SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY

COURSE HANDBOOK

DEPARTMENT OF APPLIED SCIENCE &HUMANITIES

SEMESTER 1 & 2

MAT 101 LINEAR ALGEBRA & CALCULUS

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Linear Algebra & Calculus**	Course code**: MAT 101**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**Linear algebra** Systems of linear equations, Solution by Gauss elimination, row echelon form and rank of a matrix, fundamental theorem for linear systems (homogeneous and non-homogeneous, without proof), Eigen values and Eigen vectors. Diagonalization of matrices, orthogonal transformation, quadratic forms and their canonical forms.
II	**Multivariable Calculus-Differentiation** Concept of limit and continuity of functions of two variables, partial derivatives, Differentials, Local Linear approximations, chain rule, total derivative, Relative maxima and minima, Absolute maxima and minima on closed and bounded set.
III	**Multivariable Calculus-Integration** Double integrals (Cartesian), reversing the order of integration, change of coordinates (Cartesian to polar), finding areas and volume using double integrals, mass and Centre of gravity of inhomogeneous laminas using double integral. Triple integrals, volume calculated as triple integral, triple integral in cylindrical and spherical coordinates (computations involving spheres, cylinders).
IV	**Sequences and series** Convergence of sequences and series, convergence of geometric series and p-series (without proof), test of convergence (comparison, ratio and root tests without proof); Alternating series and Leibnitz test, absolute and conditional convergence.
V	**Series representation of functions** Taylor series (without proof, assuming the possibility of power series expansion in appropriate domains), Binomial series and series representation of exponential, trigonometric, logarithmic functions (without proofs of convergence); Fourier series, Euler formulas, Convergence of Fourier series (without proof), half range sine and cosine series, Parseval's theorem (without proof).

TEXT BOOKS:

1	H. Anton, I. Biven S Davis, “Calculus”, Wiley, 10th edition, 2015.
2	Erwin Kreyszig, Advanced Engineering Mathematics, 10thEdition, John Wiley & Sons, 2016.

REFERENCES:

1	J. Stewart, Essential Calculus, Cengage, 2nd edition, 2017
2	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,
3	2002.
4	Peter V. O'Neil, Advanced Engineering Mathematics , Cengage, 7th Edition, 2012
5	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
6	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Editions, 2010.
7	J. Stewart, Essential Calculus, Cengage, 2nd edition, 2017
8	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,

PREREQUISITE: A basic course in one-variable calculus and matrix theory.

COURSE OBJECTIVES:

1	To some basic mathematical ideas and tools which are at the core of any engineering course.
2	A brief course in Linear Algebra familiarizes students with some basic techniques in matrix theory which are essential for analyzing linear systems
3	The calculus of functions of one or more variables taught in this course are useful in modeling and analyzing physical phenomena involving continuous change of variables or parameters and have applications across all branches of engineering

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Solve the consistent system of linear equations and apply orthogonal to a quadratic form
2	Find the maxima and minima of multivariable function
3	Find areas and volumes of geometrical shapes, mass and Centre of gravity of plane laminas using double and triple integrals
4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
5	Determine the power series expansion of a given function

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3	PSO4
CO1	3	3	3	3	2	1		1	1	2		2			2		
CO2	3	3	3	3	2	1		1	1	2		2			1		
CO3	3	3	3	3	2	1		1	1	2		2					
CO4	3	2	3	2	1	1		1	1	2		2					
CO5	3	3	3	3	2	1		1	1	2		2			1		

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research-based knowledge including analysis, design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change
CO2	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences

	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research-based knowledge including analysis, design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change
CO3	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyses engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research-based knowledge including analysis, design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change
CO4	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public

	PO4	3	Use research-based knowledge including analysis, design and interpretation of data
	PO5	1	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change
CO5	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyses engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research-based knowledge including analysis, design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change

CO – PSO JUSTIFICATION:

CO	PSO	Level	Justification
CO1	PSO2	2	The concept of matrices is used in areas like Machine Learning, Artificial Intelligence.
CO2	PSO2	1	The concept of derivatives is used in machine learning algorithms
CO5	PSO2	1	The concept of Fourier Series is used in Image processing

MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Vector Calculus, Differential Equations &Transforms**	Course code**: MAT 102**
L-T-P**: 3-1-0-4**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**Calculus of vector functions** Vector valued function of single variable, derivative of vector function and geometrical Interpretation, motion along a curve-velocity, speed and acceleration. Concept of scalar and vector fields, Gradient and its properties, directional derivative, divergence and curl, Line integrals of vector fields, work as line integral, Conservative vector field. independence of path and potential ,Function (results without proof).
II	**Vector integral theorems** Green's theorem (for simply connected domains, without proof) and applications to evaluating line Integrals and finding areas. Surface integrals over surfaces of the form z = g (x, y) , y = g(x, z) or x = g(y, z) , Flux integrals over surfaces of the form z = g(x, y), y = g(x, z) or x = g(y, z), divergence theorem (without proof) and its applications to finding flux integrals, Stokes' theorem (without Proof) and its applications to finding line integrals of vector fields and work done.
III	**Ordinary differential equations** Homogenous linear differential equation of second order, superposition principle, general solution, homogenous linear ODEs with constant coefficients-general solution. Solution of Euler-Cauchy equations (second order only). Existence and uniqueness (without proof). Non homogenous linear ODEs-general solution, solution by the method of undetermined coefficients (for the right hand side of the for x^n, e^{kx}, $sinax$, $cosax$, $e^{kx}sinax$, $e^{kx}cosax$ and their linear combinations), methods of variation of parameters. Solution of higher order equations-homogeneous and non-homogeneous with constant coefficient using method of undetermined coefficient.

IV	**Laplace transforms** Laplace Transform and its inverse, Existence theorem (without proof), linearity, Laplace transform of basic functions, first shifting theorem, Laplace transform of derivatives and integrals, solution of differential equations using Laplace transform, Unit step function, Second shifting theorems. Dirac delta function and its Laplace transform, Solution of ordinary differential equation involving unit step function and Dirac delta functions. Convolution theorem (without proof) and its application, to Finding inverse Laplace transform of products of functions.
V	**Fourier Transforms** Fourier integral representation, Fourier sine and cosine integrals. Fourier sine and cosine transforms, inverse sine and cosine transform. Fourier transform and inverse Fourier transform, basic properties. The Fourier transform of derivatives. Convolution theorem (without proof)

TEXT BOOKS:

1	H. Anton, I. Biven S Davis, "Calculus", Wiley, 10th edition, 2015.
2	Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, 10th edition, 2015

REFERENCES:

1	J. Stewart, Essential Calculus, Cengage, 2nd edition, 2017
2	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3	Peter O Neil, Advanced Engineering Mathematics, 7th Edition, Thomson, 2007.
4	Louis C Barret, C Ray Wylie, "Advanced Engineering Mathematics", Tata McGraw Hill, 6th Edition, 2003.
5	VeerarajanT." Engineering Mathematics for first year", Tata McGraw - Hill, 2008. 6. B.
6	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th edition, 2010.
7	Srimanta Pal, Subodh C. Bhunia, "Engineering Mathematics", Oxford University Press, 2015.
8	Ronald N. Bracewell, "The Fourier Transform and its Applications", McGraw – Hill International Editions, 2000.

PREREQUISITE: Calculus of single and multivariable functions.

COURSE OBJECTIVES:

This course will help students to achieve the following objectives:

1	Introduces the concepts and applications of differentiation and integration of Vector valued functions, differential equations, Laplace and Fourier Transforms.
2	The objective of this course is to familiarize the prospective engineers with some advanced concepts and methods in Mathematics which include the Calculus of vector valued functions, ordinary differential equations and basic transforms such as Laplace and Fourier Transforms which are invaluable for any engineer's mathematical tool box.

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Compute the derivatives and line integrals of vector functions and learn their applications
2	Evaluate surface and volume integrals and learn their inter-relations and applications.
3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
4	Compute Laplace transform and apply them to solve ODEs arising in engineering
5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	3	3	3	2	1		1	1	2		2			2		
CO2	3	3	3	3	2	1		1	1	2		2					
CO3	3	3	3	3	2	1		1	1	2		2					
CO4	3	3	3	3	2	1		1	1	2		2					
CO5	3	3	3	3	2	1		1	1	2		2			2		

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research based knowledge including analysis, design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change
CO2	PO1	3	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences

	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research-based knowledge including analysis, design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change
CO3	PO1	3	Apply the knowledge of, mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research based knowledge including analysis, design and interpretation of data
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	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public

	PO4	3	Use research based knowledge including analysis ,design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
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	PO12	2	Independent lifelong learning to technological change
CO5	PO1	3	Apply the knowledge of ,mathematics, science and engineering fundamentals and engineering specialization to the complex engineering problems
	PO2	3	Identify, formulate and analyze engineering problems using first principle of mathematics and engineering sciences
	PO3	3	Design solutions for complex engineering problems to meet the specifications with consideration for the public
	PO4	3	Use research based knowledge including analysis ,design and interpretation of data
	PO5	2	Apply appropriate techniques and modern engineering to complex engineering activities
	PO6	1	Apply reasoning informed by the contextual knowledge to assess society practices and consequent responsibilities
	PO8	1	To discharge the duties of subject in proper way
	PO9	1	Function effectively in multidisciplinary settings
	PO10	2	Communicate and document effectively in engineering community
	PO12	2	Independent lifelong learning to technological change

CO – PSO JUSTIFICATION:

CO	PSO	Level	Justification
CO1	PSO2	2	The concept of gradient, vector calculus is used in areas like Machine Learning Algorithms
CO5	PSO2	2	The concept of Fourier Transforms is used in Image processing and related areas.

PHT 100 ENGINEERING PHYSICS A

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Physics A**	Course code**: PHT 100**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**Oscillations and Waves** Harmonic oscillations, damped harmonic motion -Derivation of differential equation and its solution, over damped, critically damped and Under Damped Cases, Quality Factor-Expression, Forced Oscillations-Differential Equation-Derivation of expressions for amplitude and phase of forced oscillations, Amplitude Resonance-Expression for Resonant frequency, Quality factor and Sharpness of Resonance, Electrical analogy of mechanical oscillators Wave motion- Derivation of one-dimensional wave equation and its solution, Three dimensional wave equation and its solution (no derivation), Distinction between transverse and longitudinal waves, Transverse vibration in a stretched string, Statement of laws of vibration
II	**Wave Optics** Interference of Light-Principle of superposition of waves, Theory of thin films - Cosine law (Reflected system), Derivation of the conditions of constructive and destructive Interference, Interference due to wedge shaped films -Determination of thickness and test for optical planeness, Newton's rings -Measurement of wavelength and refractive index, Antireflection coatings Diffraction of light, Fresnel and Fraunhofer classes of diffraction, Diffraction grating-Grating equation, Rayleigh criterion for limit of resolution, Resolving and Dispersive power of a grating with expression (no derivation)

III	**Quantum Mechanics & Nanotechnology** Introduction for the need of Quantum mechanics, Wave nature of Particles, Uncertainty principle, Applications-Absence of electrons inside a nucleus and Natural line broadening mechanism, Formulation of time dependent and independent Schrodinger wave Equations-Physical meaning of wave function, Particle in a one dimensional box-Derivation for normalized wave function and energy Eigen values, Quantum Mechanical Tunneling (Qualitative) Introduction to Nano science and technology, Increase in surface to volume ratio for nanomaterials, Quantum confinement in one dimension, two dimension and three dimension-Nano sheets, Nano wires and Quantum dots, Properties of nanomaterials-mechanical, electrical and optical, Applications of nanotechnology (qualitative ideas)
IV	**Magnetism & Electro Magnetic Theory** Magnetic field and Magnetic flux density, Gauss's law for Magnetic flux density, Ampere's Circuital law, Faraday's law in terms of EMF produced by changing magnetic flux, Magnetic permeability and susceptibility, Classification of magnetic materials-para, dia and ferromagnetic materials Fundamentals of vector calculus, concept of divergence, gradient and curl along with physical significance, Line, Surface and Volume integrals, Gauss divergence theorem & Stokes' theorem, Equation of continuity, Derivation of Maxwell's equations in vacuum, Comparison of displacement current with conduction current. Electromagnetic waves, Velocity of Electromagnetic waves in free space, Flow of energy and Poynting's vector (no derivation)
V	**Superconductivity & Photonics** Superconducting phenomena, Meissner effect and perfect diamagnetism, Types of superconductors- Type I and Type II, BCS Theory (Qualitative), High temperature Superconductors-Applications of super conductivity Introduction to photonics-Photonic devices-Light Emitting Diode, Photo detectors - Junction and PIN photodiodes, Solar cells-I-V Characteristics, Optic fiber-Principle of propagation of light, Types of fibers-Step index and Graded index fibers, Numerical aperture –Derivation, Fiber optic communication system (block diagram), Industrial, Medical and Technological applications of optical fiber, Fiber optic sensors-Intensity Modulated and Phase modulated sensors.

TEXT BOOKS:

1	M.N.Avadhanulu, P.G.Kshirsagar,TVS Arun Murthy "A Text book of Engineering Physics", S.Chand &Co., Revised Edition 2019
2	H.K.Malik , A.K. Singh, "Engineering Physics" McGraw Hill Education, Second Edition 2017

REFERENCES:

1	Arthur Beiser, "Concepts of Modern Physics ", Tata McGraw Hill Publications, 6th Edition 2003
2	D.K. Bhattacharya, Poonam Tandon, "Engineering Physics", Oxford University Press, 2015
3	Md.N.Khan & S.Panigrahi "Principles of Engineering Physics 1&2", Cambridge University Press, 2016
4	Aruldhas G., "Engineering Physics", PHI Pvt. Ltd., 2015
5	Ajoy Ghatak, "Optics", Mc Graw Hill Education, Sixth Edition, 2017
6	T. Pradeep, "Nano:The Essentials'', McGraw Hill India Ltd, 2007
7	Halliday, Resnick, Walker, "Fundamentals of Physics'', John Wiley & Sons.Inc, 2001
8	David J Griffiths, "Introduction to Electrodynamics'', Addison-Wesley publishing, 3rd Edition, 1999
9	Premlet B., "Advanced Engineering Physics", Phasor Books,10th edition,2017
10	I. Dominic and. A. Nahari, "A Text Book of Engineering physics", Owl Books Publishers, Revised edition, 2016

PREREQUISITE: Higher secondary level Physics, Mathematical course on vector calculus, differential equations and linear algebra

COURSE OBJECTIVES:

1	Understand the concepts of various types of oscillations namely free, damped, forced damped. Realize the importance of special cases of the same. Understand the role of Resonance and get knowledge about similarity between electrical and mechanical oscillations.
2	Know the formation of plane progressive wave; understand the concepts of one- and three-dimensional wave equation and its solution. Calculate the frequency of transverse vibration.
3	Realize the role of interference in daily life. Inculcate the working principle of Air wedge and Newton's rings. Familiarize about various interference devices used in industries.
4	Understand diffraction in single slit. Apply the concepts of single slit for explaining n slit diffraction. Familiarize the use of grating and spectrometer. Understand and apply the concept of resolving power.
5	Appreciate the evolution of quantum mechanics. Formulize the various forms of Schrodinger equation. Apply the concepts to solve Infinite Square well potential problem.
6	Understand and appreciate the need of Nano technology. Understand the role of Nano technology in modern world and its application.
7	Understand the various types of magnetic materials, laws associated with magnetism derive Maxwell's equations etc.
8	Familiarize with various properties of superconductivity, types of superconductors, working of superconducting materials and their applications.
9	Understand the working of types of photo detecting devices.
10	Understand the working of optical fiber and appreciate the types of optical fibers and the parts of fiber optic communication system.

