



AGCE

**ARVIND GAVALI
COLLEGE OF ENGINEERING**
An Autonomous Institute



GROUP-B

SYLLABUS FIRST YEAR

EXAMINATION SECTION

Syllabus and Course Structure of First Year B.Tech Engineering Programme at Arvind Gavali College of Engineering, Satara – Designed to nurture foundational knowledge, practical skills, and holistic development for future engineers

**ARVIND GAVALI
COLLEGE OF ENGINEERING,
SATARA.**

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Panmalewadi, Varye, Satara 

Ref No.:

Date :

As per NEP Guidelines, Proposed Scheme of Credit Distribution

First Year B. Tech-2025-26(Common to all Branches)**SEMESTER I (Group B)**

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme			
				L	T	P	Hrs./ Week	Cr	Components	Max	Min for Passing	
1	BSC	25BSE1101	Engineering Mathematics I	3	1	0	4	4	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
2	BSC	25BSE1001	Engineering Physics	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
3	ESC	25BSE1102	Basic Electrical & Electronics Engineering	3	0	0	3	3	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
4	ESC	25BSE1103	C Programming for Problem Solving	2	0	0	2	2	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
5	AEC	25BSE1104	Communication Skills	2	0	0	2	2	CA1	10		40
									MSE	30		
									CA2	10		
									ESE	50	20	
6	BSC	25BSE1001L/ 25BSE1002L	Engineering Physics Laboratory/ Modern Chemistry Laboratory	0	0	2	2	1	CA1	25		20
									CA2	25		
									OE	--	--	
7	ESC	25BSE1102L	Basic Electrical & Electronics Engineering Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
8	ESC	25BSE1103L	C Programming for Problem Solving Laboratory	0	0	2	2	1	CA1	25		40
									CA2	25		
									OE	50	20	
9	AEC	25BSE1104L	Communication Skills Laboratory	0	0	2	2	1	CA1	25		20
									CA2	25		
									OE	--	--	
10	VSEC	25BSE1105L	Engineering Practice Laboratory	0	0	2	2	1	CA1	25		20
									CA2	25		
									OE	--	--	
11	CC	25BSE1106L	Yoga	0	0	2	2	1	CA1	25		20
									CA2	25		
									OE	--	--	
			Total	13	1	12	26	20		900		
Total Contact Hours –26 Total Credits – 20												

First Year B. Tech-2025-26(Common for all Branches)

SEMESTER II (Group B)

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme				
				L	T	P	Hrs./ Week	Cr	Components	Max	Min for Passing		
1	BSC	25BSE1201	Engineering Mathematics II	3	1	0	4	4	CA1	10	20	40	
									MSE	30			
									CA2	10			
									ESE	50			
2	BSC	25BSE1002	Modern Chemistry	3	0	0	3	3	CA1	10	20	40	
									MSE	30			
									CA2	10			
									ESE	50			
3	ESC	25BSE1202	Engineering Mechanics	2	0	0	2	2	CA1	10	20	40	
									MSE	30			
									CA2	10			
									ESE	50			
4	ESC	25BSE1203	Python Programming	2	0	0	2	2	CA1	25	--	20	
									MSE	--			
									CA2	25			
									ESE	--			
5	VSEC	25BSE1204	Computer Aided Engineering Drawing	2	0	0	2	2	CA1	10	20	40	
									MSE	30			
									CA2	10			
									ESE	50			
6	PCC	25PCC1201	Introduction to Industry 4.0	2	0	0	2	2	CA1	10	20	40	
									MSE	30			
									CA2	10			
									ESE	50			
7	IKS	25BSE1205	Energy, Ecology & Environment	2	0	0	2	2	CA1	25	--	20	
									MSE	--			
									CA2	25			
									ESE	--			
8	BSC	25BSE1001L/ 25BSE1002L	Engineering Physics Laboratory/ Modern Chemistry Laboratory	0	0	2	2	1	CA1	25	--	20	
									CA2	25			
									OE	--			
9	ESC	25BSE1203L	Python Programming Laboratory	0	0	2	2	1	CA1	25	20	40	
									CA2	25			
									OE	50			
10	VSEC	25BSE1204L	Computer Aided Engineering Drawing Laboratory	0	0	2	2	1	CA1	25	--	20	
									CA2	25			
									OE	--			
11	VSEC	25BSE1205L	Design Thinking	0	0	2	2	1	CA1	25	--	20	
									CA2	25			
									OE	--			
12	CC	25BSE1206L	Community Services	0	0	2	2	1	CA1	25	--	20	
									CA2	25			
									OE	--			
			Total	16	1	10	27	22		900			
Total Contact Hours –27												Total Credits - 22	

Title of the Course: Engineering Mathematics-I	L	T	P	Credit
Course Code: 25BSE1101	3	1	-	4

Course Prerequisite: Basics of matrices, complex algebra, Indefinite and definite integrals, standard integration formulas.

Course Description:

In this course the students will learn linear algebra techniques, eigenvalues and eigenvectors with applications, complex numbers and hyperbolic functions, and the use of multiple integrals to solve real-world problems involving areas, volumes, and surface areas.

Course Objectives:

By the end of this course, the students will be able to:

1. To provide the knowledge of linear algebra for solving linear system equations
2. To calculate eigenvalues, eigenvectors and apply it to diagonalize a matrix.
3. To study the applications of De Moivre's theorem and elementary properties of hyperbolic functions.
4. To understand and estimate errors and approximations using Taylor's expansion.
5. To evaluate multiple integrals and their applications to area and volume.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand the nature of solutions and solve the system of linear homogeneous and non- homogeneous equations.
CO2	Apply Cayley-Hamilton theorem to find inverse and higher powers of a matrix.
CO3	Analyze the properties of complex numbers and their functions and find powers and roots of complex numbers by using De- Mover's theorem..
CO4	Evaluate the behavior of sequences and series using convergence tests and apply power series and Taylor/Maclaurin expansions for approximation and error analysis.
CO5	Apply multiple integrals to evaluate areas and volumes of given regions.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011
CO1	3	2		2	1						1
CO2	3	2		2							1
CO3	3	2		2							1
CO4	3	2		3							1
CO5	3	2		2							1

Assessment Scheme:

Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Matrices and Linear Systems of Equations Rank of a matrix (Echelon and Row-reduced Echelon Forms), Linear dependence and independence of vectors, Consistency of linear systems (homogeneous and non-homogeneous), Solution of systems of linear equations using matrix methods, Applications in circuit theory, mechanics, and engineering systems.	7
2	Eigenvalues and Eigenvectors Eigenvalues and Eigenvectors: Definition, properties, and computation, Cayley-Hamilton Theorem (statement only), Application of Cayley-Hamilton to find inverse and powers of matrices, Diagonalization of matrices (conceptual overview), Applications in dynamic systems and stability analysis.	9
3	Complex Numbers and Hyperbolic Functions Complex numbers in Cartesian and polar form, De Moivre's Theorem and its applications, Roots of complex numbers, Circular and hyperbolic functions: Definitions and inter-relations, Inverse hyperbolic functions, Functions of a complex variable (definition only), Separation of real and imaginary parts, Applications: AC circuits, wave phenomena.	8
4	Sequences and Series Sequences and convergence, Infinite series, tests of convergence (comparison test, ratio test), Power series: Radius and interval of convergence, Taylor and Maclaurin series (with examples), Errors and approximations using Taylor's expansion (first-order).	7

