SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY

COURSE HANDBOOK

DEPARTMENT OF APPLIED SCIENCE &HUMANITIES

SEMESTER 1 & 2

MA 101 CALCULUS

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Calculus**	Course code**: MA101**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	Single Variable Calculus and Infinite series (Book I –sec 9.3,9.5,9.6,9.8) Basic ideas of infinite series and convergence -Geometric series- Harmonic series-Convergence tests-comparison, ratio, root tests (without proof). Alternating series- Leibnitz Test- Absolute convergence, Maclaurins series-Taylor series - radius of convergence.(For practice and submission as assignment only:Sketching, plotting and interpretation of hyperbolic functions using suitable software. Demonstration of convergence of series bysoftware packages)
II	Partial derivatives and its applications(Book I–sec. 13.3 to 13.5 and 13.8) Partial derivatives–Partial derivatives of functions of more than two variables – higherorder partial derivatives - differentiability, differentials and local linearity -The chain rule – Maxima and Minima of functions of two variables - extreme value theorem (without proof)-relative extrema .
III	Calculus ofvectorvaluedfunctions(Book I-12.1,12.2,12.4&12.6,13.6&13.7)Introductionto vectorvaluedfunctions-parametriccurves in 3-spaceLimits and continuity– derivatives–tangentlines – derivativeof dot andcross product-definiteintegrals ofvectorvalued functions-unit tangent-normal-velocity-acceleration andspeed–Normalandtangential componentsofacceleration.Directionalderivativesandgradients-tangentplanesand normalvectors(Forpractice and submission as assignmentonly:Graphingparametriccurvesand surfaces usingsoftwarepackages)
IV	Multipleintegrals(Book I-sec. 14.1, 14.2, 14.3, 14.5) Doubleintegrals-Evaluation ofdouble integrals–Double integrals innon-rectangularcoordinates-reversingtheorder ofintegration-Areacalculatedasadoubleintegral-Tripleintegrals(Cartesianco ordinates only)-volumecalculatedasa tripleintegral-(applications ofresults only)
V	Topics in vector calculus (Book I-15.1, 15.2, 15.3) Vector and scalar fields- Gradient fields –conservative fields and potential functions –divergence and curl - the operator - the 2Laplacian,Line integrals - work as a line integral- independence of path-conservative vector field –(For practice and submission as assignment only: graphical representation of vector fields using software packages)
VI	Topics in vector calculus (continued) (Book I sec., 15.4, 15.5, 15.7, 15.8) Green's Theorem (without proof- only for simply connected region in plane),surface integrals –Divergence Theorem (without proof for evaluating surface integrals) ,Stokes' Theorem (without proof for evaluating line integrals)(All the above theorems are to be taught in regions in the rectangular co

	ordinate system only)

TEXT BOOKS:

1	Anton, Bivens, Davis: Calculus, John Wiley and Sons, 10th
2	Thomas Jr., G. B., Weir, M. D. and Hass, J. R., Thomas' Calculus, Pearson

REFERENCES:

1	Sengar and Singh, Advanced Calculus, Cengage Learning, Ist Edition
2	Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India edition, 10thed.
3	B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4	N. P. Bali, Manish Goyal, Engineering Mathematics, Lakshmy Publications
5	D. W. Jordan, P Smith. Mathematical Techniques, Oxford University Press, 4th

PREREQUISITE: A basic course in one-variable calculus.