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Compute the quantitative aspects of waves and oscillations in engineering systems.
2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
3	Analyze the behavior of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems.
5	Analyze the principles behind various superconducting applications; explain the working of solid state lighting devices and fiber optic communication system.

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PSO 4
CO1	3	2	2	2				1	2	2		1		1			1
CO2	3	2	2	2				1	2	2		1		1			1
CO3	3	2	2	2				1	2	2		1		1			1
CO4	3	2	2	2				1	2	2		1		1			1
CO5	3	2	2	2				1	2	2		1		1			1

CO-PO MAPPING JUSTIFICATION:

CO	PO	Level	Justification
CO1	PO1	3	Students apply the idea of oscillations and waves in various engineering technique
	PO2	2	Analyze various engineering problems using the principles of oscillations and waves
	PO 3		Designing of instruments, structures and analysis using tools requires fundamentals of oscillation, resonance and waves
	PO4	2	Applying the theoretical knowledge of waves and resonance to design and conduct data interpretation
	PO8	1	Helps to achieve the skills through assignments, regular class etc
	PO9	2	Gather ability to communicate regarding waves and oscillators.
	PO10	2	Students will be able to communicate the principles in lab experiments and projects
	PO12	1	Identify the principles of oscillations and waves in professional career and daily life situations
CO2	PO1	3	Apply the idea of interference and diffraction and recognize the natural patterns of the same.

	PO2	2	Applying the theoretical knowledge of interference and diffraction to design and conduct experiments for data interpretation
	PO3	2	Understand the concepts in interference and diffraction to design system components
	PO4	2	Helps to design various engineering problems using the concepts of interference and diffraction
	PO8	1	Understand the norms of ethics to conduct experiments like air wedge, Newton's rings and spectrometer.
	PO9	2	Students achieve skills of team work in solving problems and doing experiments related to the topic interference and diffraction.
	PO10	2	Students can communicate the ideas of interference and diffraction in various engineering techniques .
	PO12	1	Students can recognize the examples in daily life connected to interference and diffraction
CO3	PO1	3	Apply quantum mechanics and nano technology for understanding the working of quantum mechanical devices and nano devices.
	PO2	2	Students are able to analyze simple problems in quantum mechanics.
	PO3	2	Using nano devices and quantum mechanical devices students can design various engineering problems.
	PO4	2	Quantum mechanics and nanotechnology is an area of great potential concerning the research .
	PO8	1	Ethical principles are used in designing and utilizing some tools of measurements in experiments using the quantum mechanical devices and fabrication of nano weapons,
	PO9	2	Gather ability to communicate regarding quantum mechanics and nanotechnology.
	PO10	2	Students are able to handle different assignments and projects towards nanotechnology and quantum mechanics.
	PO12	1	Understand the application of quantum mechanics and nanotechnology and students will be able to identify the concepts in various engineering fields.
CO4	PO1	3	Apply the knowledge of magnetic materials and mathematical methods to solve complex engineering problems.
	PO2	2	

			Using Maxwell's equations and equations in magnetism students are able to analyze engineering problems
	PO3	2	Electromagnetic materials can be utilized in engineering technology which are useful to societal and environmental considerations.
	PO4	2	Synthesis of Electromagnetic theory and magnetic materials are widely applicable in the analysis and interpretation of data ,research etc.
	PO8	1	Norms of ethics are used in the design of various electromagnetic equipment.
	PO9	2	Problems related to magnetic fields and Maxwell's equations are solved effectively by peer groups.
	PO10	2	Students are able to communicate concepts in electromagnetic theory in lab experiments and projects.
	PO12	1	Understand the application of magnetic materials and deal with the applications.in life long learning to provide a technological change in our society.
CO5	PO1	3	Apply the knowledge of superconducting materials and fiber optic communication.t to solve engineering problems
	PO2	2	Understand the working of different types of superconducting materials, communications systems, photo sensors and fiber optic sensors to analyze engineering problems
	PO3	2	Students are able to design solutions for complex problems using superconductors, photonic devices and optic fibers.
	PO4	2	Using superconductors ,photonic devices and optic fibers are useful in research to solve complex problems and to provide valid conclusions.
	PO8	1	Ethical concepts are used in the design of different types of superconducting materials, photo detectors and communication systems.
	PO9	2	Students are able to design equipment using the concepts of superconductivity photonics and optic fiber systems
	PO10	2	Gather ability to communicate regarding superconducting materials, application of photodetector, optical fiber and sensors.
	PO12	1	Understand the application of superconducting materials and photo detectors, optical communication systems and will be able to address the issues in daily life ..

CO – PSO MAPPING JUSTIFICATION:

CO	PSO's	Level	Justification
CO1	PSO1	1	Students acquire knowledge about the oscillatory systems. The oscillatory systems like specialized oscillators can be used to design hardware systems.
	PSO4	1	Knowledge about the oscillatory systems and wave properties are used to provide new ideas and innovations.
CO2	PSO1	1	Students are able to understand the concept of optical processes and optical instruments in various hardware systems.
	PSO4	1	Students can apply the concept of optical process and optical instruments in the field of research techniques and tools.
CO3	PSO1	1	Attain the knowledge about the use of nanomaterial, tiny molecular machines to create more efficient and sustainable hardware materials.
	PSO4	1	Understand the extensive use of nanotechnology to design and manufacture smaller, faster and more reliable computer systems.
CO4	PSO1	1	Students acquire basic knowledge about the concepts of electromagnets which are used in data storage devices
	PSO4	1	The concepts of electromagnetic theory lead to the production of more efficient data storage devices.
CO5	PSO1	1	Understanding the concept of superconductivity, students learn that superconducting circuits allow for faster computer performance.
	PSO4	1	Concept of optical technologies and superconducting circuits provides scientific research in computer systems.

CYT100 ENGINEERING CHEMISTRY

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Chemistry**	Course code**: CYT100**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**Electrochemistry and Corrosion** Introduction - Differences between electrolytic and electrochemical cells - Daniel cell – redox reactions - cell representation. Different types of electrodes (brief) - Reference electrodes - SHE - Calomel electrode - Glass Electrode - Construction and Working. Single electrode potential-definition - Helmholtz electrical double layer -Determination of E0 using calomel electrode. Determination of pH using glass electrode. Electrochemical series and its applications. Free energy and EMF - Nernst Equation - Derivation - single electrode and cell (Numerical) -Application -Variation of emf with temperature. Potentiometric titration - Introduction -Redox titration only. Lithiumion cell - construction and working. Conductivity- Measurement of conductivity of a solution (Numericals). Corrosion- Electrochemical corrosion – mechanism. Galvanic series- cathodic protection – electroless plating –Copper and Nickel plating.
II	**Spectroscopic Techniques and Applications** Introduction- Types of spectrum - electromagnetic spectrum - molecular energy levels – Beer Lambert's law (Numericals). UV-Visible Spectroscopy – Principle - Types of electronic transitions - Energy level diagram of ethane, butadiene, benzene and hexatriene. Instrumentation of UV-Visible spectrometer and applications.IR-Spectroscopy – Principle - Number of vibrational modes -Vibrational energy states of a diatomic molecule and - Determination of force constant of diatomic molecule (Numericals) –Applications. 1H NMR spectroscopy – Principle - Relation between field strength and frequency - chemical shift - spin-spin splitting (spectral problems) - coupling constant(definition) - applications of NMR- including MRI (brief).

III	**Instrumental Methods and Nanomaterials** Thermal analysis –TGA- Principle, instrumentation (block diagram) and applications – TGA of CaC2O4.H2O and polymers. DTA-Principle, instrumentation (block diagram) and applications - DTA of CaC2O4.H2O. Chromatographic methods - Basic principles and applications of column and TLCRetention factor. GC and HPLC-Principle, instrumentation (block diagram) - retention time and applications. Nanomaterials - Definition - Classification - Chemical methods of preparation - Hydrolysis and Reduction - Applications of nanomaterials - Surface characterization -SEM – Principle and instrumentation (block diagram).
IV	**Stereochemistry and Polymer Chemistry** Isomerism-Structural, chain, position, functional, tautomerism and matamerism - Definition with examples - Representation of 3D structures-Newman, Sawhorse, Wedge and Fischer projection of substituted methane and ethane. Stereoisomerism - Geometrical isomerism in double bonds and cycloalkanes (cis-trans and E-Z notations). R-S Notation – Rules and examples - Optical isomerism, Chirality, Enantiomers and Diastereoisomers- Definition with examples. Conformational analysis of ethane, butane, cyclohexane, mono and di methyl substituted cyclohexane. Copolymers - Definition - Types - Random, Alternating, Block and Graft copolymers - ABS - preparation, properties and applications. Kevlar-preparation, properties and applications. Conducting polymers - Doping -Polyaniline and Polypyrrole - preparation properties and applications. OLED -Principle, construction and advantages
V	**Water Chemistry and Sewage Water Treatment** Water characteristics - Hardness - Types of hardness- Temporary and Permanent - Disadvantages of hard water -Units of hardness- ppm and mg/L -Degree of hardness (Numericals) - Estimation of hardness-EDTA method (Numericals). Water softening Methods-Ion Exchange Process-Principle, procedure and advantages. Reverse osmosis – principle, process and advantages. Municipal water treatment (brief) - Disinfection methods - chlorination, ozone and UV irradiation. Dissolved oxygen (DO) -Estimation (only brief Procedure-Winkler's method), BOD and COD definition, estimation (only brief procedure) and significance (Numericals). Sewage water treatment - Primary, Secondary and Tertiary - Flow diagram -Trickling filter and UASB process.

TEXT BOOKS:

1	B. L. Tembe, Kamaluddin, M. S. Krishnan, "Engineering Chemistry (NPTEL Web-book)", 2018.
2	P. W. Atkins, "Physical Chemistry", Oxford University Press, 10th edn., 2014.

REFERENCES:

1	Soney C. George,RinoLaly Jose, "Text Book of Engineering Chemistry", S. Chand & Company Pvt Ltd, 2019.
2	C. N. Banwell, "Fundamentals of Molecular Spectroscopy", McGraw-Hill, 4th edn., 1995.
3	Donald L. Pavia, "Introduction to Spectroscopy", Cengage Learning India Pvt. Ltd., 2015.
4	B. R. Puri, L. R. Sharma, M. S. Pathania, "Principles of Physical Chemistry", Vishal Publishing Co., 47th Edition, 2017.
5	H. H. Willard, L. L. Merritt, "Instrumental Methods of Analysis", CBS Publishers, 7th Edition,2005.
6	Ernest L. Eliel, Samuel H. Wilen, "Stereo-chemistry of Organic Compounds", WILEY, 2008.
7	Raymond B. Seymour, Charles E. Carraher, "Polymer Chemistry: An Introduction", Marcel Dekker Inc; 4th Revised Edition, 1996.
8	MuhammedArif, Annette Fernandez, Kavitha P. Nair "Engineering Chemistry", Owl Books, 2019.
9	Ahad J., "Engineering Chemistry", Jai Publication, 2019.
10	Roy K. Varghese, "Engineering Chemistry", Crownplus Publishers, 2019.

PREREQUISITE: Concepts of chemistry introduced at the plus two levels in schools

COURSE OBJECTIVES:

1	To enable the students to acquire knowledge in the concepts of chemistry for engineering Applications.
2	To familiarize the students with different application oriented topics like spectroscopy, electrochemistry, instrumental methods etc.
3	To familiarize the students with topics like mechanism of corrosion, corrosion prevention methods, SEM, stereochemistry, polymers, desalination etc., which enable them to develop abilities and skills that are relevant to the study and practice of Chemistry.

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1.	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
2.	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
3.	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterization of nanomaterials.
4.	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering
5.	Study various types of water treatment methods to develop skills for treating wastewater.

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PS O4
CO1	1	2	1					1		1		1		1			
CO2	1	1	1	1	2			1		1		1		1			
CO3	1	1	1	1	2		1	1		1		1		1			
CO4	2	1	1				1	1						1			
CO5	1		1	1		1	3	1		1		1		1			

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO1	1	Apply the knowledge of science and engineering fundamentals like electrochemistry and corrosion
	PO2	2	Identify, formulate and analyze engineering problems to arrive at substantiated conclusions using first principles of engineering sciences.
	PO3	1	Design solutions to meet the specifications with consideration for the public health and safety like corrosion prevention methods and energy conservation under environmental considerations.
	PO8	1	Apply ethics along with possible applications of electrochemistry and corrosion
	PO10	1	Communicate effectively with the community and society and design documentation in the application level of electrochemical cells
	PO12	1	Recognize the need of lifelong learning in the broadest context of technological change like electrochemical secondary cells, corrosion prevention etc.
CO2	PO1	1	Apply the knowledge of Spectroscopy.
	PO2	1	Identify, formulate, research literature and analyze chemical compounds by spectroscopic analysis to arrive at substantiated conclusions using first principles of engineering sciences.
	PO3	1	Design solutions for the complex engineering problems like electrochemical batteries rechargeable and non-rechargeable cells and design system components or processes having knowledge in corrosion by considering public health and safety.

	PO4	1	Use research based knowledge including design of experiments, structural analysis of chemical compounds and interpretation of data and synthesis of the information in various engineering fields to provide valid conclusions.
	PO5	2	Create, select and apply appropriate techniques of spectroscopy with an understanding of the limitations.
	PO8	1	Apply ethics in the application level of Spectroscopic techniques
	PO10	1	Communicate effectively during the application of spectroscopic techniques and convey the importance of radiations like UV, Visible, IR, radiaowaves in different fields like MRI etc.
	PO12	1	In the Lifelong learning aspects, Spectroscopically applications play a vital role just like in the engineering applications like structural characterization of different components.
CO3	PO1	1	Apply the knowledge of Instrumental methods and Nano chemistry.
	PO2	1	Identify, formulate and analyze engineering problems to arrive at substantiated conclusions using different chromatographic methods and thermal analysis.
	PO3	1	For the design and development of solutions certain instrumental techniques TGA, DTA for choosing the correct method for any experiment, need to be conducted which meet the specified needs with appropriate consideration for public health and safety.
	PO4	1	Use research based knowledge including instrumentation and interpretation of data and synthesis of the information to provide valid conclusions.
	PO5	2	Create, select and apply appropriate techniques, resources like Nano materials and modern engineering tools including SEM imaging to complex engineering activities with an understanding of the limitations.
	PO7	1	Understanding the impact of professional engineering solutions in societal and environmental aspects like SEM characterization in finding detailed imaging of different substances in environment.
	PO8	1	Applying professional ethics and responsibilities of engineering practice like instrumentation with 100% accuracy and care.
	PO10	1	Communicate effectively about the applications instrumental techniques and nanomaterials with the engineering community and with the society.
	PO12	1	Recognize the need of lifelong learning in the engineering application level like knowledge on Nano chemistry and instrumental techniques for practical conduct of any application.