5	Multiple Integral Double integration in cartesian and polar co-ordinate, Evaluation of double integrals by changing the order of integration and changing to polar form, triple integral, Application of multiple integrals to find area as double integral, volume as triple integral and surface area.	9
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Text Books			
Sr. No.	Title	Author	Publisher
1	Engineering Mathematics	G.V. Kumbhojekar	C. Jammadas and Co.
2	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publishers, Delhi
3	Engineering Mathematics (Vol-1)	H.K. Dass & Er. Rajnish Verma	S. Chand Publishing
4	A Text Book of Applied Mathematics Vol. I	P. N. Wartikar & J. N. Wartikar	Pune Vidyarthi Griha Prakashan, Pune

Reference Books			
Sr. No.	Title	Author	Publisher
1	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons
2	Advanced Engineering Mathematics	H. K. Dass	S. Chand & Company Pvt. Ltd, New Delhi
3	Higher Engineering Mathematics	B. S. Grewal	Laxmi Publications (P) Ltd., New Delhi
4	A Textbook of Engineering Mathematics	N.P. Bali and Manish Goyal	Laxmi Publications
5	Engineering Mathematics	B.V. Ramana	Tata McGraw-Hill Education

Title of the Course: Engineering Physics Course Code: 25BSE1001	L	T	P	Credit
	3	--	-	3

Course Prerequisite:

To ensure that the students can fully benefit from this course, they should have:

1. Basic knowledge of Intermediate level Physics and Mathematics
2. Familiarity with light behavior and optical phenomena.
3. To have fundamental knowledge of modern physics.

Course Description:

This course explores physics principles through an engineering lens, starting from wave optics and progressing through modern materials, quantum theory, and semiconductor devices. Each unit is carefully connected to develop scientific thinking and problem-solving for engineering applications.

Course Objectives:

By the end of this course, the students will be able to:

1. Introduce fundamental wave optics and its industrial applications.
2. Develop a basic understanding of laser and optical fiber technologies.
3. Provide foundational knowledge of quantum mechanics for nanoscale systems.
4. Understand crystal structure and X-ray applications in material science.
5. Classify solids on the basis of Band theory and to calculate carrier concentrations.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand the concepts of interference, diffraction and polarization in engineering measurements.
CO2	Explain the working principles of laser and optical fiber technologies and their applications.
CO3	Apply quantum mechanical concepts to solve basic physical models.
CO4	Analyze crystal structures using X-ray diffraction principles.
CO5	Assess band theory and semiconductor behavior for engineering applications in sensors and devices

CO-PO Mapping:

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

Assessment Scheme:

Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/ Surprise test/Quiz/Seminar/Group discussions/presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Engineering Optics Introduction, Interference: conditions, thin film interference, wedge-shaped film, Newton's rings, Diffraction: single slit and diffraction grating, resolving power, Polarization: Polarization by reflection and refraction, double refraction, types of polarization, Optical Activity and Specific rotation, Applications: anti-reflection coatings, polarizers.	08
2	Lasers and Optical Fiber Interaction of light with matter: Spontaneous and stimulated emission, Population inversion, Pumping (conceptual), Construction and working of: Ruby laser, Nd-YAG Laser, Semiconductor Laser (basic structure and operation), Engineering applications of Lasers, Fiber Optics: Total internal reflection, Numerical aperture, Types (step-index and graded-index), Applications in sensors and communication.	08
3	Quantum Mechanics Limitations of classical mechanics; need for quantum theory, wave particle duality, de-Broglie hypothesis, Heisenberg's Uncertainty Principle(qualitative), Wave function: Physical significance, Probability interpretation Schrödinger Equation: Time-dependent form; Time-independent form (1D infinite potential well), Applications: Quantum tunneling (qualitative), Energy levels in quantum wells.	08
4	Crystallography and X-Ray Diffraction Crystal structure basics: Unit cell, Lattice, Bravais lattices (SC, BCC,	08

	FCC), Crystal systems, packing factor (qualitative), Miller indices, Crystallographic planes and directions, Interplanar spacing, X-ray production (characteristic and bremsstrahlung), Bragg's Law and Applications: Basics of material structure analysis.	
5	Band Theory and Semiconductor Devices Energy bands in solids: Formation of bands and classification (metal, insulator, semiconductor), Fermi level (concept), Carrier concentration (intrinsic vs. extrinsic semiconductors), Electrical Conductivity in semiconductors, Hall Effect: Principle, Significance, Measurement of carrier type and concentration, Applications: Diodes, Photodetectors, Sensors (brief, illustrative).	08

Text Books

Sr. No.	Title	Author	Publisher
1	A textbook of Engineering Physics	M.N. Avadhanulu and P. G. Kshirsagar	S. Chand & Company Ltd., Delhi
2	Engineering Physics	Shailendra Sharma, Jyostna Sharma	Pearson Publications.
3	Engineering Physics	R.K. Gaur & S.L. Gupta	Dhanpat Rai Publications

Reference Books

Sr. No.	Title	Author	Publisher
1	Optics	Ajoy Ghatak	Tata McGraw-Hill Education
2	Engineering Physics	H K Malik A K Singh	McGraw Hill
3	Introduction to Quantum Mechanics	David J. Griffiths	Pearson Education
4	Introduction to Solid State Physics	Charles Kittel	Wiley
5	Applied Physics	P.K. Palanisamy	Scitech Publications (India) Pvt. Ltd.

Title of the Course: Modern Chemistry Course Code: 25BSE1002	L	T	P	Credit
	3	-	-	3

Course Prerequisite:

The students should have knowledge about basic chemistry related to the periodic table, properties of elements, electrochemistry, properties of electromagnetic radiations, energy storage and energy conversion devices, physical and chemical properties of nanomaterials and advanced materials, etc.

Course Description:

This course intends to impart fundamental knowledge of advanced materials and applied knowledge of instrumental methods, energy conversion and storage devices, prevention techniques of corrosion. The students will be expected to communicate knowledge to society and industry.

Course Objectives:

By the end of this course, the students will be able to:

1. To introduce phenomenon involved in corrosion and corrosion control methods.
2. To provide and demonstrate chemistry concepts relevant to the technological field.
3. To understand the basic principles of electrochemistry and chemistry of different energy conversion devices such as batteries, fuel cells.
4. To train the students to effectively use knowledge of instrumental techniques & advanced materials and nanomaterials.
5. Design nanomaterials, and propose innovative engineering applications.

Course Outcomes:

CO	After the completion of the course the students should be able to
CO1	Understand the concepts of corrosion and its prevention methods to select appropriate materials and techniques for enhancing the durability of engineering components.
CO2	Apply the concepts of chemistry to lay the ground work for subsequent studies in various engineering fields to examine fuel and suggest alternative fuels.
CO3	Analyze the principles of electrochemistry, fuel cell and battery technology to analyze and select suitable electrochemical systems for energy storage and conversion in industrial and engineering applications.
CO4	Evaluate the principles, working, advantages, limitations, and industrial applications of instrumental techniques to determine their effectiveness in qualitative and quantitative chemical analysis.
CO5	Create nanomaterials using appropriate top-down or bottom-up synthesis methods, review their structure through characterization techniques and propose innovative engineering applications.