COURSE OBJECTIVES:

1	Some basic tools in Mathematics which are useful in modelling and analyzing physical phenomena involving continuous changes of variables or parameters.
2	The differential and integral calculus of functions of one or more variables and of vector functions taught in this course have applications across all branches of engineering.
3	This course will also provide basic training in plotting and visualizing graphs of functions and intuitively understanding their properties using appropriate software packages

COURSE OUTCOMES

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

CO's	DESCRIPTION
1	Students are introduced to some basic tools which are useful in modelling and analysing physical phenomena
2	Students will get an awareness of phenomena involving continuous change of variables
3	Students are introduced to differential and integral calculus of functions of one or more variables and of vector functions.
4	Students are introduced finding areas and volumes using integrals.
5	Students will analyze the application of vector valued functions in physical applications.
6	Students will be introduced to plotting and visualizing graphs of functions.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	3		3									

CO4	3		3									
CO5	3											
CO6	3	2	3									

CO-PO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION
CO1	PO1	3	Fundamental knowledge in Calculus will help in analyzing engineering problems very easily
CO2	PO1	3	Basic knowledge in continuous change in variables will help to model various engineering problems.
CO3	PO1	3	Basic knowledge in differential and integral calculus of functions of several variables helps in solving engineering problems
	PO3	3	Differential and integral calculus will help to design solutions for various engineering problems
CO4	PO1	3	Basic knowledge in finding areas and volumes is used for solving complex engineering problems
	PO3	3	Techniques of finding areas and volumes using integration is used for designing solutions for various engineering problems
CO5	PO1	3	Concept of vector valued functions will give thorough knowledge in the application problems.
CO6	PO1	3	Plotting and visualizing graphs and surfaces will help in analyzing various engineering problems.
	PO2	2	Visualizing of graphs will help in easier formulation of various problems.
	PO3	3	Plotting and visualizing graphs and surfaces will help in designing solutions of complex problems easily.

MA 102 DIFFERENTIAL EQUATIONS

COURSE INFORMATION SHEET:

Program:**CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Differential Equations**	Course code**: MA 102**
L-T-P**:3-1-0**	Credit**:4**

MODULE	CONTENT
I	HOMOGENEOUSDIFFERENTIALEQUATIONS (TextBook 1 : Sections1.7,2.1,2.2,2.6,3.2) Existenceanduniqueness ofsolutionsfor initial valueproblems,Homogenouslinear ODEs of secondorder.Homogenous linearODEswithconstantcoefficients,ExistenceandUniqueness of solutionsWronskian, Homogenous linearODEswithconstantCoefficients(HigherOrder) (For practice and submission as assignment only:Modelling of freeoscillations ofa mass– springsystem)
II	NON-HOMOGENEOUSLINEAR ORDINARYDIFFERENTIALEQUATIONS (Text Book2:Sections1.2.7to 1.2.14) TheparticularIntegral (P.I.),Working ruleforP.I.when g(x) isX^m,TofindP.I.when g(x)= e^{ax} 1(x), .V Workingrulefor P.I.when g(x)=x.V(x),HomogeneousLinearEquations,PIofHomogenousequations Legendde'sLineaɗeɗuations Methodofvariationofparameters forfindingPIs(For practice and submission as assignmentsonly:Modellingforcedoscillations,resonance, electriccircuits)
III	FOURIER SERIES (Text Book 2 - Sections 4.1,4.2,4.3,4.4) Periodic functions ,Orthogonally of Sine and Cosine functions (Statement only), Fourier series and Euler's formulas Fourier cosine series and Fourier sine series (Fourier series of even and Odd functions) Half range expansions (All results without proof) (For practice and submission as assignment only: Plots of partial sums of Fourier series and demonstrations of convergence using plotting software)
IV	PARTIAL DIFFERENTIAL EQUATIONS (Text Book 2 : Sections : 5.1, 5.1.1, 5.1.2, 5.1.5, 5.2.6- 5.2.10) Introduction to partial differential equations , formation of PDE, Solutions of first order PDE(Linear only) Lagrange's Method Linear PDE with constant coefficients , Solutions of Linear Homogenous PDE with constant coefficients , Shorter method for finding PI when g(x,y)=f(ax+by), Method of finding PI when g(x,y) = xm n, method of Y find PI when g(x,y)= e ax+by V(x,y)
V	ONEDIMENSIONALWAVE EQUATION (Text Book2: Sections:6.1--6.4)Method of separation of variablesThe waveEquation Vibrations ofa stretchedstring Solutions of one dimensional waveequationusingmethod of

	separation of variables and problems
VI	ONEDIMENSIONALHEATEQUATION (Text Book 2: sections 6.7,6.8 ,6.9,6.9.1,6.9.2)The equation ofHeatconduction Onedimensional Heattransfer equation. Solutions of OneDimensional Heattransfer equation,Alonginsulatedrodwithendsat zerotemperatures, Alonginsulatedrodwith endsatnon zerotemperatures