CO4	PO1	2	Apply the knowledge of advanced polymers ad stereochemistry
	PO2	1	Identify, formulate and analyze the applications of advanced and conducting polymers and stereochemistry
	PO3	1	Design solutions for complex engineering problems and design system components or processes using polymers that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
	PO7	1	Understand the impact of professional engineering solutions in societal and environmental contexts like having an idea about the properties and structure of naturally obtained organic and inorganic compounds via stereochemistry and use of polymers in daily life.
	PO8	1	Apply ethics in the manufacturing of substances like polymers etc.
CO5	PO1	1	Apply the knowledge of Waste water treatment.
	PO3	1	Design solutions for complex engineering problems like water purifier plants and promote environmental considerations like water pollution
	PO4	1	Use research based knowledge including water softening, waste water treatment and estimation of hardness of water and interpretation of data and synthesis of the information to provide valid conclusions.
	PO6	1	Apply reasoning informed by the contextual knowledge of importance of one of the basic need, water, to societal, health and safety issues
	PO7	3	Understand the impact of professional engineering solutions to save and treat waste water in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
	PO8	1	Apply ethics in the application of all the water treatment procedures.
	PO10	1	Communicate effectively with the engineering community and with society at large as we all know how much importance water has in the life of every living being.
	PO12	1	Lifelong learning about water treatment is very much necessary in the society and in the broadest context of technological change.

CO – PSO MAPPING JUSTIFICATION

CO's	PSO's	Level	Justification
CO1	PSO1	1	Attain the ability to evaluate and recognize potential risks and provide creative solutions by having the knowledge of Corrosion and Electrochemistry.
CO2	PSO1	1	Attain the ability to provide creative solutions for hardware development knowing Spectroscopic techniques.
CO3	PSO1	1	Attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions by have the knowledge of Instrumentation and Nano materials mainly in the hardware development.
CO4	PSO1	1	Attain the ability to design and develop hardware based systems by using the knowledge about Polymers and Conducting polymers.
CO5	PSO1	1	Attain the ability to recognize potential risks by having environmental awareness.

EST100 ENGINEERING MECHANICS

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Mechanics**	Course code**: EST100**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Introduction to Engineering Mechanics-statics-basic principles of Statics-Parallelogram law, equilibrium law, principles of superposition and transmissibility, law of action and reaction(review) free body diagrams. Concurrent coplanar forces-composition and resolution of forces-resultant and equilibrium equations – methods of projections – methods of moments – Varignon's Theorem of moments.
II	Friction – sliding friction - Coulomb's laws of friction – analysis of single bodies – wedges, ladder analysis of connected bodies. Parallel coplanar forces – couple - resultant of parallel forces – Centre of parallel forces – equilibrium of parallel forces – Simple beam subject to concentrated vertical loads. General coplanar force system - resultant and equilibrium equations.
III	Centroid of composite areas- – moment of inertia-parallel axis and perpendicular axis theorems. Polar moment of inertia, radius of gyration, mass moment of inertia-ring, cylinder and disc. Theorem of Pappus Guldinus (demonstration only) Forces in space - vectorial representation of forces, moments and couples –resultant and equilibrium equations – concurrent forces in space (simple problems only)
IV	Dynamics – rectilinear translation - equations of kinematics (review) kinetics – equation of motion – D'Alembert's principle. – motion on horizontal and inclined surfaces, motion of connected bodies. Impulse momentum equation and work energy equation (concepts only). Curvilinear translation - equations of kinematics –projectile motion (review), kinetics – equation of motion. Moment of momentum and work energy equation (concepts only).

V	Rotation – kinematics of rotation- equation of motion for a rigid body rotating about a fixed axis –rotation under a constant moment. Plane motion of rigid body – instantaneous Centre of rotation (concept only). Simple harmonic motion – free vibration –degree of freedom- undamped free vibration of spring mass system-effect of damping(concept only)

TEXT BOOKS:

1	Timoshenko and Young, Engineering Mechanics, McGraw Hill Publishers
2	2. Shames, I. H., Engineering Mechanics - Statics and Dynamics, Prentice Hall of India.
3	3. R. C. Hibbeler and Ashok Gupta, Engineering Mechanics, Vol. I statics, Vol II Dynamics, Pearson

REFERENCES:

1	Merriam J. L and Krieg L. G., Engineering Mechanics - Vols. 1 and 2, John Wiley.
2	Tayal A K, Engineering Mechanics – Statics and Dynamics, Umesh Publications
3	Bhavikkatti, S.S., Engineering Mechanics, New Age International Publishers
4	F.P.Beer and E.R.Johnston (2011), Vector Mechanics for Engineers, Vol.I-Statics, Vol.II-Dynamics, 9th Ed, Tata McGraw Hill
5	Rajasekaran S and Sankarasubramanian G, Engineering Mechanics - Statics and Dynamics, Vikas Publishing House Pvt Ltd.

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Recall principles and theorems related to rigid body mechanics
2	Identify and describe the components of system of forces acting on the rigid body
3	Apply the conditions of equilibrium to various practical problems involving different force system.
4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2		PSO 1	PSO 2	PSO 3	PSO 4
CO1	2	2							1					1			
CO2	3	3	1						1			1		1			
CO3	3	3							1			1		1			
CO4	3	3							1			1		1			
CO5	3	3							1			1		1			

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
C01	PO1	2	Students should have a strong base in theorems and basic principles of rigid body mechanics
	PO2	2	Students should have an idea analyzing problems of forces acting on rigid body
	PO9	1	Students shall function effectively as an individual and as a team member in solving the problems
CO2	PO1	3	Idea to apply the knowledge of fundamentals in describing components of system of forces acting on a rigid body
	PO2	3	Analyze complex problems which comes in day-to-day life where application of component of forces is required
	PO3	1	Developing an idea to find solutions in components of forces acting on bodies
	PO9	2	Students shall function effectively as an individual and as a team member in solving the problems
C03	PO1	3	Apply the concept of equilibrium in various practical problems involving different force system
	PO2	3	Formulate the concept of equations of equilibrium which is the pillar of the subject in doing various practical problems
	PO3	1	Developing solutions to practical problems which involves equations of equilibrium

	PO9	2	Solving different problems in engineering mechanics will improve students' individual and team work performance
C04	PO1	3	Students will be able to use the knowledge in formulating various practical problems using appropriate theorems in mechanics
	PO2	3	Knowledge in various theorems of mechanics shall be useful to the designing solutions for complex problems
	PO9	1	Students shall apply principles of professional ethics for completing the works given to them
C05	PO1	3	Knowledge in properties of distributed areas will be helpful in many cases of solving engineering problems.
	PO2	3	Knowledge in Centroid moment of inertia shall be useful to the designing solutions for complex problems
	PO9	2	Solving different problems in engineering mechanics will improve students' individual and team work performance

CO-PSO MAPPING JUSTIFICATION

CO's	PSO's	LEVEL	JUSTIFICATION
CO1	PSO1	1	Knowledge in engineering mechanics will be required for the development of new software's in the field of engineering.
CO2	PSO1	1	
CO3	PSO1	1	
CO4	PSO1	1	
CO5	PSO1	1	

EST110 ENGINEERING GRAPHICS

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Graphics**	Course code**: EST110**
L-T-P**: 2-0-2**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Introduction: Relevance of technical drawing in engineering field. Types of lines, Dimensioning, BIS code of practice for technical drawing. Orthographic projection of Points and Lines: Projection of points in different quadrants, Projection of straight lines inclined to one plane and inclined to both planes. Trace of line
II	Orthographic projection of Solids: Projection of Simple solids such as Triangular, Rectangle, Square, Pentagonal and Hexagonal Prisms, Pyramids, Cone and Cylinder. Projection of solids in simple position including profile view. Projection of solids with axis inclined to one of the reference planes and with axis inclined to both reference planes.
III	Sections of Solids: Sections of Prisms, Pyramids, Cone, Cylinder with axis in vertical position and cut by different section planes. True shape of the sections. Also locating the section plane when the true shape of the section is given. Development of Surfaces: Development of surfaces of the above solids and solids cut by different section planes. Also finding the shortest distance between two points on the surface.
IV	Isometric Projection: Isometric View and Projections of Prisms, Pyramids, Cone , Cylinder, Frustum of Pyramid, Frustum of Cone, Sphere, Hemisphere and their combinations.
V	Perspective Projection: Perspective projection of Prisms and Pyramids with axis perpendicular to the ground plane, axis perpendicular to picture plane. Conversion of Pictorial Views: Conversion of pictorial views into orthographic views.

TEXT BOOKS:

1	Bhatt, N.D., Engineering Drawing, Charotar Publishing House Pvt. Ltd.
2	John, K.C. Engineering Graphics, Prentice Hall India Publishers.

REFERENCES:

1	Anilkumar, K.N., Engineering Graphics, Adhyuth Narayan Publishers
2	Agrawal, B. And Agrawal, C.M., Engineering Drawing, Tata McGraw Hill Publishers.
3	Benjamin, J., Engineering Graphics, Pentex Publishers- 3rd Edition, 2017
4	Duff, J.M. and Ross, W.A., Engineering Design and Visualization, Cengage Learning.
5	Kulkarni, D.M., Rastogi, A.P. and Sarkar, A.K., Engineering Graphics with AutoCAD, PHI.
6	Luzaddff, W.J. and Duff, J.M., Fundamentals of Engineering Drawing, PHI.
7	Varghese, P.I., Engineering Graphics, V I P Publishers
8	Venugopal, K., Engineering Drawing and Graphics, New Age International Publishers.

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Draw the projection of points and lines located in different quadrants
2	Prepare multiview orthographic projections of objects by visualizing them in different positions
3	Draw sectional views and develop surfaces of a given object
4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
5	Convert 3D views to orthographic views
6	Obtain multiview projections and solid models of objects using CAD tools

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PSO 1	PSO 2	PSO 3	PSO 4
CO1	3		1						2					1			
CO2	3		1						2			1		1			
CO3	3	1	1						2			1		1			
CO4	3		1						2	1		1		1			
CO5	3		1						2	2		1		1			
CO6	3		1		3			1	2	3				1			1

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO1	3	Students should have a strong base in projections of objects for analyzing and solving complex engineering problems.
	PO3	1	Students should have a base in projections of objects for designing solutions for complex problems
	PO8	1	Students shall apply principles of professional ethics for completing the works given to them
	PO9	2	Solving different problems in engineering graphics will improve students' individual and team work performance
CO2	PO1	3	Ability to draw the projections of solids shall be useful to the solution of engineering problems.
	PO3	1	Ability to draw the projections of solids shall be useful to the designing solutions for complex problems
	PO8	1	Students shall apply principles of professional ethics for completing the works given to them
	PO9	2	Solving different problems in engineering graphics will improve students' individual and team work performance
	PO12	1	Knowledge in projections of objects will be helpful in lifelong learning in the context of technological development
CO3	PO1	3	Students will be able to use the basic knowledge in sections of objects to the solution of complex engineering problems.
	PO2	1	Knowledge in sections and development of surfaces of various objects leads to design and manufacturing of system components.
	PO3	1	Knowledge in sections and development of surfaces of various objects shall be useful to the designing solutions for complex problems
	PO8	1	Students shall apply principles of professional ethics for completing the works given to them
	PO9	2	Solving different problems in engineering graphics will improve students' individual and team work performance

	PO12	1	Knowledge in projections of objects will be helpful in lifelong learning in the context of technological development
CO4	PO1	3	Students will be able to use the knowledge in isometric projections for the analysis and solution of complex engineering problems.
	PO3	1	Knowledge in Isometric and perspective projections shall be useful to the designing solutions for complex problems
	PO8	1	Students shall apply principles of professional ethics for completing the works given to them
	PO9	2	Solving different problems in engineering graphics will improve students' individual and team work performance
	PO10	1	Knowledge in perspective projections will help in communicating effectively the proposed views of various objects.
	PO12	1	Knowledge in projections of objects will be helpful in lifelong learning in the context of technological development
	PO1	3	Knowledge in orthographic projections of various objects is very much required in many cases of solving engineering problems.
CO5	PO3	1	Knowledge in Multi view projections shall be useful to the designing solutions for complex problems
	PO8	1	Students shall apply principles of professional ethics for completing the works given to them
	PO9	2	Solving different problems in engineering graphics will improve students' individual and team work performance
	PO10	2	Conversion of 3D drawing into 2D drawing is very much essential in communicating with the manufactures of various objects.
	PO12	1	Knowledge in projections of objects will be helpful in lifelong learning in the context of technological development
CO6	PO1	3	Students will be able to use the knowledge in CAD Software for the solution of complex engineering problems.
	PO3	1	Knowledge in Multi view projections using software shall be useful to the designing solutions for complex problems
	PO5	3	Knowledge in CAD will help in creating and analyzing models of complex engineering problems.
	PO8	1	Students shall apply principles of professional ethics for completing the works given to them

	PO9	2	Solving different problems in engineering graphics will improve students' individual and team work performance
	PO10	3	Use of Computer aided designing software's will help in communicating effectively the proposed design with high level of accuracy and in less time.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	Level	Justification
CO1	PSO1	1	Knowledge in engineering drawing concepts will be required for the development of new software's in the field of engineering
CO2	PSO1	1	
CO3	PSO1	1	
CO4	PSO1	1	
CO5	PSO1	1	
CO6	PSO1	1	
	PSO4	1	Knowledge in engineering drawing tools will definitely enhance the creativity for innovative idea development

EST120 BASICS OF CIVIL & MECHANICAL ENGINEERING

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Basics of Civil & Mechanical Engineering**	Course code**: EST120**
L-T-P**: 4-0-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**General Introduction to Civil Engineering**: Relevance of Civil Engineering in the overall infrastructural development of the country. Responsibility of an engineer in ensuring the safety of built environment. Brief introduction to major disciplines of Civil Engineering like Transportation Engineering, Structural Engineering, Geo-technical Engineering, Water Resources Engineering and Environmental Engineering. **Introduction to buildings**: Types of buildings, selection of site for buildings, components of a residential building and their functions. **Building rules and regulations**: Relevance of NBC, KBR & CRZ norms (brief discussion only). **Building area**: Plinth area, built up area, floor area, carpet area and floor area ratio for a building as per KBR.
II	**Surveying**: Importance, objectives and principles. **Construction materials**, Conventional construction materials: types, properties and uses of building materials: bricks, stones, cement, sand and timber **Cement concrete**: Constituent materials, properties and types. Steel: Steel sections and steel reinforcements, types and uses. **Modern construction materials**: - Architectural glass, ceramics, Plastics, composite materials, thermal and acoustic insulating materials, decorative panels, waterproofing materials. Modern uses of gypsum, pre-fabricated building components (brief discussion only).
III	**Building Construction**: Foundations: Bearing capacity of soil (definition only), functions of foundations, types – shallow and deep (brief discussion only). Load bearing and framed structures (concept only).

	Brick masonry: - Header and stretcher bond, English bond & Flemish bond random rubble masonry. **Roofs and floors**: - Functions, types; flooring materials (brief discussion only). **Basic infrastructure services**: MEP, HVAC, elevators, escalators and ramps (Civil Engineering aspects only), fire safety for buildings. **Green buildings**: - Materials, energy systems, water management and environment for green buildings. (brief discussion only).
IV	**Analysis of thermodynamic cycles**: Carnot, Otto, Diesel cycles, Derivation of efficiency of these cycles, Problems to calculate heat added, heat rejected, network and efficiency. IC Engines: CI, SI, 2-Stroke, 4-Stroke engines. Listing the parts of different types of IC Engines. Efficiencies of IC Engines (Definitions only), Air, Fuel, cooling and lubricating systems in SI and CI Engines, CRDI, MPFI. Concept of hybrid engines.
V	**Refrigeration**: Unit of refrigeration, reversed Carnot cycle, COP, vapor compression cycle (only description and no problems); Definitions of dry, wet & dew point temperatures, specific humidity and relative humidity, Cooling and dehumidification, Layout of unit and central air conditioners. Description about working with sketches of: Reciprocating pump, Centrifugal pump, Pelton turbine, Francis turbine and Kaplan turbine. Overall efficiency, Problems on calculation of input and output power of pumps and turbines (No velocity triangles) Description about working with sketches of: Belt and Chain drives, Gear and Gear trains, Single plate clutches.
VI	**Manufacturing Process**: Basic description of the manufacturing processes – Sand Casting, Forging, Rolling, Extrusion and their applications. Metal Joining Processes: List types of welding, Description with sketches of Arc Welding, Soldering and Brazing and their applications Basic Machining operations: Turning, Drilling, Milling and Grinding. Description about working with block diagram of: Lathe, drilling machine, Milling machine, CNC Machine. Principle of CAD/CAM, Rapid and Additive manufacturing.