CO-PO Mapping:

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

Assessment Scheme:

Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/ Declared test/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Corrosion and Its Prevention Introduction, dry corrosion (corrosion due to oxygen and other gases), wet corrosion: electrochemical theory of corrosion (hydrogen evolution and oxygen absorption), differential metal corrosion, differential aeration corrosion: pitting corrosion and water line corrosion, stress corrosion, factors affecting rate of corrosion; Corrosion control: cathodic protection-Sacrificial anode and Impressed current method, Anodic protection- electroplating.	08

2	Chemical Fuel Introduction, classification, characteristics of good fuel, calorific value-definition, units, gross calorific value, net calorific value, Calculation of calorific value by Dulong's formula, Bomb calorimeter and Boy's calorimeter-basic instrumentation, working, Numericals. Petroleum- Introduction, refining, important petroleum products, Non - petroleum fuels.	08
3	Electrochemistry, Fuel Cell & Battery Technology Introduction, cell potentials, electrolyte concentration cells, Nernst equation, reference electrodes, ion selective electrodes, glass electrode: pH measurement using glass electrode, applications of pH- metry. Fuel Cell - Principle, components, classification of fuel cell, H ₂ -O ₂ Fuel Cell. Battery technology- Introduction, components of battery, Battery characteristics, Li-Ion battery: Principle, working and applications.	08
4	Instrumental techniques Introduction to various analytical techniques such as qualitative and quantitative analysis, Ultraviolet-Visible Spectroscopy, spectrophotometer: instrumentation and working, numericals Lambert's and Beer - Lambert's Law, NMR Spectroscopy, Chromatography, numerical. advantages and disadvantages of instrumental methods.	08
5	Nanomaterials and Characterization Techniques Introduction to Nanomaterials, Synthesis of Nanomaterials (Bottom up- self-assembly and Top down approaches using methods like Ball milling, Sol-gel Process, Chemical Vapour deposition (CVD), Characterization of Nanomaterials using Scanning Electron Microscopy (SEM), Graphene, Carbon Nanotubes, Applications of nanomaterial in engineering fields.	08

Text Books			
Sr.No.	Title	Author	Publisher
1	A Textbook of Engineering Chemistry	S. S. Dara and S. S. Umare	S.Chand and Company Ltd.,New Delhi
2	A Textbook of Engineering Chemistry	Shashi Chawla	Dhanpat Rai & Co.(Pvt.) Ltd, Delhi
3	Engineering Chemistry	Godbole, Pendse, Joshi	Nirali publication, Pune

Reference Books			
Sr. No.	Title	Author	Publisher
1	Instrumental Methods of Chemical Analysis	Chatwal and Anand	Himalaya Publishing House, New Delhi
2	Engineering Chemistry	O. G. Palanna	Blackie Academic and Professional
3	Nanotechnology-Importance and Applications.	M. H. Fulekar	Wiley

Title of the Course: Basic Electrical and Electronics Engineering Course Code: 25BSE1102	L	T	P	Credit
	3	-	-	3

Course Prerequisite: Fundamental concepts of electrical engineering and semiconductor devices.

Course Description:

This course introduces the fundamental concepts of Electrical and Electronics Engineering to the students from all the branches of Engineering. It provides a strong foundation in basic electrical circuits, electrical machines, and electronic devices. The course begins with electrical circuit analysis, Ohm's law, Kirchhoff's laws, and introduces AC and DC systems. It further explores single-phase systems, transformers, and rotating machines like DC motors. The electronics part covers semiconductor devices such as diodes, transistors and electronic devices.

After completion of the course, the students will be able to understand the basic principles, analysis, and applications of key electrical and electronic systems used in engineering and everyday life.

Course Objectives:

By the end of this course, the students will be able to:

1. To impart knowledge about the fundamental concepts of electrical circuit laws and analysis methods.
2. To familiarize the students with the working principal of DC circuits and to analyze its working
3. To study performance characteristics and working of DC Motor & Transformer.
4. To familiarize the students with basic electronic components like diodes and circuits.
5. To understand various types of transistor and logic gates.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Apply basic laws and theorems for electrical circuit analysis.
CO2	Interpret the behaviour of DC electrical circuits including series, parallel, and mixed configurations.
CO3	Explain the working principle of transformer and DC Motor.
CO4	Analyze the operation of semiconductor devices like diodes and transistors.
CO5	Demonstrate working of transistors and test digital logic circuit.

CO-PO Mapping:

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

Assessment Scheme:

Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Assignment/ Surprise Test/ Quiz/Seminar/Group Discussions Presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE

Course Contents

Unit No.	Unit Title and Contents	Hours
1	DC Circuit DC Electric Circuit: Kirchhoff's laws, Concept of constant voltage and current source, Analysis of series and parallel DC circuit with resistance and capacitance, Voltage rating, Power rating of resistive devices, DC circuit with R-C & R-L (Charging and discharging of capacitor, Time constant for RC & R-L circuit.), Numerical treatment on DC electric circuit	08
2	AC Fundamentals Generation of Sinusoidal Voltage, Representation of Sinusoidal Waveforms, RMS value, Average value, Form factor, Peak factor, Phasor representation, Impedance of AC circuit, Powers- Active, Reactive & Apparent, Power Factor and its Significance, Analysis of single phase AC circuits consisting of R,L,C, R-L,R-C,R-L-C combinations (Series and Parallel) Resonance. Basic concept of Three phase circuits.	08

3	Single Phase Transformer and DC Motor Principle, Construction, Classifications, EMF equation, voltage ratio, current ratio, working at No Load & with Load, Losses in Transformer, Efficiency and Voltage Regulation, Applications. DC Motor: Basic principle of any electric motor, Construction and Working of DC motor, Types of DC motors and their Speed-Torque characteristics with applications.	08
4	Diodes and Circuits: Diodes and Rectifiers: Review of PN junction diode, Review of Zener Diodes, Light-Emitting Diodes, Photo Diodes, Load-Line Analysis of diode, Types of Rectifiers (Half Wave & Full Wave), Equation for IDC, VDC, VRMS, I RMS, Efficiency and Ripple Factor for each configuration. Block diagram of RPS.	08
5	Semiconductor Devices and Applications: Transistors: Introduction, Construction of BJT, type of biasing- fixed bias and self-bias circuit, BJT characteristics for CE, CB, CC configuration, α , β , Relationship between alpha (α) & beta (β), concept of gain and bandwidth, BJT as an Amplifier, BJT as switch. Introduction to Digital Electronics: Number System, Logic Gates, Universal Gates, Boolean Postulates, De- Morgan's Theorem.	08

Text Books

Sr. No.	Title	Author	Publisher
1	Basic Electrical and Electronics Engineering	D.P. Kothari and I.J. Nagrath	McGraw Hill 4 th Edition, 2019
2	Principles of Electrical Engineering and Electronics	V.K. Mehta and Rohit Mehta	S. Chand Publications., 2019
3	Electrical Technology Vol-II	B.L. Theraja	S. Chand, 24 th edition, 2024

Reference Books

Sr. No.	Title	Author	Publisher
1	Fundamentals of Electrical Engineering and Electronics	J.B.Gupta	S.K. Kataria & Sons, 10 th edition, 2019
2	Electronic Devices and Circuits 4 th edition	David A.Bell	PHI, 2 nd edition, 2015
3	Basic Electrical and Electronics Engineering	R Muthusubramanian, S.S Salivahanan	TMH, 2 nd edition 2024

4	Basic Electrical and Electronics Engineering	S.K. Bhattacharya	Pearson Education, 10 th edition, 2010
5	Basic Electrical and Electronics Engineering	Ritu Sahdev	Khanna Publishing House., 2021
6	Fundamentals of Electrical Engineering	Rajendra Prasad	PHI 3 RD Edition
7	Fundamentals of Electrical Engineering	Charles A. Gross and Thaddeus A. Roppel	CRC press.

