: VSE**
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		

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

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

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

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Course Title: Do It Yourself II **Course Code: GE261802**	**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.		

Course Title: PBL: Design Thinking Lab **Course Code: GE262801**	**Course Category: EL**	
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: 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.		

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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													
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		

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

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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.	Textbooks
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

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Course Title: NSS **Course Code: GE262901**		**Course Category: CC**
Teaching Scheme	**Examination Scheme**	
Practicals/Sessions: 02 Hours/Week	CA-I	25 Marks
Credits: 01	CA-II	25 Marks
Semester: First Year (Semester II)	ESE	-

Course Prerequisite:

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

Course Description:

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: Students 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

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

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Sr. No.	List of Activities	Hours
1	**Introduction, Aims and Objectives of NSS:** Report writing on understanding the social impact of NSS.	02 Hrs.
2	**Youth & Community:** Debate on role of youth in society and their responsibility toward community development.	02 Hrs.
3	**Importance and Role of Youth Leadership:** Presenting the role model and the leadership qualities of the role model which influence them.	02 Hrs.
4	**Importance and Role of Youth Leadership:** Group activity to understand the importance of leadership and how to apply it in real life scenarios.	02 Hrs.
5	**Health, Hygiene and Diseases:** Case study on hygiene in rural India.	02 Hrs.
6	**Needs and Meaning of Socio-Economic Survey:** Poster making on water conservation awareness	02 Hrs.
7	**Needs and Meaning of Socio-Economic Survey:** Survey on road safety awareness.	02 Hrs.
8	**Needs and Meaning of Socio-Economic Survey:** Presentation on Swachh Bharat Abhiyan.	02 Hrs.
9	**Environment and Energy Conservation Concepts:** Survey based on Environmental awareness.	02 Hrs.
10	**Environment and Energy Conservation Concepts:** Essay competition Renewable Energy.	02 Hrs.
11	**Disaster Management:** Survey preparedness to face any disaster.	02 Hrs.
12	**National Integration:** Stage activity of students group on fostering awareness of unity in diversity.	02 Hrs.

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

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