TEXT BOOKS:

1	Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
2	Mckay, W.B. and Mckay, J. K., Building Construction, Volumes 1 to 4, Pearson India Education Services

REFERENCES:

1	Chen W.F and Liew J Y R (Eds), The Civil Engineering Handbook. II Edition CRC Press (Taylor and Francis)
2	Chudley, R and Greeno R, Building construction handbook, Addison Wesley, Longman group,England
3	Chudley, R, Construction Technology, Vol. I to IV, Longman group, England Course Plan
4	Kandya A A, Elements of Civil Engineering, Charotar Publishing house
5	Mamlouk, M. S., and Zaniewski, J. P., Materials for Civil and Construction Engineering, Pearson Publishers
6	Rangwala S.C and Dalal K B Building Construction Charotar Publishing house
7	Clifford, M., Simmons, K. and Shipway, P., An Introduction to Mechanical Engineering Part I -CRC Press
8	Roy and Choudhary, Elements of Mechanical Engineering, Media Promoters &Publishers Pvt.Ltd. Mumbai.
9	Sawhney, G. S., Fundamentals of Mechanical Engineering, PHI
10	G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018
11	Benjamin,J.,Basic Mechanical Engineering, Pentex Books,9th Edition,2018
12	Balachandran, P. Basic Mechanical Engineering, Owl Books

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Recall the role of civil engineer in society to relate the various disciplines of Civil Engineering and explain various parts and types of buildings.
2	Describe the importance, objectives and principles of surveying and explain different types of building materials for construction.
3	Summarize the basic infrastructure services and discuss the Materials, energy systems, water management and environment for green Buildings.
4	Summarize the basic infrastructure services MEP, HVAC, elevators, escalators, and ramps
5	Discuss the Materials, energy systems, water management, and environment for green buildings

6	Analyse thermodynamic cycles and calculate its efficiency
7	Illustrate the working and features of IC engines
8	Explain the basic principles of Refrigeration and Air conditioning
9	Describe the working of hydraulic turbines and power transmission elements
10	Describe the basic manufacturing, metal joining and machining processes.

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PS O4
CO1	3	-		-		3	2	2	2								1
CO2	3	2	2	1	3	1		3									1
CO3	3	2	2	1	3		1	1	2			2					1
CO4	3	2		1	3	1	1		2	1		2					2
CO5	3	2		-	3	2	3	1	2	1		1					2
CO6	3	-		-		3	2	2	2						2		
CO7	3	2	2	1	3	1		3									1
CO8	3	2	2	1	3		1	1	2			2					1
CO9	3	2		1	3	1	1		2	1		2					2
CO10	3	2		-	3	2	3	1	2	1		1					2

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO1	3	A thorough knowledge on civil engineering as well as the civil engineer will be obtained.
	PO6	3	The consequent responsibilities of a civil engineer relevant to the professional engineering practice will be understood and can be applied to assess societal, health, safety, legal and cultural issues.
	PO7	2	Knowledge of the impact of professional civil engineering will help to bring about a sustainable developed society.
	PO8	2	Keeping the ethics and responsibilities of professional civil engineering.
	PO9	2	Course can effectively make an individual a team member or leader through the knowledge in the field of civil engineering and role of a civil engineer.
CO2	PO1	3	A basic knowledge of buildings, building components, and materials including modern building materials and building construction will be obtained.
	PO2	2	The course can analyze problems in building materials and construction to arrive at substantiated conclusions using the science of civil engineering.
	PO3	2	A thorough knowledge of building, building components and materials helps to design solutions for complex engineering problems that may arise in any discipline of civil engineering.
	PO4	1	Experiments, analysis, and interpretation of data on building materials and the information can provide valid conclusions that will be applicable to real engineering and practice.
	PO5	3	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts.
	PO6	1	Basic knowledge in construction materials and building components can be applied to assess societal, health, safety, legal and cultural issues.
	PO8	3	Keeping the ethics and responsibilities of professional civil engineering in all construction practices.
CO3	PO1	3	Course will give clarity on the importance, objectives, and principles of surveying.

	PO2	2	The course can analyze problems in various civil engineering constructions to arrive at substantiated conclusions using the science of civil engineering survey.
	PO3	2	A thorough knowledge about the principles and objective of surveying helps to design solutions for complex engineering problems that may arise in any discipline of civil engineering.
	PO4	1	Experiments, analysis, and interpretation of data on surveying and the information can provide valid conclusions that will be applicable to real engineering and practice.
	PO5	3	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts to the usual procedure of surveying.
	PO7	1	Knowledge in the field of surveying will help to bring about a sustainably developed society.
	PO8	1	Keeping the ethics and responsibilities of professional civil engineers in surveying in all construction practices.
	PO9	2	Course can effectively make an individual a team member or leader through the knowledge of surveying.
	PO12	2	Recognize the need for life long learning about the advances in the field of surveying
CO4	PO1	3	A basic knowledge of basic infrastructure services like MEP, HVAC, elevators, escalators, and ramps can be acquired.
	PO2	2	Knowledge of basic infrastructure services, can analyze problems in various civil engineering constructions to arrive at substantiated conclusions.
	PO4	1	Experiments, analysis, and interpretation of infrastructure facilities provide valid conclusions that will be applicable to real engineering and practice.
	PO5	3	Offers chances to Create, select, and apply appropriate techniques, resources, and modern engineering concepts in infrastructure services of civil engineering constructions.
	PO6	1	The consequent responsibilities of a civil engineer relevant to infrastructural development of a building will be understood and can be applied to assess societal, health, safety, legal and cultural issues.
	PO7	1	Knowledge of integrated HVAC systems will help to bring about a sustainable developed society.

	PO9	2	Scope to function as a member or leader in teams on infrastructure services.
	PO10	1	Basic engineering knowledge about HVAC, elevators, escalators and ramps helps to communicate effectively with the engineering community and society.
	PO12	2	Recognize the need for lifelong learning about HVAC systems and lifting machineries.
CO5	PO1	3	Basic introduction and information on Green buildings, their materials, energy systems, water management, and the environment.
	PO2	2	Course can analyze problems in various civil engineering constructions compared to green building concepts and arrive at substantiated conclusions.
	PO5	3	The course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts other than green building concepts by keeping it as an example.
	PO6	2	The responsibilities of a civil engineer relevant to implement innovative concepts to assess societal, health & cultural issues and to make a safe society can be obtained.
	PO7	3	The consequent responsibilities and hard work of a civil engineer are relevant to implement innovative concepts to assess societal, health, safety, legal and cultural issues and to make a sustainable society and environment.
	PO8	1	Keeping the ethics and responsibilities in developing the concept of green building.
	PO9	2	The course can effectively make an individual a member or leader in teams through the green building concept and encourages them to think about new innovative concepts for a better safe sustainable society.
	PO10	1	Basic knowledge in the concept of green building helps to communicate effectively with the engineering community and society.
	PO12	1	Recognize the need for lifelong learning about implementation of the concept of green building in a broad concept.
CO6	PO1	3	A thorough knowledge on mechanical engineering will be obtained.
	PO6	3	The consequent responsibilities of a mechanical engineer relevant to the professional engineering practice will be understood and can be applied to assess societal, health, safety, legal and cultural issues.
	PO7	2	Knowledge of the impact of professional mechanical engineering will help to bring about a sustainable developed society.

	PO8	2	Keeping the ethics and responsibilities of professional mechanical engineering.
	PO9	2	Course can effectively make an individual a team member or leader through the knowledge in the field of mechanical engineering and role of a mechanical engineer.
CO7	PO1	3	A basic knowledge of components of IC engines will be obtained.
	PO2	2	The course can analyze problems automotive industry and conclusions using the science of mechanical engineering.
	PO3	2	A thorough knowledge of engines and its working helps to design solutions for complex engineering problems that may arise in any discipline of civil engineering.
	PO4	1	Experiments, analysis, and interpretation of data on IC engines and the information can provide valid conclusions that will be applicable to real engineering and practice.
	PO5	3	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts.
	PO6	1	Basic knowledge in IC engines and its working can be applied to assess societal, health, safety, legal and cultural issues.
	PO8	3	Keeping the ethics and responsibilities of professional mechanical engineering in all practices.
CO8	PO1	3	Course will give clarity on the importance, objectives, and principles of Refrigeration
	PO2	2	The course can analyze problems in various mechanical engineering problems to arrive at substantiated conclusions using the science of mechanical engineering survey.
	PO3	2	A thorough knowledge about the principles and objective of refrigeration and air-conditioning helps to design solutions for complex engineering problems that may arise in any discipline of mechanical engineering.
	PO4	1	Experiments, analysis, and interpretation of data on air-conditioning and the information can provide valid conclusions that will be applicable to real engineering and practice.
	PO5	3	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts.

	PO7	1	Knowledge in the field of air-conditioning will help to bring about a sustainably developed society.
	PO8	1	Keeping the ethics and responsibilities of professional mechanical engineers in air conditioning in all construction practices.
	PO9	2	Course can effectively make an individual a team member or leader through the knowledge of refrigeration.
	PO12	2	Recognize the need for lifelong learning about the advances in the field of refrigeration
CO9	PO1	3	A basic knowledge of basic infrastructure services like MEP, HVAC, elevators, escalators, and ramps can be acquired.
	PO2	2	Knowledge of basic infrastructure services, can analyze problems in various mechanical engineering constructions to arrive at substantiated conclusions.
	PO4	1	Experiments, analysis, and interpretation of infrastructure facilities provide valid conclusions that will be applicable to real engineering and practice.
	PO5	3	Offers chances to Create, select, and apply appropriate techniques, resources, and modern engineering concepts in infrastructure services of mechanical engineering constructions.
	PO6	1	The consequent responsibilities of a civil engineer relevant to infrastructural development of a building will be understood and can be applied to assess societal, health, safety, legal and cultural issues.
	PO7	1	Knowledge of Hydraulic systems will help to bring about a sustainable developed society.
	PO9	2	Scope to function as a member or leader in teams on infrastructure services.
	PO10	1	Basic engineering knowledge about power transmission and hydraulic systems helps to communicate effectively with the engineering community and society.
	PO12	2	Recognize the need for lifelong learning about power transmission and hydraulic systems and lifting machineries.
CO10	PO1	3	Basic introduction and information on basic manufacturing, metal joining and machining processes.
	PO2	2	Course can analyze problems in various mechanical engineering constructions compared to green building concepts and arrive at substantiated conclusions.
	PO5	3	The course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts other than basic manufacturing,

			metal joining and machining processes
	PO6	2	The responsibilities of a mechanical engineer relevant to implement innovative concepts to assess societal, health & cultural issues and to make a safe society can be obtained.
	PO7	3	The consequent responsibilities and hard work of a mechanical engineer are relevant to implement innovative concepts to assess societal, health, safety, legal and cultural issues and to make a sustainable society and environment.
	PO8	1	Keeping the ethics and responsibilities in developing the concept of manufacturing processes.
	PO9	2	The course can effectively make an individual a member or leader in teams through the different manufacturing process concept and encourages them to think about new innovative concepts for a better safe sustainable society.
	PO10	1	Basic knowledge in the concept of manufacturing principles helps to communicate effectively with the engineering community and society.
	PO12	1	Recognize the need for life-long learning about implementation of the concept of various manufacturing processes in a broad concept.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	Level	**Justification**
CO1	PSO4	1	Graduate will have a broad understanding of economical, environmental, societal, and safety factors involved in infrastructural development through the thorough knowledge of civil engineering that help them to provide new ideas and innovations toward research.
CO2	PSO4	1	Graduate shall demonstrate sound knowledge of different types of buildings, building components, building materials, and building construction and construction aspects of civil engineering infrastructure to enhance the use of programming in those areas as research work.
CO3	PSO4	1	Graduate shall demonstrate a sound knowledge of the importance, objectives, and principles of surveying through the basic science of civil engineering survey which helps them to develop a practical proficiency in a broad area of programming concepts

CO4	PSO4	2	Graduate shall demonstrate sound knowledge in infrastructure services MEP, HVAC, elevators, escalators, and ramps and apply appropriate techniques, resources, and modern engineering and programming concepts in infrastructure services of civil engineering constructions.
CO5	PSO4	2	Graduate shall demonstrate a sound knowledge of green building concepts that will help them to think about new innovative concepts for a better safe sustainable society.
CO6	PSO2	1	Graduate will have a broad understanding of economical, environmental, societal, and safety factors involved in infrastructural development through the thorough knowledge of mechanical engineering that help them to provide new ideas and innovations toward research.
CO7	PSO4	1	Graduate shall demonstrate sound knowledge of different types of IC engines, its components, materials, and working and construction aspects of mechanical engineering infrastructure to enhance the use of programming in those areas as research work.
CO8	PSO4	1	Graduate shall demonstrate a sound knowledge of the importance, objectives, and principles of air-conditioning through the basic science of mechanical engineering which helps them to develop a practical proficiency in a broad area of programming concepts
CO9	PSO4	2	Graduate shall demonstrate sound knowledge in basic manufacturing, metal joining and machining processes and programming concepts in infrastructure services of civil engineering constructions.
CO10	PSO4	2	Graduate shall demonstrate a sound knowledge of power transmission concepts that will help them to think about new innovative concepts for a better safe sustainable society.

EST130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Basics of Electrical and Electronics Engineering**	Course code**: EST130**
L-T-P**: 4-0-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**Elementary Concepts of Electric Circuits** **Elementary concepts of DC electric circuits:** Basic Terminology including voltage, current, power, resistance, emf; Resistances in series and parallel; Current and Voltage Division Rules; Capacitors & Inductors: V-I relations and energy stored. Ohms Law and Kirchhoff's Laws-Problems; Star-delta conversion (resistive networks only-derivation not required)- problems. **Analysis of DC electric circuits**: Mesh current method - Matrix representation - Solution of network equations. Node voltage methods-matrix representation-solution of network equations by matrix methods. Numerical problems.
II	**Elementary Concepts of Magnetic circuits, Electromagnetic Induction and AC fundamentals** **Magnetic Circuits:** Basic Terminology: MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits- Series and parallel magnetic circuits with composite materials, numerical problems. **Electromagnetic Induction**: Faraday's laws, problems, Lenz's law- statically induced and dynamically induced emfs - Self-inductance and mutual inductance, coefficient of coupling **Alternating Current fundamentals:** Generation of alternating voltages- Representation of sinusoidal waveforms: frequency, period, Average, RMS values and form factor of waveforms-Numerical Problems.
III	**AC Circuits** **AC Circuits:** Phasor representation of sinusoidal quantities. Trigonometric, Rectangular, Polar and complex forms. Analysis of simple AC circuits: Purely resistive, inductive & capacitive circuits; Inductive and capacitive reactance, concept of

	impedance. Average Power, Power factor. Analysis of RL, RC and RLC series circuits- active, reactive and apparent power. Simple numerical problems. **Three phase AC systems:** Generation of three phase voltages; advantages of three phase systems, star and delta connections (balanced only), relation between line and phase voltages, line and phase currents- Numerical problems.
IV	**Introduction to Semiconductor devices** Evolution of electronics – Vacuum tubes to nano electronics (In evolutional perspective only) Resistors, Capacitors and Inductors: types, specifications. Standard values, color coding (No constructional features) PN Junction diode: Principle of operation, V-I characteristics, principle of avalanche breakdown Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration
V	**Basic electronic circuits and instrumentation:** Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing Electronic Instrumentation: Block diagram of an electronic instrumentation system
VI	**Introduction to Communication Systems:** Evolution of communication systems – Telegraphy to 5G Radio communication: principle of AM & FM, frequency bands used for various communication systems, block diagram of super heterodyne receiver, Principle of antenna – radiation from accelerated charge Mobile communication: basic principles of cellular communications, principle and block diagram of GSM.