Title of the Course: C Programming for Problem Solving Course Code: 25BSE1103	L	T	P	Credit
	2	-	-	2

Course Prerequisite: Basic Understanding of Computers

Course Description:

This course provides a comprehensive introduction to the C programming language, focusing on foundational programming concepts and structured programming techniques. The students will learn how to write efficient, readable, and error-free C programs, with an emphasis on developing problem-solving skills through algorithm design and implementation.

The course covers core topics such as variables, data types, operators, control structures, functions, arrays, pointers, strings, structures, file handling, and dynamic memory management. Through hands-on lab sessions and assignments, the students will gain practical experience and be prepared to work on system-level software, embedded systems, and application development.

By the end of the course, the students will have a strong understanding of C programming fundamentals, enabling them to develop robust programs and transition to more advanced languages like C++ and Java.

Course Objectives:

By the end of this course, the students will be able to:

1. Understand the Fundamentals of C: Grasp the basic structure, syntax, and semantics of the C programming language.
2. Apply Programming Logic and Control Structures: Implement conditional statements, loops, and branching techniques to solve computational problems to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.
3. Use Functions for Modular Programming: Design and use user-defined and library functions to build modular, reusable, and organized code.
4. Work with Arrays and Strings: Handle one-dimensional and multi-dimensional arrays, and manipulate strings using both the built-in and user-defined methods.
5. Understand and Use Pointers Effectively: Apply pointers for direct memory access, dynamic memory allocation, and as function arguments.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain features of “C” programming language.
CO2	Select “C” programming constructs for program writing.
CO3	Develop programming solution for given problem.
CO4	Implement programs using arrays, strings, and user-defined data types such as structures and unions.

CO-PO Mapping:

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

Assessment Scheme:

Two components of Continuous Assessment (CA1 & CA2), one Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

Assessment Details:

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Introduction to C Importance of programming, Algorithms, Flowchart, Pseudocode, Structure of C Program, Compilation and Execution, Data Types (user defined, pre-defined), Variables, Constants, Reading and printing variable values, Preprocessor Directive.	07

2	Operators and Control Flow Operators in C: Arithmetic Operators, Relational Operators, Logical Operators, Unary Operators, Bitwise Operators, Ternary Operator, size of operator. Control Flow: Statements & Blocks, Decision Controls, If-else statements, Nested if-else, Switch Case, Loops (for loop, while loop, do-while loop), Loop interruption (break, continue, exit functions).	07
3	Functions and Arrays Functions: Fundamentals of function, Function declaration and prototype, Function definition, Function call, Return type and return statement. Arrays: Single Dimensional Array, Multi-Dimensional Array, Character Array, Strings, Built-in String functions (strcat, strcmp, strcpy, strlen).	07
4	Pointers, Structures and File Handling Pointers: Pointer variables, Pointer to functions, Pointer to array Structure: Basics of structures File. handling: Defining and opening the file, Closing the file, Operations on file.	07

Text Books			
Sr. No.	Title	Author	Publisher
1	The Complete Reference, 4th Edition	Herbert Schildt	McGraw Hill Education
2	The C Programming Language	E. Balagurusamy	McGraw Hill Education
3	C Programmer's Companion	R.S. Jone	Universities Press Pvt. Ltd.
4	Programming In C	Pradip Dey	Oxford University Press

Reference Books			
Sr. No.	Title	Author	Publisher
1	Let Us C	Yashavant Kanetkar	17th Edition (2023) BPB Publications
2	Programming in ANSI C	E. Balagurusamy	8th Edition (2019), McGraw Hill Education
3	Practical “C” Programming	Steve Oualline	Third Edition, Oreilly, 2013
4	Introduction to C programming	Reema Thareja	Oxford University press (2nd edition),2015
5	The C Puzzle book	Alan R. Feuer	Pearson,1999

Certification Courses					
Sr. No.	Course/ Certification	Provider/Platform	Level	Mode	Certification Authority
1	Problem Solving Through Programming in C	https://onlinecourses.nptel.ac.in/noc23_cs53/preview	UG	Online	NPTEL
2	Introduction to Programming in C	https://onlinecourses.nptel.ac.in/noc25_cs119/preview	Beginner	Online	NPTEL

Title of the Course: Communication Skills Course Code: 25BSE1104	L	T	P	Credit
	2	-	-	2

Course Prerequisite: English subject at HSC

Course Description:

The course intends to make learners understand and develop various communication skills required in day-to-day life as well as in professional contexts. As domain knowledge and skills have become equally important in today's technology-driven world, the current course and the one being offered in the Third Year will provide the learners a great opportunity to strengthen their English communication and soft skills. Keeping in mind the current competence of the learners, the course aims to provide them with revision and ample practice in the skills essential for their professional life. It includes four modules that cover basic concepts and theory of communication, business communication, verbal aptitude (English grammar), language learning skills, letter writing, and comprehension. In addition to Listening, Speaking, Reading, and Writing (LSRW) the course sees Thinking as an essential language learning skill.

Course Objectives:

By the end of this course, the students will be able to:

1. To understand the fundamentals of communication theory and its relevance in a professional context.
2. To apply the listening and reading comprehension skills.
3. To summarize the techniques to improve Spoken English and to provide the students with a platform for practicing these skills.
4. To prepare the students to write correct and effective business letters, official letters, and covering letters with resume, and to participate in Group Discussion (GD) and face the interviews.

Course Outcomes:

CO	After the completion of the course, the students should be able to
CO1	Demonstrate the communication process, methods of communication, and flow of Communication in a business context.
CO2	Apply acquired LSRW skills in real-life situations and in a professional context.
CO3	Compose effective business and cover letters using standard language, style, and structure.
CO4	Apply the techniques for effective participation in GD and tips to face interviews successfully.

CO-PO Mapping:

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

Assessment Scheme:

Two components of Continuous Assessment (CA1 & CA2), one Mid Semester Examination (MSE) and one End Semester Examination (ESE), have 20%, 30% and 50% weightage, respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on the Assignment/ Surprise test/ Quiz/Seminar/Group discussions/ presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Communication Theory Communication basics: Importance, process, levels, forms, methods: verbal and non-verbal, Barriers and solutions, Flow/channels of business communication (Internal, External, Vertical, Horizontal, Diagonal, Grapevine), Problems and Solutions.	08
2	Enhancing Language Learning Skills (LSRW) Effective listening: Process and advantages of listening, poor listening habits, types of listening, strategies for effective listening, listening barriers Effective speaking: Importance of telephonic conversation, various oral business contexts/situations, group communication, Preparing effective public communications Effective reading: Importance, types, overcoming common obstacles, tips and strategies Effective Writing: Mastering English Essentials and Fundamentals, paragraph and essay writing techniques, diary/blog writing Art of précis writing, Techniques to comprehend and summarize a given technical, scientific, or industry-oriented text Thinking is intricately with the LSRW skills.	08
3	Formal Business Correspondence Principles, structure (elements), Layout (complete block, modified block, semi-block), Types (enquiry and replies, claim and adjustment).	06
4	Employability Skills Covering letter and resume, Group Discussion, Interviews (Online / Offline) Introduction to soft skills (Etiquettes, Team Work, Empathy, Problem Solving etc.)	06

Text Books			
Sr.No.	Title	Author	Publisher
1	Developing Communication Skills	Krishna Mohan Meera Banerji	Macmillan Publishers India Ltd.
2	Communication Skills for Engineers and Scientists	Sangeeta Sharma Binod Mishra	PHI Learning Private Limited.

Reference Books			
Sr.No.	Title	Author	Publisher
1	Professional Communication Skills	Er. A.K.Jain, Dr.Pravin S.R.Bhatia, Dr. A.M.Shaikh	S.Chand
2	Personality Development and Soft skills	Barun K.Mitra	Oxford University Press
3	Communication Skills for Engineers	Sunita Mishra C.Muralikrishna	Pearson Education
4	Effective Technical Communication	M.Ashraf Rizvi	McGraw Hill Education Pvt.Ltd.

Title of the Course: Engineering Physics Laboratory Course Code: 25BSE1001L	L	T	P	Credit
	-	-	2	1

Course Prerequisite:

1. To calculate the least count of measuring instruments.
2. Ability to use standard measuring instruments and analyze data with fundamental mathematical tools.

Course Description:

This course offers hands-on experiments aligned with Engineering Physics theory. It reinforces concepts of wave optics, lasers, optical fibers, crystal structure, and semiconductor physics through experimental verification and measurements.

Course Objectives:

By the end of this course, the students will be able to:

1. To explore wave optics phenomena through laboratory demonstrations.
2. To understand characteristics and engineering applications of lasers and optical fibers.
3. To analyze crystal structure and semiconducting properties using models and instruments.
4. To enhance experimental design, data analysis, and interpretation.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Demonstrate different phenomenon of light and their applications.
CO2	Demonstrate working of the optical fiber and determine its acceptance angle.
CO3	Analyze crystal structure and electrical properties of semiconducting material and semiconducting device.
CO4	Design, develop and demonstrate experimental set up and models for tools applicable in engineering.
CO5	Interpret experimental observations to understand physical phenomena from solid-state physics.

CO-PO Mapping:

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

Assessment Scheme:

Two components of in semester evaluation (CA1 and CA2) having 50% weightage each.

Assessment Component	Marks
CA1	25
CA2	25
OE	-

CA1 and CA2 are based on practical performance etc.

Course Contents

Practical No.	List of Experiments	Hours
1	To determine the wavelength of prominent lines of mercury by plane diffraction grating.	2
2	To determine radius of curvature of Plano-convex lens and to determine wavelength of sodium light by newton's ring	2
3	To determine the wavelength of He-Ne Laser light using a diffraction grating.	2
4	To calculate the Numerical Aperture and acceptance angle of an optical fibre.	2
5	To determine Planck's constant and to verify inverse square law of radiation using photoelectric effect	2
6	To analyze the crystal structure from X-ray diffraction pattern using Bragg's Law.	2
7	Study of planes with the help of models related Miller Indices	2

8	To determine the Hall coefficient and carrier concentration of a semiconductor.	2
9	To study forward and reverse bias I–V characteristics of a p–n junction diode.	2
10	To measure electrical conductivity of a semiconducting sample using the four-probe method.	2
11	To calculate the specific rotation of sugar solution using a polarimeter.	2
12	To determine Divergence of LASER beam and study directionality of LASER	2

***Any 10 practicals /experiments to be conducted.**

Textbooks			
Sr. No.	Title	Author/s	Publisher
1	An Advanced Course In practical physics	D. Chattopadhyay	New Central Book Agency(P) Ltd
2	Engineering Physics Laboratory Manual	Dr. A.S. Vasudeva	S. Chand

Reference Books			
Sr. No.	Title	Author/s	Publisher
1	Experiments in Engineering Physics	M.N. Avadhanulu, A.A. Dani, P.M. Pokley.	S. Chand & Company Ltd., Delhi
2	Engineering Physics Practical	S.P. Singh	Laxmi Publications

Title of the Course: Modern Chemistry Laboratory Course Code: 25BSE1002L	L	T	P	Credit
	-	-	2	1

Course Prerequisite:

The students should have basic knowledge about acid bases reactions apparatus and preparation of chemicals. The students should have basic knowledge about fundamental principles used in various analytical techniques.

Course Description:

The course intends to train the students to enhance experimental skills and apply fundamental chemical principles to solve chemistry related problems in engineering. The course provides experience to the students about qualitative and quantitative analysis of different samples using instrumental and non-instrumental techniques.

Course Objectives:

By the end of this course, the students will be able to:

1. To study the mechanism and estimation of corrosion rate of metals as well as corrosion preventative techniques.
2. To understand the various quality parameters of water using volumetric quantitative analysis.
3. To develop the ability to analyze electrochemical reactions.
4. To analyze the various analytical samples by using conductometer, potentiometer and spectrophotometer.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Recall the basic principles of corrosion processes and pH measurement techniques.
CO2	Demonstrate an understanding of titrations and analytical procedures to determine chemical properties.
CO3	Analyze electrochemical reactions and spectrophotometric data to evaluate material properties and solution behavior.
CO4	Illustrate the operation of different instrumental and non-instrumental techniques for the analysis of various engineering materials.
CO5	Design and synthesize nanoparticles using conventional and green chemistry methods.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3										1
CO2	3										1
CO3	3										1
CO4	3										1
CO5	3										1

Assessment Scheme:

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

Assessment Component	Marks
CA1	25
CA2	25
OE	--

CA1 and CA2 are based on practical performance.