TEXT BOOKS:

1	D P Kothari and I J Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2	D C Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3	ChinmoySaha, Arindham Halder and Debarati Ganguly, Basic Electronics - Principles and Applications, Cambridge University Press, 2018.
4	M.S.Sukhija and T.K.Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press, 2012.
5	Wayne Tomasi and Neil Storey, A Textbook On Basic Communication and Information Engineering, Pearson, 2010.

REFERENCES:

1	Del Toro V, "Electrical Engineering Fundamentals", Pearson Education.
2	T. K. Nagsarkar, M. S. Sukhija, "Basic Electrical Engineering", Oxford Higher Education.
3	Hayt W H, Kemmerly J E, and Durbin S M, "Engineering Circuit Analysis", Tata McGraw-Hill
4	Hughes, "Electrical and Electronic Technology", Pearson Education.
5	V. N. Mittle and Arvind Mittal, "Basic Electrical Engineering," Second Edition, McGraw Hill.
6	Parker and Smith, "Problems in Electrical Engineering", CBS Publishers and Distributors.
7	S. B. Lal Seksena and Kaustuv Dasgupta, "Fundamentals of Electrical Engineering", Cambridge University Press.
8	Anant Agarwal, Jeffrey Lang, Foundations of Analog and Digital Electronic Circuits, Morgan Kaufmann Publishers, 2005.
9	Bernard Grob, Ba sic Electronics, McGraw Hill.
10	A. Bruce Carlson, Paul B. Crilly, Communication Systems: An Introduction to Signals and Noise in Electrical Communication, Tata McGraw Hill, 5th Edition.

PREREQUISITE: Physics and Mathematics (Pre-University Level)

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
2	Develop and solve models of magnetic circuits
3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady states
4	Understand the basics of passive components and semiconductor devices.
5	Describe about the working principle of basic electronic circuits and instrumentation.
6	Illustrate the principle of radio and cellular communication.

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PS O4
CO 1	3	1	2	1		1		2		1		2			2		
CO 2	3	1	3	1		2		2		2		2			2		
CO 3	3	1	2	1		2		2		1		2			2		

CO 4	2	3	2	1		1		2		2		3		1		1	
CO 5	2	3	2	1		2		2		2		2				2	
CO 6	2	1	1	1		2		2		2		2					

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO1	3	Apply the knowledge of various electrical circuits
	PO2	1	Analyse Problems related to ohms law
	PO3	2	Design Solution of complex DC circuits using Kirchhoff's Law
	PO4	1	Analysis of electrical components and parameters
	PO6	1	Create electrical engineers who can analyse various electrical Circuits
	PO8	2	Maintain the time and Punctuality to submit Tutorials and Assignments
	PO10	1	Electrical engineers can effectively analyse, write and present the various dc circuits
	PO12	2	Learn more about DC Electric circuits, Equivalent Resistance and Kirchhoff's Law
CO2	PO1	3	Apply the knowledge of various types of Magnetic circuits
	PO2	1	Analyse Problems related to Magnetic Circuits
	PO3	3	Design solutions for complex problems based on different types of magnetic circuits
	PO4	1	Familiarization of various cables and wires
	PO6	1	Create electrical engineers who can analyse various magnetic Circuits

	PO8	2	Maintain the time and Punctuality to submit Tutorials and Assignments
	PO10	2	Electrical engineers can effectively analyze, write and present the various magnetic circuits.
	PO12	2	Improve the knowledge of magnetic circuits
CO3	PO1	3	Apply the knowledge of different types ac circuits
	PO2	1	Analyse Problems related to inductance
	PO3	2	Design solutions for complex series ac circuits problems
	PO4	1	Experimental design of single phase ac circuits
	PO6	1	Create electrical engineers who can analyse various periodic waveforms
	PO8	2	Maintain the time and Punctuality to submit Tutorials and Assignments
	PO10	1	Electrical engineers can effectively analyze, write and present the various ac circuits
	PO12	2	Learn more about the ac circuits
CO4	PO1	2	Apply the knowledge of various types of passive and active components and also voltage amplifiers
	PO2	3	Analyse Problems related to Transistors
	PO3	2	Design solutions for complex problems based on Transistors
	PO4	1	Design of Various electronic components
	PO6	1	Create electronics engineers who can design various electronics Circuits
	PO8	2	Maintain the time and Punctuality to submit Tutorials and Assignments
	PO10	2	Electronics engineers can design various electronic circuits using different electronic components
	PO12	3	Learn more about evolution of electronics, electronic components and transistors

CO5	PO1	2	Apply the knowledge of various types of electronic instruments.
	PO2	3	Analyse Problems related to amplifiers
	PO3	2	Design solutions for complex problems based on different types of amplifiers
	PO4	1	Experimental Design of different types of amplifiers, rectifiers
	PO6	2	Create electronics engineers who can design various electronics Circuits such as amplifiers, rectifiers etc.
	PO8	2	Maintain the time and Punctuality to submit Tutorials and Assignments
	PO10	2	Electronics engineers can design various electronic circuits using different electronic components
	PO12	2	Improve the knowledge of electronic instruments
CO6	PO1	2	Apply the knowledge about the optical communication and entertainment electronics to real world applications
	PO2	1	Analyse Problems related to Antennas
	PO3	1	Design solutions for complex antenna problems and also design various types of antennas
	PO4	1	Experimental design of antennas
	PO6	2	Create electronics engineers who can design various antennas
	PO8	2	Maintain the time and Punctuality to submit Tutorials and Assignments
	PO10	2	Electronics engineers can design various antennas
	PO12	2	Learn more about the optical communication systems

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	Level	Justification
CO1	PSO2	2	Graduates will be skilled in circuit analysis as it involves equation solving and matrix analysis.
CO2	PSO2	2	Graduates will be able to solve and analyze many magnetic circuits.
CO3	PSO2	2	Graduates will be able to solve and develop numerous waveforms using integration.
CO4	PSO1	1	Graduates will be able to provide novel approaches to knowledge of various types of passive and active components
	PSO3	1	Graduates will able to apply the learnt knowledge to draw various types of passive and active components in PSPICE
CO5	PSO1	3	Graduates will be able to grasp the software development lifecycle and methodologies of software systems used in PSPICE

HUN 101 LIFE SKILLS

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Physics**	Course code**: HUN 101**
L-T-P**: 2-0-2**	Credit**: --**

SYLLABUS:

MODULE	CONTENT
I	Overview of Life Skills: Meaning and significance of life skills, Life skills identified by WHO: Self-awareness, Empathy, Critical thinking, Creative thinking, Decision making, problem solving, Effective communication, interpersonal relationship, coping with stress, coping with emotion. Life skills for professionals: positive thinking, right attitude, attention to detail, having the big picture, learning skills, research skills, perseverance, setting goals and achieving them, helping others, leadership, motivation, self-motivation, and motivating others, personality development, IQ, EQ, and SQ
II	Self-awareness: definition, need for self-awareness; Coping with Stress and Emotions, Human Values, tools and techniques of SA: questionnaires, journaling, reflective questions, meditation, mindfulness, psychometric tests, feedback. Stress Management: Stress, reasons and effects, identifying stress, stress diaries, the four A's of stress management, techniques, Approaches: action-oriented, emotion-oriented, acceptance oriented, resilience, Gratitude Training, Coping with emotions: Identifying and managing emotions, harmful ways of dealing with emotions, PATH method and relaxation techniques. Morals, Values and Ethics: Integrity, Civic Virtue, Respect for Others, Living Peacefully. Caring, Sharing, Honesty, Courage, Valuing Time, Time management, Cooperation, Commitment, Empathy, Self-Confidence, Character, Spirituality, Avoiding Procrastination, Sense of Engineering Ethics
III	21st century skills: Creativity, Critical Thinking, Collaboration, Problem Solving, Decision Making, Need for Creativity in the 21st century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity, Critical thinking Vs Creative thinking,

	Functions of Left Brain & Right brain, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence. Steps in problem solving: Problem Solving Techniques, Six Thinking Hats, Mind Mapping, Forced Connections. Analytical Thinking, Numeric, symbolic, and graphic reasoning. Scientific temperament and Logical thinking.
IV	Group and Team Dynamics: Introduction to Groups: Composition, formation, Cycle, thinking, Clarifying expectations, Problem Solving, Consensus, Dynamics techniques, Group vs Team, Team Dynamics, Virtual Teams. Managing team performance and managing conflicts, Entrepreneurship
V	Leadership: Leadership framework, entrepreneurial and moral leadership, vision, cultural Dimensions. Growing as a leader, turnaround leadership, managing diverse stakeholders, crisis Management. Types of Leadership, Traits, Styles, VUCA Leadership, Levels of Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders.

REFERENCES:

1.	Shiv Khera, You Can Win, Macmillan Books, New York, 2003
2.	Barun K. Mitra, "Personality Development & Soft Skills", Oxford Publishers, Third impression,2017.
3.	ICT Academy of Kerala, "Life Skills for Engineers", McGraw Hill Education (India) Private Ltd.,2016.
4.	Caruso, D. R. and Salovey P, "The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership", John Wiley & Sons, 2004.
5.	Kalyana, "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd, 2015.
6.	Larry James, "The First Book of Life Skills"; First Edition, Embassy Books, 2016.
7.	Shalini Verma, "Development of Life Skills and Professional Practice"; First Edition; Sultan Chand (G/L) & Company, 2014
8.	Daniel Goleman, "Emotional Intelligence"; Bantam, 2006.
9.	Remesh S., Vishnu R.G., "Life Skills for Engineers", Ridhima Publications, First Edition, 2016.
10	Butterfield Jeff, "Soft Skills for Everyone", Cengage Learning India Pvt Ltd; 1 edition, 2011.
11	Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6 edition, 2015.

12	The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.

PREREQUISITE: Nil

COURSE OBJECTIVES:

1	To enable the students to have an awareness on different life skill values identified by WHO
2	To familiarize the students with different concepts of problem solving, decision making, stress management and self-awareness.
3	To provide the students awareness on critical and creative thinking, team work, leadership qualities and other professional skills required in personal and professional life.

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1.	Define and Identify different life skills required in personal and professional life
2.	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
3.	Explain the basic mechanics of effective communication and demonstrate these through presentations.
4.	Take part in group discussions
5.	Use appropriate thinking and problem solving techniques to solve new problems
6.	Understand the basics of teamwork and leadership

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PS 04
CO1						2		1	2	2	1	3		1			
CO2	3					3		3	3			2					
CO3						1		1	1	3		2					
CO4								1		3		1					
CO5		3	2	1				1	2			2					1
CO6						1		1	3			2					

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justifcation
CO1	PO6	2	Apply the different life skill values identified by WHO to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
	PO8	1	Apply professional ethics in problem solving and decision making and make aware of the responsibilities and norms of engineering practice.
	PO9	2	Function effectively as an individual by setting goals and achieving them, helping and motivating others, self-motivation and personality development
	PO10	2	Effective communication and interpersonal relationship with engineering community and society at large. Achieve learning skills and research skills to write effective reports documentation and effective presentation. Achieve leadership qualities to give and receive clear instructions.

	PO11	1	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work, as a member and leader in a team. Manage projects in multidisciplinary environments.
	PO12	3	Recognize the need for, and have personality development, improve IQ, EQ, SQ and lifelong learning in the broadest context of technological change.
CO2	PO1	3	Develop and awareness of the self and apply the knowledge of engineering fundamentals to complex engineering problems.
	PO6	3	Apply reasoning for dealing societal wealth, health, safety, legal and cultural issues and the responsibilities to the professional engineering practices.
	PO8	3	By developing an awareness of the self it will help to apply ethical principles and professional responsibilities in multidisciplinary situations.
	PO9	3	Function effectively as an individual by coping with stress and emotions, attaining skills of stress management, self-awareness and achieve moral values and engineering ethics.
	PO12	2	Recognize the need for self-awareness and moral values and engineering ethics in the broadest context of technological change.
CO3	PO6	1	Apply the need for creativity, different types of reading, thinking and multiple intelligence and problem-solving techniques to assess societal, health, safety, legal and cultural issues and responsibilities relevant to professional engineering practice
	PO8	1	Explain the basic mechanics of effective communication and principles along with ethical principles and responsibilities and norms of engineering practices.
	PO9	1	Function effectively as an individual in problem solving using creativity and different thinking methodologies.
	PO10	3	Communicate effectively with engineering community by forced connections, numeric symbolic and graphic reasoning.
	PO12	2	Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
CO4	PO8	1	Take part in group discussions. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.
	PO10	3	Communicate effectively with engineering community and society with effective group and team work to give and receive clear instructions. Manage team performance and conflicts.

	PO12	1	Recognize the need for intrapreneurship in the broadest context of technological change.
CO5	PO2	3	Identify and Analyze engineering problems, crisis management.
	PO3	2	Design solutions for complex engineering problems like crisis management. Achieve leadership qualities with consideration for the public health, cultural and societal considerations.
	PO4	1	Use different entrepreneurial and moral leadership framework to analyze crisis management, synthesize information to provide valid conclusions.
	PO8	1	Function effectively by using appropriate thinking and problem-solving techniques to solve new problems.
	PO9	2	Function effectively as an individual and as a member or leader in teams and in multidisciplinary setting.
	PO12	2	Use appropriate thinking and problem-solving techniques to solve new problems and recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
CO6	PO6	1	Apply team work to assess societal, health, safety, legal and cultural issues and consequent responsibilities relevant to professional engineering practice.
	PO8	1	Understand the basics of teamwork and leadership and function effectively by using appropriate thinking and problem solving techniques to solve new problems.with ethical principles and responsibilities and norms of the engineering practices.
	PO9	3	Function effectively as individual and understand the importance of teamwork and leadership in multidisciplinary settings
	PO12	2	By understanding the basics of teamwork and leadership, recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context.

CO – PSO MAPPING JUSTIFICATION

CO's	PSO's	Level	Justification
CO1	PSO1	1	Define and identify different life skills required in personal and professional life. Life skills are those competencies that provide the means for an individual to be resourceful and positive.
CO5	PSO4	1	Use appropriate thinking and problem-solving techniques to solve new problems. By introducing them to the principles they acquire the competent proficiency in a broad area of programming concepts and provide new ideas and innovations.