Course Contents:

Practical No.	List of Experiments	Hours
1	Preparation of corrosive Medium & Determination of rate of corrosion of Aluminum metal.	02
2	Determination of pH of different type of water using pH meter.	02
3	Determination of Acid dissociation constant (pKa) of acetic acid by pH metric titration with NaOH solution.	02
4	Determination of total hardness of water sample by EDTA method (Complexometric Titration).	02
5	To determine calorific value of a fuel.	02
6	Estimation of strong acid and weak acid from given mixture by conductometric Titration.	02
7	Determination of cell potential of Galvanic cell (Zn /Cu cell)	02
8	Determine maximum wavelength of absorption-of a given inorganic coloured sample by colorimeter	02
9	Identification of basic radicals from given binary mixture of inorganic salts by paper chromatography.	02

10	Synthesis of Iron Oxide Nanoparticles by co-precipitation method (Fe ₃ O ₄)	02
11	Preparation of ZnO Nanoparticles -Based Sunscreen	02
12	Green Synthesis of Silver Nanoparticles Using Tulasi Extract	02

***Any 10 practicals /experiments to be conducted.**

Reference Books					
Sr.No.	Title	Edition	Author/s	Publisher	Year
1	Laboratory Manual of Engineering Chemistry	3rd	S..K..Bhasin, Sudha Rani	Dhanpat Publishing Company	2012
2	Textbook of Engineering Chemistry with Lab Manual of Chemistry and Environmental Studies	9th	Shashi Chawla	Dhanpat Publishing Company	2013
3	Engineering Chemistry Laboratory Manual	3rd	Manoj Kumar Solanki	Educreation Publishing	2019

Text Books					
Sr.No.	Title	Edition	Author/s	Publisher	Year
1	Vogels Qualitative Inorganic Analysis	7th	Michael Urban and Joel Murach	Murach's Publication, 2016.	2012
2	Instrumental Methods of Chemical Analysis	5th	Dr.R.Nageswara Rao	Dreamtech Press, 1st Edition, 2016.	2019

Title of the Course: Basic Electrical & Electronics Engineering Laboratory Course Code: 25BSE1102L	L	T	P	Credit
	-	-	2	1

Course Prerequisite: Basic theoretical concepts of electrical circuits and semiconductor devices.

Course Description:

This laboratory course is designed to complement the theoretical concepts covered in the Basic Electrical and Electronics Engineering course. It introduces students to hands-on experimentation with fundamental electrical and electronic components, circuits, and instruments. The students will gain practical experience in circuit wiring, testing of semiconductor devices, and selection of appropriate logic gate for given applications.

Course Objectives:

1. To reinforce the theoretical knowledge of electrical and electronics engineering through experiments.
2. To familiarize students with electrical circuit components, measuring instruments, and wiring methods.
3. To develop skills in constructing and analyzing basic circuits and systems.
4. To understand the characteristics and applications of electrical machines and semiconductor devices.
5. To introduce the use of Logic Gates, Boolean algebra in engineering applications.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Demonstrate the use of safety electrical equipment.
CO2	Identify the use DC motors and single-phase transformers in daily life.
CO3	Verify Kirchhoff's law and determine voltage and current ratios of single-phase transformers through experiment.
CO4	Analyze the performance of rectifiers, filters circuits
CO5	Understand the logic gates with their truth tables and verify Demorgan's theorem

CO-PO Mapping:

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

Assessment Scheme:

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage of course contents and OE is having 50 % weightage of total course contents which is based on practical performance, presenty and oral discussion.

Assessment Component	Marks
CA1	25
CA2	25
OE	50

Course Content

Practical No.	List of Experiment	Hours
1	Determine frequency, time period, peak value, rms value, peak factor of a Sinusoidal ac waveform on CRO/DSO	2
2	Identify switches , fuse, switch fuse and fuse switch, MCB, MCCB	2
3	Study and verify Kirchhoff's current and voltage law.	2
4	Determine current and voltage ratio of single phase transformers.	2
5	Load test on DC shunt/ compound motor.	2
6	Speed Control of the DC Shunt Motor using Three point starter.	2
7	Study of Half Wave Rectifier (HWR) with & without filter.	2
8	Study of Full Wave Rectifier (FWR) with & without filter	2
9	Study of output characteristics of transistors.	2
10	Verify Truth Table of Logic Gates (AND, OR, NOT, NAND & NOR Gates).	2
11	Design Basic Gates Using NOR/ NAND gates.	2
12	Verify Demorgan's theorem.	2

Textbooks/Software			
Sr. No.	Title	Author	Publisher
1	Basic Electronics	B.L. Theraja	S. Chand
2	Principles of Electrical and Electronics Engineering	V.K. Mehta & Rohit Mehta	S. Chand
3	Electronic Devices and Circuits	Millman and Halkias	McGraw Hill Education.

Reference Books			
Sr.No.	Title	Author	Publisher
1	Basic Electrical and Electronics Engineering	D.P. Kothari and I.J. Nagrath	McGraw Hill Education
2	A Course in Electrical and Electronic Measurements and Instrumentation	J.B.Gupta	S.K. Kataria & Sons.
3	Electronic Devices and Circuits	Millman and Halkias	McGraw Hill Education.
4	Electronics Lab Manual (Volume I and II)	K. A. Navas	Rajath Publishers.
5	Basic Electrical and Electronics Engineering	S.K. Bhattacharya	Pearson Edition
6	Basic Electrical and Electronics Engineering	Ritu Sahdev	Khanna Publisher

Title of the Course: C Programming for Problem Solving Laboratory Course Code: 25BSE1103L	L	T	P	Credit
	--	--	2	1

Course Prerequisite: Basic understanding of computers and logic building.

Course Description:

This laboratory course provides hands-on experience in solving engineering and real-life problems using the C programming language. It is designed to complement the theoretical foundations of C programming by engaging the students in implementing structured, modular, and efficient code. The students will learn to apply programming constructs such as variables, data types, control structures, functions, arrays, strings, pointers, and dynamic memory management through practical problem-solving. The course also focuses on debugging, compiling, and testing C programs using modern development tools and IDEs. Emphasis is placed on developing logical thinking, structured programming habits, and effective algorithmic approaches to real-world computational problems.

Course Objectives:

By the end of this course, the students will be able to:

1. To familiarize students with the syntax and semantics of C programming language.
2. To develop the ability to write programs using fundamental programming constructs.
3. To implement modular programming and memory management using pointers.
4. To enhance logical reasoning and problem-solving abilities.
5. To prepare students to use C programming in engineering applications and further Programming courses.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Explain 'C' Language Constructs
CO2	Select Constructs of 'C' to develop programming solution
CO3	Use Memory Management techniques for dynamic memory management
CO4	Develop “C” program to solve problem
CO5	Create a C program to implement modular programming and memory management using pointers.

CO-PO Mapping:

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

Assessment Scheme:

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

Assessment Component	Marks
CA1	25
CA2	25
OE	50

CA1 OE based on 50% of course content, attendance, lab overall performance.

CA2 OE based on 100% of course content, attendance, lab overall performance.

Intent of this laboratory is to build the logic development and problem-solving skills of students and build proficiency and competency in C language. For this purpose, a sample list of assignments is grouped into Group A, Group B and Group C with increasing levels of difficulty and understanding.

Group A assignments are based on real life problems using language constructs such as constant, variable, data type, operator, array, string, expressions, decision, iteration etc.

Group B assignments are based on the applications of language constructs and combination of language constructs, control structures, String, Arrays, Pointers, Structures, Functions.

Group C assignments are a little more challenging. Assignments will be open ended which can either be a mini project or simulation of real-life problems/scenarios/applications. It can also include

Debugging and Feature enhancement / Alternative solution/ testing / Code-refactoring of given problem statements or analyze the given code and comment on the output.

Instructors can conduct a total of 10 assignments, six from Group A, three from Group B, one from Group C. Other assignments can be considered as extra assignments.

Suggestive List of Assignments

Assignment 0: Get acquainted with Windows/Linux Platform, C environment, structure of

basic C program, compilation, debugging and execution of C program.

Group A - Language constructs

For Group A problem statements, students should draw flowchart/ algorithm/ pseudo code and convert it into a C program. Problems are based on constructs such as concepts of constant, variable, data type, operator and expressions, arrays, strings, iteration, decision making and others.

Practical No.	Practical Title and Contents	Hours
1	To Study Basic Linux commands used for programming: i. Hands on Basic Linux Commands. ii. Command Line based compilation and execution of program.	2
2	Convert measurement units such as feet to inches, inches to centimeters, Kilograms to grams, Dollar to Rupees, temperature conversion Degree to Fahrenheit, days into years, weeks and days.	2
3	Number conversion (decimal to binary, binary to decimal, binary to octal, octal to binary).	2
4	i) Find the maximum/minimum of given numbers. ii) Obtain the first 25 numbers of a Fibonacci sequence/prime numbers with and without recursion etc.	2
5	Search the data from an array of numbers/ characters/ string.	2
6	Calculate the total number of characters in the string and the total number of vowels in the string with the number of occurrences in the string.	2
7	Swap two data elements using pass by value, pass by reference and without using a third variable.	2
8	Operations on matrices.	2

Applications of Language Constructs

Group B problem statements address the applications of language constructs such as Loops for iteration, Arrays, Strings, Structures, and Functions for modularity wherever required. They should implement the application using a function (call by reference/ call by value) wherever appropriate. Problems are based on real life applications/ scenarios.

Practical No.	Practical Title and Contents	Hours
1	Perform employee operations such as accept, display, search by name, and search by number, update a record. Explore the possibility of modularity for implementation.	2

2	For a class an examination is conducted and the results for the students of all the 5 subjects are recorded. Write a C program to display the record of students. On the basis of the record compute: i. The average score of class Highest score and lowest score of class.	2
3	Create a structure to specify data of customers in a bank. The data to be stored is: Account number, Name, Balance in account. Assume a maximum of 200 customers in the bank. Write a C program to display details of customers.	2
4	Write a C program that simulates an ATM machine. The user should be able to choose an operation such as balance inquiry, deposit, withdrawal, or exit using a switch-case structure. Within each operation, use if-else statements to check conditions such as sufficient balance for withdrawal or valid deposit amount.	2

Group C

Group C problem statements address big real-life problem solving. Students are expected to apply the learnt concepts to solve these problems. Students should choose any one of the following: -

Practical No.	Practical Title and Contents	Hours
1	Micro Project – Students should implement a micro project which simulates real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of C language.	2
2	Game - Students should develop a game which simulates real life problems/scenarios/applications. They are expected to make use of the appropriate constructs of C language.	2

Textbooks				
Sr. No.	Title	Edition	Author/s	Publisher
1	The Complete Reference	Fourth	Herbert Schildt	McGraw-Hill Education,
2	The C Programming Language	Eighth	E. Balagurusamy	McGraw Hill Education
3	C Programmer's Companion	First Edition	R.S. Jones	Universities Press Pvt. Ltd.

Reference Books				
Sr. No.	Title	Edition	Author/s	Publisher
1	C”Programmg Language	Second Edition	Brian Kernighan, Dennis Ritchie	PHI Learning
2	Practical “C” Programmig	Third	Steve Oualline	McGraw Hill Education
3	Programming in ANSI C	Eight Edition	E.Balagurusamy	McGraw Hill Education,

Title of the Course: Communication Skills Laboratory	L	T	P	Credit
Course Code: 25BSE1104L	-	-	2	1

Course Prerequisite: English subject at HSC, Communication Skills Theory

Course Description:

This is a practice-oriented course, laying importance on application of various skills being learnt in the Communication Skills theory course such as grammar, techniques and strategies for improving English sub-skills and vocabulary, etc. In addition, this course focuses on English speaking, reading, writing skills, effective presentation and building confidence.

Course Objectives:

By the end of this course, the students will be able to:

1. To exhibit confident and effective communication skills in presentations, group discussions, and role-plays.
2. To design clear, concise, and persuasive messages in written and oral formats, applying principles of effective communication.
3. To analyze the students' own communication strengths and weaknesses, identifying areas for improvement.
4. To deliver engaging presentations, incorporating visual aids and effective delivery techniques.
5. To assess the effectiveness of communication strategies, providing constructive feedback and suggestions for improvement.

Course Outcomes:

CO	After completion of the course, the students should be able to
CO1	Demonstrate confidence in public speaking, group discussions, and other communication settings.
CO2	Create engaging and informative content for presentations, reports, and other written assignments.
CO3	Use nonverbal communication effectively, including body language, tone of voice, and facial expressions.
CO4	Practice active listening skills, including paraphrasing, summarizing, and asking clarifying questions.
CO5	Adapt their communication style to different audiences, purposes, and contexts, demonstrating flexibility and effectiveness.

CO-PO Mapping:

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

Assessment Scheme:

Two components of Continuous Assessment (CA1 and CA2), having 50% weightage respectively.

Assessment Component	Marks
CA1	25
CA2	25
OE	--

CA1 and CA2 are based on the performance of the practicals

Course Contents

Practical No.	Practical Title and Contents	Hours
1	Icebreaking: Introducing yourself and others Adjectives, phrases and clauses to describe yourself and others Introducing yourself and others demonstration.	2
2	Introduction to English Building Blocks -1 Grammar fundamentals: parts of speech, tenses, prepositions, articles, modals, Vocabulary building: synonyms, antonyms, prefixes/suffixes, idioms, phrases.	2
3	Verbal Aptitude1(Discussion on applications of grammar) Using proper tenses, correct use of articles, conjunctions and prepositions.	2
4	Verbal Aptitude 2(Watching videos and solving grammar exercises) Using proper tenses, correct use of articles, conjunctions and prepositions.	2
5	Listening practice Listening comprehension, Strategies for effective listening with audio/ video samples.	2
6	Speaking practice-1 Video samples of effective and ineffective public speeches, Extempore(JAM), prepared speeches.	2
7	Speaking practice-2 Prepared speeches.	2
8	Group Discussion-1 Group discussion tips, Dos and Don'ts, video samples Mock GD-1analysis and comments on individual performances.	2
9	Group Discussion-2 Final GD participation.	2

10	Interview1 Discussing interview FAQs in detail, video samples.	2
11	Interview2 Mock interviews (prepared and formal).	2
12	Incident Narration or Storytelling Practicing narration methods and techniques for effective narration.	2

***Any 10 practicals to be conducted.**

Reference Books					
Sr.No.	Title	Edition	Author/s	Publisher	Year
1	Better English Pronunciation	Second	J.D. O'Connor	OUP	1980
2	A Practical Course in Spoken English	First	J.K. Gangaj	PHI Learning Pvt. Ltd	2014
3	English Language Laboratories	Second	Nira Konar	PHI Learning	2014

Software
Orell Talk Digital Language Lab Software – Professional Version with 1+50 users' subscription.

Title of the Course: Engineering Practice Lab Course Code: 25BSE1105L	L	T	P	Credit
	-	--	2	1

Course Prerequisite: Basic engineering drawing, equipment's and safety rules.