HUN 102 PROFESSIONAL COMMUNICATION

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Professional Communication**	Course code**: HUN 102**
L-T-P**: 2-0-2**	Credit**: --**

SYLLABUS:

MODULE	CONTENT
I	Use of language in communication: Significance of technical communication Vocabulary Development: technical vocabulary, vocabulary used in formal letters/emails and reports, sequence words, misspelled words, compound words, finding suitable synonyms, paraphrasing, verbal analogies. Language Development: subject-verb agreement, personal passive voice, numerical adjectives, embedded sentences, clauses, conditionals, reported speech, active/passive voice. Technology-based communication: Effective email messages, slide presentations, editing skills using software. Modern day research and study skills: search engines, repositories, forums such as GitHub, Stack Exchange, OSS communities (MOOC, SWAYAM, NPTEL), and Quora; Plagiarism
II	Reading, Comprehension, and Summarizing: Reading styles, speed, valuation, critical reading, reading and comprehending shorter and longer technical articles from journals, newspapers, identifying the various transitions in a text, SQ3R method, PQRST method, speed reading. Comprehension: techniques, understanding textbooks, marking and underlining, Note-taking: recognizing non-verbal cues.

III	Oral Presentation: Voice modulation, tone, describing a process, Presentation Skills: Oral presentation and public speaking skills, business presentations, Preparation: organizing the material, self-Introduction, introducing the topic, answering questions, individual presentation practice, presenting visuals effectively. Debate and Group Discussions: introduction to Group Discussion (GD), differences between GD and debate; participating GD, understanding GD, brainstorming the topic, questioning and clarifying, GD strategies, activities to improve GD skills
IV	Listening and Interview Skills Listening: Active and Passive listening, listening: for general content, to fill up information, intensive listening, for specific information, to answer, and to understand. Developing effective listening skills, barriers to effective listening, listening to longer technical talks, listening to classroom lectures, talks on engineering /technology, listening to documentaries and making notes, TED talks. Interview Skills: types of interviews, successful interviews, interview etiquette, dress code, body language, telephone/online (skype) interviews, one-to-one interview & panel interview, FAQs related to job interviews
V	Formal writing: Technical Writing: differences between technical and literary style. Letter Writing (formal, informal and semi-formal), Job applications, Minute preparation, CV preparation (differences between Bio-Data, CV and Resume), and Reports. Elements of style, Common Errors in Writing: describing a process, use of sequence words, Statements of Purpose, Instructions, Checklists. Analytical and issue-based Essays and Report Writing: basics of report writing; Referencing Style (IEEE Format), structure of a report; types of reports, references, bibliography.

REFERENCES:

1.	English for Engineers and Technologists (Combined edition, Vol. 1 and 2), Orient Blackswan 2010
2.	Meenakshi Raman and Sangeetha Sharma,"Technical Communication: Principles and Practice", 2ndEdition, Oxford University Press, 2011
3.	Stephen E. Lucas, "The Art of Public Speaking", 10th Edition; McGraw Hill Education, 2012.
4.	Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw Hill Education, 2017.
5.	William Strunk Jr. & E.B. White, "The Elements of Style", 4th Edition, Pearson, 1999.

6.	David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004.
7.	Goodheart-Willcox, "Professional Communication", First Edition , 2017.
8.	Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India, 6 edition, 2015.
9.	The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1edition, 2013.
10.	Anand Ganguly, “Success in Interview”, RPH, 5th Edition, 2016.
11.	Raman Sharma, “Technical Communications”, Oxford Publication, London, 2004

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO’s	DESCRIPTION
1.	Develop vocabulary and language skills relevant to engineering as a profession
2.	Analyze, interpret and effectively summarize a variety of textual content
3.	Create effective technical presentations
4.	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
5.	Identify drawbacks in listening patterns and apply listening techniques for specific needs
6.	Create professional and technical documents that are clear and adhering to all the necessary conventions

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1					1		1		3		2				
CO2								1		1		3				
CO3						1		1	1	3		2				
CO4								1	1	3		1			1	
CO5		1						1	2	3		2				
CO6	1					1		1	1	3		2				

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	JUSTIFICATION
CO1	PO1	1	Develop vocabulary and language skills relevant to engineering as a profession and apply those knowledge to the solution of complex engineering problems.
	PO6	1	Apply reasoning informes by the contextual knowledge to assess societal, health cultural issues and consequent responsibilities relevant to the engineering practice.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO10	3	Effective communication is laid on the foundations of vocabulary and grammar
	PO12	2	Lexical and Grammatical proficiency ensures strong foundation for a life long understanding of the dynamic rules of language.
CO2	PO8	1	Analyze, interpret and effectively summarize a variety of textual content and apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO10		Ability to absorb ,comprehend, process and present information.
	PO12		Develop a systematic competence to critically analyse and comprehend a given set of data and to summarize it effectively.

CO3	PO6		Technical presentations aid in outlining the societal issues and responsibilities relevant to the professional engineering practice.
	PO8		Create effective technical presentations and apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
	PO9		Team activities such as delegation, updation etc requires proper and contextual PO9 assimilation and presentation of ideas.
	PO10		Effectively communicating the point in a technical presentation/seminar
	PO12		Develop a systematic competence to critically analyse and comprehend a given set of data and to summarize it effectively
CO4	PO8		Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus and apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
	PO9		Getting assimilation Presentation of ideas relevant to professional engineering practice.
	PO10		Ability to understand and communicate points in a technical or non-technical group discussion.
	PO12		Recognize the need for, and have the ability to overcome physical and mental inhibitions to engage in effective group discussions/activities.
CO5	PO2		Problem solving requires understanding the context though listening
	PO8		Identify drawbacks in listening patterns and apply listening techniques for specific needs and apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
	PO9		Proper and contextual listening skills are a necessary prerequisite to function effectively as a member or leader in a team/group.
	PO10		Ability to understand and utilize multiple listening techniques to filter out extraneous information and focus only on the relevant data.
	PO12		Recognize the need for, and have the ability to overcome physical and mental inhibitions to engage in effective group discussions/activities.
CO6	PO1		Technical papers and official documents require an expertise of the written word.
	PO6		Technical documents need to be framed by proper societal and cultural contexts
	PO8		Create professional and technical documents that are clear and adhering to all the necessary conventions and apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9		Generating standard documents required in a multidisciplinary setting/group.

	PO10		Effective communication using the written word; for both technical and nontechnical documents.
	PO12		Recognize the need for, and have the ability to overcome physical and mental inhibitions to engage in effective group discussions/activities.

CO – PSO MAPPING

CO's	PSO's	Level	Justification
CO4	PSO3	1	It helps to develop a systematic competence to critically analyze and comprehend a given set of data and to summarize it effectively. Through this the student able to possess competent skills and knowledge in software design process

EST102 PROGRAMMING IN C

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Programming in C**	Course code**: EST102**
L-T-P**: 2-1-2**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	**Basics of Computer Hardware and Software** Basics of Computer Architecture: processor, Memory, Input& Output devices Application Software & System software: Compilers, interpreters, High level and low level languages Introduction to structured approach to programming, Flow chart Algorithms, Pseudo code (bubble sort, linear search - algorithms and pseudo code)
II	**Program Basics** Basic structure of C program: Character set, Tokens, Identifiers in C, Variables and Data Types ,Constants, Console IO Operations, printf and scanf Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators. Operators Precedence Control Flow Statements: If Statement, Switch Statement, Unconditional Branching using goto statement, While Loop, Do While Loop, For Loop, Break and Continue statements.(Simple programs covering control flow)
III	**Arrays and strings** Arrays Declaration and Initialization, 1-Dimensional Array, 2-Dimensional Array String processing: In built String handling functions (strlen, strcpy, strcat and strcmp, puts, gets) Linear search program, bubble sort program, simple programs covering arrays and strings

IV	**Working with functions** Introduction to modular programming, writing functions, formal parameters, actual parameters Pass by Value, Recursion, Arrays as Function Parameters structure, union, Storage Classes, Scope and life time of variables, simple programs using functions
V	**Pointers and Files** Basics of Pointer: declaring pointers, accessing data though pointers, NULL pointer, array access using pointers, pass by reference effect File Operations: open, close, read, write, append Sequential access and random access to files: In built file handling functions (rewind (), fseek (), ftell (), feof (), fread (), fwrite ()), simple programs covering pointers and files.

TEXT BOOKS:

1	Schaum Series, Gottfried B.S.,Tata McGraw Hill,Programming with C
2	E. Balagurusamy, Mcgraw Hill,Programming in ANSI C
3	Asok N Kamthane, Pearson,Programming in C
4	Anita Goel, Pearson, Computer Fundamentals

REFERENCES:

1	Anita Goel and Ajay Mittal, Pearson, Computer fundamentals and Programming in C
2	Brian W. Kernighan and Dennis M. Ritchie, Pearson, C Programming Language
3	Rajaraman V, PHI, Computer Basics and Programming in C
4	Yashavant P, Kanetkar, BPB Publications, Let us C

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
3	Write readable C programs with arrays, structure or union for storing the data to be processed

4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
5	Write readable C programs which use pointers for array processing and parameter passing
6	Develop readable C programs with files for reading input and storing output

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**		**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	2		2		1		3	2	2		1		1	
CO2	3	2	3	2	3				1	3		2		2		2	1
CO3	3	2	3	2	3				1	3		2		2		2	1
CO4	3	2	3	2	3				1	3	2	2		2		2	1
CO5	3	2			3				1	3		2		2		2	1
CO6	3	2			3				1	3		2		2		2	1

CO s	PO s	Level	JUSTIFICATION
CO1	PO1	3	Students can apply the knowledge of fundamentals to analyze a computational problem
	PO2	2	Students can analyze complex problems
	PO3	2	Students can develop solutions for complex problems
	PO4	2	Students can select appropriate C language construct for synthesis and interpretation of data
	PO6	2	Students will learn how to implement the given program to the society
	PO8	1	Students will attain the responsibilities through the problems
	PO10	3	Students will be able to identify and design desired programs which make effective solution of a problems
	PO11	2	Students will be able to manage the computational problem
	PO12	1	Students will be able to understand the basics of c language which will be need for other language basics
CO2	PO1	3	Students can apply the fundamental knowledge to develop C programs using looping, branching statements
	PO2	2	Select appropriate C language construct like looping, branching statements while analyzing engineering problems
	PO3	3	Develop Programming solutions for complex problems using looping, branching statements
	PO4	2	Design algorithms for synthesis and interpretation of data
	PO5	3	Choose an appropriate C Constructs for various software there by delivering quality products

	PO9	1	Students will able to do the programs as a member or leader in diverse teams
	PO10	3	Students being able to comprehend and write appropriate c programs through effective communication
	PO12	2	Students attain lifelong learning about branching and looping statement
CO3	**PO1**	3	Students can apply the fundamental knowledge to create C programs with arrays, structure or union for storing the data to be processed
	PO2	2	Complex problems can analyze problems which can be implemented using array & Structure
	PO3	3	Design solutions for problems using array & structure
	PO4	2	Appropriate C language construct like arrays and structures can be used for synthesis and interpretation of data
	PO5	3	Students can replace homogeneous constructs by heterogeneous constructs
	PO9	1	Students are able to be a team for the implementation of programs
	PO10	3	Students will attain ability to solve complex programs of array and structure through effective communication with team
	PO12	2	Students will attain lifelong learning about the method to implement array and structure
CO4	**PO1**	3	Students can apply the fundamental knowledge for sorting the data to be processed using array or structure
	PO2	2	Analyze problems, identify subtasks and implement them as functions/procedures while analyzing engineering problems
	PO3	3	Students can develop solutions for complex engineering problems by implementing them as functions

	PO4	2	use functions for the design of experiments
	PO5	3	Complex problems can be subdivided into subtask and can be implemented using functions
	PO9	1	Students can achieve solutions for complex task working with team
	PO10	3	Students will able to documented the subtask and the implementation of functions
	PO11	2	Students can attain team for the implementation of function/procedure
	PO12	2	Students can achieve long solutions for complex engineering problems by implementing them as functions
CO5	**PO1**	3	Students can apply the fundamental knowledge to divide a given computational problem into a number of modules and find the solution to the computational problem
	PO2	2	Students can develop algorithm leading to implementation of efficient C-programs while analyzing problems
	PO5	3	Students can implement algorithms by selecting appropriate techniques and tools
	PO9	1	Students can implement algorithm of complex engineering problems using efficient C program
	PO10	3	Conduct investigation of complex problems by implementing the algorithm in C language
	PO12	2	Students can achieve a life long learning about computational problem into a number of modules and find the solution to the computational problem
CO6	**PO1**	3	Students can apply fundamental knowledge to develop readable C programs with files
	PO2	2	Files are widely used in quality software to store large amount of data

	PO5	3	Files can be used for storage while developing using IT tools
	PO9	1	Students can use files for the synthesis and interpretation of data
	PO10	3	Students can use files as being able to comprehend and write effective reports and design documentation, make effective storage of data
	PO12	2	Files are widely used in quality software to ensure a long process of storing data

CO-PSO MAPPING JUSTIFICATION:

COs	PSOs	Level	JUSTIFICATION
CO1	**PSO1**	1	Students can appropriate analyze the problems, evaluate them and recognize potential risk and provide creative solutions in multi-disciplinary area
	PSO3	1	Can get the foundations of software development
CO2	**PSO1**	2	Complex algorithms can be implemented using various C programming constructs
	PSO3	2	Complex algorithms for research can be implemented using C programs
	PSO4	1	Students acquire the ability to design algorithms and implement it as programs by applying standard practice in software project development
CO3	**PSO1**	2	Provide creative solutions by using proper data structure
	PSO3	2	Familiarity and practical proficiency with a broad area of programming
	PSO4	1	Break problem using suitable mathematical analysis, choosing the most appropriate data structure
CO4	**PSO1**	2	Attain the ability to design and develop hardware and software based system, evaluate and recognize potential risks and provide creative solutions by identifying the subtasks involved

	PSO3	2	Grasp the software development life cycle and methodologies of software system and implementing them as proper modules
	PSO4	1	Break problem using suitable mathematical analysis, data structure and suitable algorithm by implementing them as functions
CO5	**PSO1**	2	Complex engineering solutions can be designed with the C programs
	PSO3	2	Familiarity and practical proficiency with a broad area of programming concepts and provide new ideas and innovations
	PSO4	1	Students acquire the ability to design algorithms and implement it as programs
CO6	**PSO1**	2	complex engineering solutions can be designed with the help of files for sorting data and retrieving from them later
	PSO3	2	Different types of files can be used for sorting the results of various stages of research
	PSO4	1	Files are widely used in quality software to store large amount of data

PHL120 ENGINEERING PHYSICS LAB

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Physics Lab**	Course code**: PHL 120**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

SL NO.	LIST OF EXPERIMENTS
1.	CRO-Measurement of frequency and amplitude of wave forms
2.	Measurement of strain using strain gauge and Wheatstone bridge
3.	LCR Circuit – Forced and damped harmonic oscillations
4.	Melde's string apparatus- Measurement of frequency in the transverse and longitudinal mode
5.	Wave length measurement of a monochromatic source of light using Newton's Rings method.
6.	Determination of diameter of a thin wire or thickness of a thin strip of paper using air wedge method.
7.	To measure the wavelength using a millimeter scale as a grating.
8.	Measurement of wavelength of a source of light using grating.
9.	Determination of dispersive power and resolving power of a plane transmission grating
10.	Determination of the particle size of lycopodium powder
11.	Determination of the wavelength of He-Ne laser or any standard laser using diffraction grating
12.	Calculate the numerical aperture and study the losses that occur in optical fiber cable.
13.	I-V characteristics of solar cell.
14.	LED Characteristics.
15.	Ultrasonic Diffractometer- Wavelength and velocity measurement of ultrasonic waves in a liquid
16.	Deflection magnetometer-Moment of a magnet- Tan A position.

REFERENCES:

1	S.L.Gupta and Dr.V.Kumar, "Practical physics with viva voice", Pragati PrakashanPublishers, Revised
2	Edition, 2009
3	M.N.Avadhanulu, A.A.Dani and Pokely P.M, "Experiments in Engineering Physics", S.Chand&Co,2008
4	S. K. Gupta, "Engineering physics practicals", Krishna Prakashan Pvt. Ltd., 2014

PREREQUISITE: Higher secondary level Physics

COURSE OBJECTIVES:

1	Familiarize the working of strain gauge apparatus, application of wheat stone bridge in strain gauge apparatus and usage of the same to measure the strain acting.
2	Familiarize the parts of Newton's rings apparatus, application of interference in Newton's rings and use it to measure the wavelength of the given light.
3	Familiarize the parts of spectrometer, familiarize grating, application of diffraction in grating and use it to measure the wavelength of the given light.
4	Familiarize the parts of solar cell apparatus, application of the apparatus for studying characteristics of solar cell.
5	Familiarize the parts of Air-wedge apparatus, application of interference in air - wedge and use it to measure the wavelength of the given light.
6	Study characteristics of LED and plot a V – I characteristics of the same.
7	Understand diffraction taking place in spectrometer and use it to measure resolving power and dispersive power.
8	Understand formation of waves in Melde's apparatus use it to measure frequency of tuning fork.

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Apply modern instruments like CRO, strain gauge to measure the basic physical quantities viz. frequency and amplitude of a wave pattern, strain etc. Carryout measurement of wave pattern in a stretched string and the corresponding frequency values using a Melde's string apparatus.
2	Determine the wavelength of monochromatic beam of light and thickness of micro-thin object etc. by forming Newton's rings pattern and an air wedge fringe pattern

3	Carryout the measurement of wavelength by diffraction of plane transmission grating and the spectra formed by a monochromatic beam of light and a laser.
4	Determine the wavelength of a laser beam using the plane transmission grating. Measurement of numerical aperture of an optic fiber and evaluate the properties of a solar cell and LED through its I-V characteristics
5	Determine the velocity of ultrasonic waves in liquid using ultrasonic diffractometer. Compare the magnetic moment of various magnets and determine the magnetic flux density using deflection/vibration Magnetometer

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**		**PSO 1**	**PSO 2**	**PSO3**	**PSO4**
CO1	3	2	1	2	2			1	2	1		1					1
CO2	3	2	1	2	2			1	2	1		1					1
CO3	3	2	1	2	2			1	2	1		1					1
CO4	3	2	1	2	2			1	2	1		1					1
CO5	3	2	1	2	2			1	2	1		1					1

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO1	3	Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the Melde's string experiment and strain gauge experiment to find solution of complex engineering problems.
	PO2	2	Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences in Melde's string experiment and strain gauge experiment.
	PO3	1	Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations while using Melde's string experiment and strain gauge experiment.
	PO4	2	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions using Melde's string experiment and strain gauge experiment.
	PO5	2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations using Melde's string experiment and strain gauge experiment.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice using Melde's string experiment and strain gauge experiment.
	PO9	2	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings using Melde's string experiment and strain gauge experiment.
	PO10	1	Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions using Melde's string experiment and strain gauge experiment.

	PO12	1	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change using Melde's string experiment and strain gauge experiment.
CO2	PO1	3	Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the Newton's ring and air wedge fringe pattern find solution of complex engineering problems.
	PO2	2	Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences in Newton's ring and air wedge fringe pattern.
	PO3	1	Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations while using Newton's ring and air wedge fringe pattern.
	PO4	2	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions using Newton's ring and air wedge fringe pattern.
	PO5	2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations using Newton's ring and air wedge fringe pattern.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice using Newton's ring and air wedge fringe pattern.
	PO9	2	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings using Newton's ring and air wedge fringe pattern.
	PO10	1	Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions using Newton's ring and air wedge fringe pattern.
	PO12	1	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change using Newton's ring and air wedge fringe pattern.

CO3	PO1	3	Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the grating experiment to find solution of complex engineering problems.
	PO2	2	Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences in grating experiment.
	PO3	1	Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations while using Grating experiment.
	PO4	2	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions using Grating experiment.
	PO5	2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations using Grating experiment.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice using Grating experiment.
	PO9	2	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings using Grating experiment.
	PO10	1	Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions using Grating experiment.
	PO12	1	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change using Grating experiment.
CO4	PO1	3	Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the LED and solar cell characteristics to find solution of complex engineering problems.
	PO2	2	Identify, formulate, research literature, and analyze engineering problems to arrive at substantiated conclusions using first principles of mathematics, natural, and engineering sciences in LED and solar cell characteristics.

	PO3	1	Design solutions for complex engineering problems and design system components, processes to meet the specifications with consideration for the public health and safety, and the cultural, societal, and environmental considerations while using LED and solar cell characteristics.
	PO4	2	Use research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions using LED and solar cell characteristics.
	PO5	2	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations using LED and solar cell characteristics.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice using LED and solar cell characteristics.
	PO9	2	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings using LED and solar cell characteristics.
	PO10	1	Communicate effectively with the engineering community and with society at large. Be able to comprehend and write effective reports documentation. Make effective presentations, and give and receive clear instructions using LED and solar cell characteristics.
	PO12	1	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change using LED and solar cell characteristics.

CO – PSO MAPPING JUSTIFICATION

CO's	PSO's	Level	Justification
CO1	PSO4	1	Students become familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research using Melde's experiment.
CO2	PSO4	1	Students become familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research using Newton's rings and Air wedge.

CO3	PSO4	1	Students become familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research using spectrometer.
CO4	PSO4	1	Students become familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research using solar cell and LED.

CYL120 ENGINEERING CHEMISTRY LAB

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Engineering Chemistry Lab**	Course code**: CYL 120**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

SL NO.	LIST OF EXPERIMENTS
1.	Estimation of total hardness of water-EDTA method
2.	Potentiometric titration
3.	Determination of cell constant and conductance of solutions.
4.	Calibration of pH meter and determination of pH of a solution
5.	Estimation of chloride in water
6.	Identification of drugs using TLC
7.	Determination of wavelength of absorption maximum and colorimetric estimation of Fe3+ in solution
8.	Determination of molar absorptivity of a compound (KMnO4 or any water soluble food colorant)
9.	Synthesis of polymers (a) Urea-formaldehyde resin (b) Phenol-formaldehyde resin
10.	Estimation of iron in iron ore
11.	Estimation of copper in brass
12.	Estimation of dissolved oxygen by Winkler's method
13.	(a) Analysis of IR spectra (minimum 3 spectra) (b) Analysis of 1H NMR spectra (minimum 3 spectra)
14.	Flame photometric estimation of Na+ to find out the salinity in sand
15.	Determination of acid value of a vegetable oil
16.	Determination of saponification of a vegetable oil

REFERENCES:

1	G. Svehla, B. Sivasankar, “Vogel's Qualitative Inorganic Analysis”, Pearson, 2012.
2	R. K. Mohapatra, “Engineering Chemistry with Laboratory Experiments”, PHI Learning, 2017.
3	Muhammed Arif, “Engineering Chemistry Lab Manual”, Owl publishers, 2019.
4	Ahad J., “Engineering Chemistry Lab manual”, Jai Publications, 2019.
5	Roy K Varghese, “Engineering Chemistry Laboratory Manual”, Crownplus Publishers, 2019.
6	Soney C George, Rino Laly Jose, “Lab Manual of Engineering Chemistry”, S. Chand &

PREREQUISITE: Experiments in chemistry introduced at the plus two levels in schools

COURSE OBJECTIVES:

1	To enable the students to acquire knowledge in the Chemistry Lab Experiments for engineering Applications.
2	To familiarize the students with different types of titrations like hardness estimation, chloride estimation and iodometric titrations and preparation methods of polymers like phenol formaldehyde and urea formaldehyde etc.
3	To familiarize the students with concepts of Potentiometric titrations, pH measurements and conductivity measurements

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO’s	DESCRIPTION
1.	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
2.	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
3.	Develop the ability to understand and explain the use of modern spectroscopic techniques for analyzing and interpreting the IR spectra and NMR spectra of some organic compounds
4.	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
5.	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments

6.	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum.

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**		**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1		1	2			1	2			3		1			
CO2	3	1		1	3			1	2			3		1			
CO3	3	1		1	3			1	2			3		1			
CO4	3	1		1	3			1	2			3		1			
CO5	3	1		1	1			1	2			3		1			
CO6	3	1		1	1			1	2			3		1			1

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO1	3	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems like estimation of hardness, chloride content, dissolved oxygen content etc.
	PO2	1	Identify and analyze complex engineering problems by having skills in quantitative chemical analysis to generate experimental skills and apply these skills in various contexts using first principles of natural and engineering sciences.
	PO4	1	Use research based knowledge and research methods including design of experiments, analysis interpretation and synthesis and environmental considerations like measuring some certain water parameters like quantitative analysis of chloride, dissolved oxygen, hardness etc. and considering them based on future limitations.
	PO5	2	Create, select and apply appropriate techniques to complex engineering activities with an understanding of the limitations of water in future and pollution control measures.
	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practices like careful approach in quantitative analysis to have accurate results.
	PO9	2	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings in all the practices like quantitative, qualitative analysis and synthesis.
	PO12	3	Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in analysis and generate experimental skills and apply those in various analysis for future use in the broadest context of technological change.
CO2	PO1	3	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems like preparation of engineering materials such as polymers like phenol formaldehyde and urea formaldehyde.
	PO2	1	Identify and formulate and analyze complex engineering problems reaching substantiated conclusions using the first principles of natural sciences and

			engineering sciences having practical skills in synthesis of organic polymers and identification of drugs by TLC.
	PO4	1	Conduct investigations of complex problems by practicing certain synthesis techniques and identification of new compounds.
	PO5	3	Create, select and apply appropriate techniques for the production of polymers to complex engineering activities like TLC for identification of drugs with an understanding of the limitations.
	PO8	1	Apply ethical principles in all the areas of synthesis and identification etc. to get better results.
	PO9	2	Function effectively as an individual and team work while conducting experiments like synthesis of urea formaldehyde resin and phenol formaldehyde resin and identification of drugs using TLC method.
	PO12	3	Recognize the need for and have the preparation and ability for identification of drugs and polymer preparation for future use in the broadest context of technological change.
CO3	PO1	3	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems by modern spectroscopic techniques like IR and NMR spectra analysis of organic compounds.
	PO2	1	Identify, formulate, review and analyze complex engineering problems using first principles of natural sciences mathematics environmental sciences like spectroscopic applications.
	PO4	1	Practicing research based experiments like the usage of modern spectroscopic techniques for analyzing and interpreting the IR spectra and NMR spectra of some organic compounds, to provide valid conclusions.
	PO5	3	Create, select and apply appropriate techniques of spectral analysis for structural determination to complex engineering activities with an understanding of the limitations.
	PO8	1	Apply ethics and professional ethics while conducting experiments like IR, NMR spectroscopic analysis
	PO9	2	Function effectively as an individual and team work in the usage of modern spectroscopic analytical techniques

	PO12	3	Recognize the need for and have the preparation and ability for structural determination and analysis of a compound for future use in the broadest context of technological change.
CO4	PO1	3	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems like instrumental techniques.
	PO2	1	Identify, analyze, and formulate complex engineering problems reaching substantiated conclusions using first principles of sciences like instrumentation.
	PO4	1	Use research base knowledge and research methods including design experiments, analyze and interpretation of data by having skills in instrumental techniques
	PO5	3	Create select and apply appropriate advanced instrumental techniques to complex engineering activities with an understanding of the limitations
	PO8	1	Instrumental techniques can conduct effectively and successfully only by keeping professional ethics in mind
	PO9	2	Effective Team work is required in conducting experiments ike instrumentation
	PO12	3	Recognize the need for and have the preparation and ability of instrumentation in the broadest context of technological change.
CO5	PO1	3	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems like pH measurements, digital potentiometric titrations and conductivity measurements.
	PO2	1	Learn to design and carry out scientific experiments as well as accurately record and analyze the resukt of uch experiments by identifying, formulating, reviewing research literature and analyse complex engineering problems reaching substantiated conclusions using the first principles of sciences.
	PO4	1	Use research based knowledge including experiment design and analysis by carrying out scientific experiments accurately.
	PO5	1	Create select and apply appropriate advanced titration techniques to complex engineering activities with an understanding of the limitations.
	PO8	1	Professional ethics is required to carry out scientific experiments accurately and analyze the results of such experiments.
	PO9	2	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings to get accurate results by accurately recording and analyzing scientific experiments.

	PO12	3	Recognize the need for and have the preparation and ability for advanced titration methods and measurement of conductivity and pH of various chemicals for future use in the broadest context of technological change.
CO6	PO1	3	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems by environment friendly methods and reactions
	PO2	1	Chemistry helps to analyze complex engineering problems by considering social, economical and environmental factors by having practical knowledge in determining parameters of basic needs of human like water include determination of hardness, chloride, dissolved oxygen etc and helps to prepare engineering materials like phenol formaldehyde, urea formaldehyde resins etc. and finding pH, Conductivity and potential of various chemicals required for engineering.
	PO4	1	Chemistry lays the foundation for many research based topics of engineering like estimation of hardness, chloride, Dissolved oxygen, pH determination, conductivity, Potentiometric experiments and synthesis of engineering materials like Phenol formaldehyde and Urea formaldehyde resin.
	PO5	1	Create, select and apply appropriate advanced titration and preparation techniques to complex engineering activities with an understanding of the limitations.
	PO8	1	Applying professional ethics is very necessary while conducting a chemical experiment to get safer and successful results, otherwise it may cause chemical accidents. Special care should be taken by considering social, economic and environmental safety.
	PO9	2	Function effectively as an individual and as member or leader in diverse teams, and in multidisciplinary settings for a successful conduct of scientific experiments by considering social, economic and environmental safety. Chemistry experiment conduct will fruitify this qualities.
	PO12	3	Recognize the need for and have the preparation and ability for advanced environment friendly and pollution free methods which contribute economic and social development in the broadest context of technological change.