Course Description: The Engineering Practice Lab course is designed to provide first-year engineering students with hands-on experience and fundamental knowledge of various manufacturing practices, tools, and machining processes. The course introduces students to basic fabrication methods, enabling them to understand the practical aspects of engineering, materials, and processes used in industry.

Students will engage in practical sessions involving fitting, carpentry, welding, sheet metal work, plumbing, plastic injection, metal forming, and machining. Emphasis is placed on safety protocols, tool handling, measurement techniques, and the working principles of workshop machines and tools. This course lays the foundation for core mechanical and manufacturing subjects in later semesters.

Course Objectives:

By the end of this course, the students will be able to:

1. To familiarize students with basic manufacturing techniques and tools.
2. To develop manual skills and technical understanding of fabrication processes.
3. To encourage safe workshop practices and working discipline.
4. To prepare students for real-world engineering tasks requiring practical knowledge.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand the work culture, how to use tools and safety in the workshop.
CO2	Practice on manufacturing of components using workshop trades including fitting, carpentry, sheet metal working, metal forming, and welding.
CO3	Demonstrate practical skills in household wiring, electronic circuit assembly, soldering, and testing of electrical and electronic components through hands-on experiments.
CO4	Acquire skills in basic engineering practices and enhance their skill set using hands on experience and their teamwork.

CO-PO Mapping:

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

Assessment Scheme:

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

Assessment Component	Marks
CA1	25
CA2	25
OE	--

CA1 and CA2 are based on the Practical performance.

Course Contents

Practical No.	List of Experiments	Hours
1	Safety precaution while working in workshop (Fire, Electric, Accidental prevention) and introduction of workshop tools.	02
2	Wood sizing (pattern making) exercises in planning, marking, sawing, chiseling and grooving to make half lap joint and cross lap joint.	04
3	A job fitting includes cutting, filing to saw cut, filing sides and faces, drilling and tapping on M. S. plates. Measure accuracy of dimension.	08
4	Demonstration of different piping connection, Threading dies, and pipe fitting.	02
5	Introduction to metal forming process and common tools required are anvil, hammers, forging dies, furnace etc.	02
6	Making a small parts using GI sheet involving development, marking, cutting, bending, brazing and soldering operations- i) Tray ii) Pan iii) Box and similar articles.	04
7	Demonstration of Arc welding process to make a square butt joint.	02
8	Demonstration of household wiring connection, wiring of experiments assembly and disassembly.	02

9	Demonstration of soldering and testing of electronics components. Demonstration of Use of electronic circuits.	02

Text Book			
Sr.No.	Title	Author	Publisher
1	Work Shop Technology – Vol. 1	S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy	Media Promoters and Publishers Pvt Ltd.
2	Mechanical Workshop Practice	K. C. John	Prentice Hall Publication, New Delhi, 2010.
3	Elements of Workshop Technology – Vol. 1	S.K. Hajra Choudhury & A.K. Hajra Choudhury	Media Promoters
4	Engineering Workshop Practice	H.S. Bawa	McGraw Hill Education

Reference Books			
Sr.No.	Title	Author	Publisher
1	Workshop Technology (Vol. 1 & 2)	R.S. Khurmi & J.K. Gupta	S. Chand Publishing
2	Manufacturing Technology: Foundry, Forming and Welding	P.N. Rao	McGraw Hill Education
3	Workshop Practice	B.S. Raghuwanshi	Dhanpat Rai & Co.
4	Production Technology	H.M.T. (Hindustan Machine Tools)	Tata McGraw Hill

Certification Courses				
Course/Certification	Provider/Platform	Level	Mode	Certification Authority
NPTEL “Manufacturing Processes I & II”	IITs/IISc (via NPTEL)	UG	Online	NPTEL
SWAYAM "Introduction to Engineering Workshop"	IITs/IISc (via SWAYAM)	UG	Online	SWAYAM
Skill India / NSDC Courses (Pradhan Mantri Kaushal Vikas Yojana)	NSDC / Skill India	Base	Online + offline hands-on (at training centers)	Government-recognized
Coursera / edX – Fundamentals of Manufacturing Processes	Coursera / edX	Base	Online	University at Buffalo / MIT
TCS iON Career Edge – Young Professional	TCS iON	Base	Online	TCS iON

Title of the Course: Yoga	L	T	P	Credit
Course Code: 25BSE1106L	-	-	2	1

Course Prerequisite: No prior knowledge required; only willingness to participate and awareness of personal health conditions.

Course Description:

This course helps the students achieve physical fitness, mental clarity, and emotional balance through asanas, pranayama, and meditation. It promotes stress management, concentration, and a healthy lifestyle, supporting overall well-being.

Course Objectives:

By the end of this course, the students will be able to:

1. To introduce students to the foundational concepts and philosophy of Yoga.
2. To familiarize students with various yogic practices such as asanas, pranayama, and meditation.
3. To develop physical flexibility, strength, and mental clarity through regular yoga practice.
4. To understand the connection between breath, body, and mind in achieving holistic well-being.
5. To reinforce the importance of discipline, mindfulness, and a balanced lifestyle.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand the science and philosophy behind yogic practices and their relevance to holistic health.
CO2	Demonstrate proficiency in performing basic asanas, breathing techniques (pranayama), and meditation.
CO3	Use yogic techniques to enhance focus, emotional balance, and stress management in daily life.
CO4	Analyze the physical and psychological impacts of regular yoga practice on the human body and mind.
CO5	Demonstrate the ability to integrate yogic discipline and mindfulness into personal and professional

CO-PO Mapping:

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

Assessment Scheme:

Two components of in Semester Evaluation (CA1 and CA2), having 50% weightage respectively.

Assessment Component	Marks
CA1	25
CA2	25
OE	--

CA1 and CA2 are based on the practical performance.

Course Contents

Practical No.	List of Experiments	Hours
1	Conduct Physical Activities.	2
2	Conditioning Exercise	2
3	Warming and cooling down exercises.	2
4	Conduct different style of yoga. (Hatha, Vinyasa, Ashtang)	2
5	Conduct yoga for alignment and balance, Shitalikarna, Vyayama, Suryanamaskar.	2
6	Basic yoga postures (Asanas).	2
7	Practice of Suryanamaskar & Pranayama, Anulom Vilom.	2
8	Practice basic yoga postures & Pranayama, Kapalabhati.	2
9	Practice Asanas & Pranayama Bhramari	2
10	Breath control for physical and mental health.	2
11	Types of Dhyana.	2
12	Perform sitting in Dhyana Mudra and meditating.	2

***Any 10 practical's experiments to be conducted.**

Textbook				
Sr.No.	Title	Edition	Author/s	Publisher
1	Asanas	2nd	Swami Kuvalyananda Pioneer in scientific Yoga	Kaivalyadhama samiti Lonavla.
2	Hathayoga Pradipika Swatmarama	3rd	Swami Digambaraji	Kaivalyadhama, Lonavala
3	The Science of Yoga	2nd	Taimini	Theosophical Publishing House, Adyar, Madras

Reference Books				
Sr.No.	Title	Edition	Author/s	Publisher
1	Light on yoga	2nd	B.K.S Iyengar	Schocken Books
2	Yoga Darshan	2nd	Swami Niranjanananda	Swami Niranjanananda
3	Modern Trends and Physical Education	4th	A. Singh	Kalyani Publishers