CO PSO MAPPING JUSTIFICATION

CO's	PSO's	Level	Justification
CO1	PSO1	1	Apply the knowledge of science and engineering fundamentals of engineering based experiments and engineering solutions of complex engineering problems like potential risk analysis tests during hardware development
CO2	PSO1	1	Applying the knowledge of polymers at the time of hardware manufacturing.
CO3	PSO1	1	Applying the quality checking techniques during hardware development
CO4	PSO1	1	Instrumental techniques are necessary during hardware and software implementing, manufacturing and development
CO5	PSO1	1	Apply the knowledge of science and engineering fundamentals of engineering based experiments like pH measurements, digital potentiometric titrations and conductivity measurements which enables the user to develop the importance of accuracy during hardware and software development.
CO6	PSO1	1	Help to understand how chemistry addresses social, economical and environmental problems during implementation of new ideas and innovation during research by keeping the environment pollution free
	PSO4	1	Creating practical proficiency skills by communicating effectively as a team work

ESL120 CIVIL & MECHANICAL WORKSHOP

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Civil & Mechanical Workshop**	Course code**: ESL120**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

EXERCISE	LIST OF EXPERIMENTS
1.	Calculate the area of a built-up space and a small parcel of land- Use standard measuring tape and digital distance measuring devices
2.	a) Use screw gauge and vernier calliper to measure the diameter of a steel rod an thickness of a flat bar
	b) Transfer the level from one point to another using a water level
	c) Set out a one room building with a given plan and measuring tape
3.	Find the level difference between any two points using dumpy level
4.	a) Construct a 1 and half thick brick wall of 50 cm height and 60 cm length using English bond. Use spirit level to assess the tilt of walls.
	b) Estimate the number of different types of building blocks to construct this wall.
5.	a) Introduce the students to plumbing tools, different types of pipes, type of Connections, traps, valves, fixtures and sanitary fittings.
	b) Install a small rainwater harvesting installation in the campus
PART II MECHANICAL WORKSHOP	
1	**General**: Introduction to workshop practice, Safety precautions, Shop floor ethics, Basic First Aid knowledge. Study of mechanical tools, components and their applications: (a) Tools: screw drivers, spanners, Allen keys, cutting pliers etc. and accessories (b) bearings, seals, O-rings, circlips, keys etc.
2	**Carpentry** : Understanding of carpentry tools Minimum any one model 1. T –Lap joint 2. Cross lap joint

	3. Dovetail joint 4. Mortise joints
3	**Foundry** : Understanding of foundry tools Minimum any one model 1. Bench Molding 2. Floor Molding 3. Core making 4. Pattern making
4	**Sheet Metal**: Understanding of sheet metal working tools Minimum any one model 1. Cylindrical shape 2. Conical shape 3. Prismatic shaped job from sheet metal
5	**Fitting:** Understanding of tools used for fitting Minimum any one model 1. Square Joint 2. V- Joint 3. Male and female fitting
6	**Plumbing**: Understanding of plumbing tools, pipe joints Any one exercise on joining of pipes making use of minimum three types of pipe joints
7	**Smithy:** Understanding of tools used for smithy. Demonstrating the forge-ability of different materials (MS, Al, alloy steel and cast steels) in cold and hot states. Observing the qualitative difference in the hardness of these materials Minimum any one exercise on smithy 1. Square prism 2. Hexagonal headed bolt 3. Hexagonal prism 4. Octagonal prism
8	**Welding**: Understanding of welding equipments Minimum any one welding practice Making Joints using electric arc welding. bead formation in horizontal, vertical and overhead positions
9	**Assembly**: Demonstration only Dissembling and assembling of

	1. Cylinder and piston assembly 2. Tail stock assembly 3. Bicycle 4. Pump or any other machine
10	**Machines**: Demonstration and applications of the following machines Shaping and slotting machine; Milling machine; Grinding Machine; Lathe; Drilling Machine.
11	**Modern manufacturing methods**: Power tools, CNC machine tools, 3D printing, Glass cutting.

REFERENCES:

1	Khanna P.N, "Indian Practical Civil Engineering Handbook", Engineers Publishers.
2	Bhavikatti. S, "Surveying and Levelling (Volume 1)", I.K. International Publishing House
3	Arora S.P and Bindra S.P, " Building Construction", Dhanpat Rai Publications
4	S. C. Rangwala, "Engineering Materials," Charotar Publishing House

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Name and explain different devices and tools used for civil engineering measurements.
2	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
3	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
4	Calculate the area and volume of various features of a building
5	Identify Basic Mechanical workshop operations in accordance with the material and objects
6	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
7	Apply appropriate safety measures with respect to the mechanical workshop trades

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PS O4
CO1	3	3	2	1	2	2	1	1	1	1	1				1		1
CO2	3	3	3	2	2	2	1	1	2	1	1			1	1		1
CO3	3	3	2	2	2	2	1	1	2	1	1			1	1		1
CO4	3	3	2	2	2	2	1	1	2	1	1			1	1		1
CO5	3	2	2	1	2	1	1	1	2	1	1						
CO6	3	3	2	2	2	2	1	1	2	1	1	1		1			
CO7	3	3	2	2	2	2	2	2	2	1	1	2		1			

CO-PO MAPPING JUSTIFICATION

CO's	PO's	Level	Justification
CO1	PO1	3	Able to choose the tools required for civil engineering measurements which uses fundamentals of mathematics to get a solution
	PO2	3	Various devices used in this workshop will help to analyze complex engineering problems reaching substantiated conclusions using mathematics
	PO3	2	It will help in designing solutions for complex engineering problems and design system components or processes
	PO4	1	Devices used will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	2	Able to select right type of instrument for the particular work which suits the need of society.
	PO7	1	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.
	PO8	1	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	1	The students will be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
	PO10	1	Communication: Communicate effectively on complex engineering activities with the teammates and will be able to comprehend and write effective reports and design documentation.
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
CO2	PO1	3	Applying the basic concepts of engineering knowledge in setting out of building is an important aspect in the engineering field.
	PO2	3	Various civil engineering activities will be analyzed reaching substantiated conclusions using mathematics
	PO3	3	It will help in designing solutions for complex engineering problems and design system components or processes

	PO4	2	This will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	2	Able to select right type of instrument for the particular work which suits the need of society.
	PO7	1	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.
	PO8	1	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	2	Able to work in a team since setting out ,evaluating natural profile etc are all done in the field as team work
	PO10	1	Able to communicate with the society for getting different inputs in order to carry out the work
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
CO3	PO1	3	Able to apply o the fundamentals of engineering in construction of different bonds in the masonry which is an important aspect in the engineering field.
	PO2	3	Various civil engineering activities will be analyzed reaching substantiated conclusions using mathematics
	PO3	2	It will help in designing solutions for complex engineering problems and design system components or processes
	PO4	2	This will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	2	Able to choose different type of masonry and plumbing tools according to the need of society.
	PO7	1	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.
	PO8	1	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	2	Able to work in a team since setting out ,evaluating natural profile etc are all

			done in the field as team work
	PO10	1	Able to communicate with the society for getting different inputs in order to carry out the work
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
CO4	PO1	3	Apply fundamental aspects of engineering knowledge for the determination of the areas and volumes of different parts of a building.
	PO2	3	Various civil engineering activities will be analyzed reaching substantiated conclusions using mathematics
	PO3	2	It will help in designing solutions for complex engineering problems and design system components or processes
	PO4	2	This will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	2	Able to choose different type of masonry and plumbing tools according to the need of society.
	PO7	1	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.
	PO8	1	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	2	Area and volume calculation of parts of buildings is done as teamwork in an experiment
	PO10	1	The area and volume calculation of the different components of building are conveyed to the community with a view to proper utilisation of the available resources.
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
CO5	PO1	3	Able to choose the tools required for civil engineering measurements which uses fundamentals of mathematics to get a solution
	PO2	2	Various devices used in this workshop will help to analyze complex engineering problems reaching substantiated conclusions using mathematics

	PO3	2	It will help in designing solutions for complex engineering problems and design system components or processes
	PO4	1	Devices used will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	1	Able to select right type of instrument for the particular work which suits the need of society.
	PO7	1	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.
	PO8	1	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	2	The students will be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
	PO10	1	Communication: Communicate effectively on complex engineering activities with the teammates and will be able to comprehend and write effective reports and design documentation.
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
CO6	PO1	3	Applying the basic concepts of engineering knowledge in setting out of building is an important aspect in the engineering field.
	PO2	3	Various civil engineering activities will be analyzed reaching substantiated conclusions using mathematics
	PO3	3	It will help in designing solutions for complex engineering problems and design system components or processes
	PO4	2	This will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	2	Able to select right type of instrument for the particular work which suits the need of society.
	PO7	1	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.

	PO8	1	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	2	Able to work in a team since setting out ,evaluating natural profile etc are all done in the field as team work
	PO10	1	Able to communicate with the society for getting different inputs in order to carry out the work
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
	PO12	1	Students will be able to recollect the experiences and knowledge life long as these would come in handy in their daily life
CO7	PO1	3	Able to apply o the fundamentals of engineering in construction of different bonds in the masonry which is an important aspect in the engineering field.
	PO2	3	Various civil engineering activities will be analyzed reaching substantiated conclusions using mathematics
	PO3	2	It will help in designing solutions for complex engineering problems and design system components or processes
	PO4	2	This will enable research-based knowledge and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	2	Able to identify the tools for measurement for general civil engineering works such as setting out, masonry, plumbing etc.
	PO6	2	Able to choose different type of masonry and plumbing tools according to the need of society.
	PO7	2	Use of various devices will enable the students in understanding the impact of the professional engineering solutions in societal and environmental contexts.
	PO8	2	The students will apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO9	2	Able to work in a team since setting out ,evaluating natural profile etc. are all done in the field as team work
	PO10	1	Able to communicate with the society for getting different inputs in order to carry out the work
	PO11	1	The students will demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

CO-PSO MAPPING JUSTIFICATION

CO's	PSO's	Level	Justification
CO1	PSO2	1	The students will use mathematical methodologies to crack problems using suitable mathematical analysis
	PSO4	1	Graduates will use knowledge in different devices and tools used for civil engineering measurements for providing solutions and innovations towards research.
CO2	PSO1	1	The students will be able to evaluate and recognize potential risks and provide creative solutions in the usage of different devices and tools used for civil engineering measurements.
	PSO2	1	The students will use mathematical methodologies to crack problems using suitable mathematical analysis
	PSO4	1	Graduates will use knowledge about basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work for providing solutions and innovations towards research.
CO3	PSO1	1	The students will be able to evaluate and recognize potential risks and provide creative solutions in the usage of different devices and tools used for civil engineering measurements.
	PSO2	1	The students will use mathematical methodologies to crack problems using suitable mathematical analysis
	PSO4	1	Graduates will use knowledge in different types of materials available in construction industry to make the work easier for providing solutions and innovations towards research.
CO4	PSO1	1	The students will be able to evaluate and recognize potential risks and provide creative solutions in the usage of different devices and tools used for civil engineering measurements.
	PSO2	1	The students will use mathematical methodologies to crack problems using suitable mathematical analysis

	PSO4	1	Graduates will use knowledge in calculations the materials required for the construction of a building for providing solutions and innovations towards research.
CO6	PSO1	1	The students will be able to evaluate and recognize potential risks and provide creative solutions in the usage of different devices and tools used for civil engineering measurements.
CO7	PSO1	1	The students will be able to evaluate and recognize potential risks and provide creative solutions in the usage of different devices and tools used for civil engineering measurements.

ESL130 ELECTRICAL & ELECTRONICS WORKSHOP

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Electrical & Electronics Workshop**	Course code**: ESL130**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

EXERCISE	LIST OF EXPERIMENTS
PART I ELECTRICAL	
1	Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB and MCCB with ratings.
2	Wiring of simple light circuit for controlling light/ fan point (PVC conduit wiring)
3	Wiring of light/fan circuit using Two way switches . (Staircase wiring)
4	Wiring of Fluorescent lamps and light sockets (6A) with a power circuit for controlling power device.
5	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter
6	Identify different types of batteries with their specifications.
7	Demonstrate the Pipe and Plate Earthing Schemes
PART II ELECTRONICS	
1	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)
2	Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Dia or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.
3	Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de-soldering station etc.]

4	Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]
5	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]
6	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]
7	Assembling of electronic circuits using SMT (Surface Mount Technology) stations.
8	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any Two circuits).

PREREQUISITE: Nil

COURSE OUTCOMES:

After successful completion of the course, the students should be able to:

CO's	DESCRIPTION
1	Demonstrate safety measures against electric shocks.
2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
4	Identify and test various electronic components and instruments.
5	Draw circuit schematics with EDA tools.
6	Assemble, test and dismantle electronic circuits on boards.
7.	Work in a team with good interpersonal skill.

PROGRAM SPECIFIC OUTCOMES:

The Computer Science and Engineering program graduates will be able to

PSO1: Attain the ability to design and develop hardware and software-based systems, evaluate and recognize potential risks and provide creative solutions.

PSO2: Use mathematical methodologies to crack problem using suitable mathematical analysis, data structure and suitable algorithm.

PSO3: Grasp the software development lifecycle and methodologies of software systems and possess competent skills and knowledge of software design process.

PSO4: Be Familiar and have practical proficiency in a broad area of programming concepts and provide new ideas and innovations towards research.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12		PS O1	PS O2	PS O3	PS O4
CO1		1				3						1					
CO2	2		1	1				1	2	1		2					
CO3	2	1	3	1		1		1	2	2		2		2			
CO4	3	1	1	1				2	3			2					
CO5	3	1			2			2	3			2				2	
CO6	3	1	1	1	2			2	3			1		1			
CO7								2	3	2		2					

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	Justification
CO1	PO2	1	Analyze problems related to usage of various electrical components
	PO6	3	Applying contextual knowledge to provide safety.
	PO12	1	Recognize and study about the safety related aspects of electrical equipment's
	PO1	2	Applying knowledge of engineering fundamentals to identify and analyse about various electrical components.
	PO3	1	Identify the specification of various electrical components.
	PO8	1	Maintain the time and punctuality to attend workshop and submit records.

CO2	PO9	2	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.
	PO10	1	Effective communication required for group work.
	PO12	2	Improve the knowledge of electrical components
CO3	PO1	2	Apply the knowledge of electrical components in wiring of various circuits.
	PO2	1	Study Various problems related to designing of electrical circuits.
	PO3	3	Design necessary circuits for wiring simple lighting circuits for domestic buildings.
	PO4	1	Analysis of various complex problems related to wiring.
	PO6	1	Applying contextual knowledge in circuit designing for domestic buildings by considering safety aspects.
	PO8	1	Maintain the time and punctuality to attend workshop and submit records.
	PO9	2	Group work is essential for all activities.
	PO10	2	Effective communication required for group work.
	PO12	2	Recognize the need and ability to work as a team.

CO4	PO1	3	Application of Ohm's law and other basics knowledge of electronic components
	PO2	1	Analyze problems related to testing of electronic components
	PO3	1	Identify the Values of different electronic components
	PO4	1	Design and testing of Various electronic components
	PO8	2	Maintain the time and Punctuality to attend workshop and submit Records
	PO9	3	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.
	PO12	2	Improve the knowledge of electronic components
	PO1	3	Apply the knowledge of electronic circuits in EDA tools
	PO2	1	Study the problems related to design electronic circuits using EDA tools

CO5	PO5	2	Familiarization of EDA tool- PSPICE
	PO8	2	Maintain the time and Punctuality to attend workshop and submit Records
	PO9	3	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings
	PO12	2	Improve the knowledge of EDA tools especially knowledge in PSPICE
CO6	PO1	3	Able to develop circuits on breadboard.
	PO2	1	Study Various problems related to assembling of electronic circuits
	PO3	1	Design and assembling of sine and square wave generator in bread board
	PO4	1	Assembling of sine and square wave generator in bread board and also check its output on CRO
	PO5	2	Circuits can be implemented using PSPICE
	PO8	2	Maintain the time and Punctuality to attend workshop and submit Records
	PO9	3	Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings
	PO12	1	Study more about testing and assembling of electronic components
CO7	PO8	2	Maintain the time and Punctuality to attend workshop and submit Records
	PO9	3	Group work is essential for all the activities
	PO10	2	Effective communication required for group work
	PO12	2	Recognize the need and ability to work as a team.

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	Level	Justification
CO3	PSO1	2	Graduate will be able to know implementation and able to plan the process.
CO5	PSO3	2	Graduates will be able to conduct experiments and develop applications using electronic design automation (EDA)tools
CO6	PSO1	1	Graduates will able to know Implementation & able to plan the process