SYLLABUS:

TEXT BOOKS:

1	Erwin Kreyszig: Advanced Engineering Mathematics, 10th ed. Wiley
2	A C Srivastava, P K Srivasthava, Engineering Mathematics Vol 2. PHI Learning Private Limited, New Delhi.

REFERENCES:

1	Simmons: Differential Equation with Applications and its historical Notes,2e McGrawHill Education India 2002
2	Datta, Mathematical Methods for Science and Engineering. CengageLearing,1st. ed
3	B. S. Grewal. Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4	N. P. Bali, Manish Goyal. Engineering Mathematics, Lakshmy Publications
5	D. W. Jordan, P Smith. Mathematical Techniques, Oxford University Press, 4th Edition.
6	C. Henry Edwards, David. E. Penney. Differential Equations and Boundary Value Problems. Computing and Modelling, 3rd ed. Pearson

PREREQUISITE: To develop basic ideas on matrix operations, calculus, complex numbers etc

COURSE OBJECTIVES:

This course will help students to achieve the following objectives:

1	Basic ideas of differential equations, both ordinary and partial, which are widely used in the modeling and analysis of a wide range of physical phenomena and has got applications across all branches of engineering.
2	The course also introduces Fourier series which is used by engineers to represent and analyze periodic functions in terms of their frequency components.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students can differentiate ordinary differential equations and partial differential

	equations.
2	Students can analyze periodic functions in terms of their frequency components.
3	Students will be able to apply the basic knowledge of differential equation in typical mechanical or electrical systems
4	Students can model the wide range of physical phenomena by using basic ideas in ordinary differential equations and partial differential equations.
5	Students can create wave equation in the field of acoustic, electromagnetic and fluid dynamics.
6	Students can conclude quantitative statements about the physical meaning of the solution of partial differential equations related to engineering process.

CO-PO-PSO MAPPING:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1		3										3
CO2	2	3	1		2							
CO3	3					3						
CO4			3			3	2	2				
CO5						2	3					
CO6				3			3					

CO-PO MAPPING JUSTIFICATION:

CO	PO	MAPPING	JUSTIFICATION
CO1	PO2	3	Fundamental knowledge in differential equation can be used to formulate engineering principles.
	PO12	3	DE is a mathematical field which needs lot of research
CO2	PO1	2	Basic knowledge in periodic function s is necessary for the development of mathematical modelling
	PO2	3	formulating periodic functions is needed for analysing various systems
	PO3	1	Design of periodic function meet the needs for public
	PO5	2	Knowledge in periodic function can be used to develop an efficient system.
CO3	PO1	3	Working principles in typical mechanical or electric al systems are based on fundamental laws of DE
	PO6	3	DE can address various problem s of society in fields like health , safety etc
CO4	PO3	3	The solutions for various engineering problems require s mathematical modelling

	PO6	3	DE can model various daily life problem
	PO7	3	In environmental context s it has wide application
	PO8	2	mathematical modelling will commit to ethical principles and responsibilities
CO5	PO6	2	In the field of acoustic, electromagnetic and fluid dynamic s wave equation s are used.
	PO7	3	understand the impact of wave equation in sustain able development
CO6	PO4	3	PDE can design experiments and need more research
	PO7	3	For society we can use the PDE to solve problems

PH 100 ENGINEERING PHYSICS

COURSE INFORMATION SHEET:

Program: **ECE,EEE,CSE,CE,ME**	Degree : **B-Tech**
Course**: Engineering Physics**	Course code**: PH 100**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	Harmonic Oscillations: Differential equation of damped harmonic oscillation, forced harmonic oscillation and their solutions- Resonance, Q factor, Sharpness of resonance- LCR circuit as an electrical analogue of Mechanical Oscillator (Qualitative) Waves: One dimensional wave - differential equation and solution. Three dimensional waves - Differential equation & its solution. (No derivation) Transverse vibrations of a stretched string.
II	Interference: Coherence. Interference in thin films and wedge shaped films (Reflected system) Newton's rings-measurement of wavelength and refractive index of liquid Interference filters. Antireflection coating. Diffraction Fresnel and Fraunhofer diffraction. Fraunhofer diffraction at a single slit. Plane transmission grating. Grating equation - measurement of wavelength. Rayleigh's criterion for resolution of grating- Resolving power and dispersive power of grating.
III	Polarization of Light: Types of polarized light. Double refraction. Nicol Prism. Quarter wave plate and half wave plate. Production and detection of circularly and elliptically polarized light. Induced birefringence- Kerr Cell - Polaroid & applications. Superconductivity: Superconducting phenomena. Meissner effect. Type-I and Type-II superconductors. BCS theory (qualitative). High temperature superconductors - Applications of superconductors.
IV	Quantum Mechanics: Uncertainty principle and its applications- formulation of Time dependent and Time independent Schrödinger equations- physical meaning of wave function- Energy and momentum Operators-Eigen values and functions- One dimensional infinite square well potential.Quantum mechanical Tunneling (Qualitative)

	Statistical Mechanics: Macrostates and Microstates. Phase space. Basic postulates of Maxwell- Boltzmann, Bose-Einstein and Fermi Dirac
V	Acoustics: Intensity of sound- Loudness-Absorption coefficient - Reverberation and reverberation time- Significance of reverberation time- Sabine's formula (No derivation) -Factors affecting acoustics of a building. Ultrasonics: Production of ultrasonic waves - Magnetostriction effect and Piezoelectric effect - Magnetostriction oscillator and Piezoelectric oscillator - Detection of ultrasonics - Thermal and piezoelectric methods- Applications of ultrasonics - NDT and medical.
VI	Laser: Properties of Lasers, absorption, spontaneous and stimulated emissions, Population inversion, Einstein's coefficients, Working principle of laser,Optial resonant cavity. Ruby Laser, Helium-Neon Laser, Semiconductor Laser (qualitative). Applications of laser, holography (Recording and reconstruction) Photonics: Basics of solid state lighting - LED – Photodetectors - photo voltaic cell, junction & avalanche photo diodes, photo transistors, thermal detectors, Solar cells- I-V characteristics - Optic fibre-Principle of propagation-numerical aperture-optic communication system (block diagram) - Industrial, medical and technological applications of optical fibre. Fibre optic sensors - Basics of Intensity modulated and phase modulated sensors.

REFERENCES:

1	Aruldhas, G., Engineering Physics, PHI Ltd.
2	Beiser, A., Concepts of Modern Physics, McGraw Hill India Ltd.
3	Bhattacharya and Tandon, Engineering Physics , Oxford India
4	Brijlal and Subramanyam, A Text Book of Optics, S. Chand & Co.
5	Dominic and Nahari, A Text Book of Engineering Physics, Owl Books Publishers
6	Hecht, E., Optics, Pearson Education
7	Mehta, N., Applied Physics for Engineers, PHI Ltd
8	Palais, J. C., Fiber Optic Communications, Pearson Education
9	Pandey, B. K. and Chathurvedi, S., Engineering Physics, Cengage Learning
10	Philip, J., A Text Book of Engineering Physics, Educational Publishers
11	Premlet, B., Engineering Physics, Mc GrawHill India Ltd
12	Sarin, A. and Rewal, A., Engineering Physics, Wiley India Pvt Ltd
13	Sears and Zemansky, University Physics , Pearson
14	Vasudeva, A. S., A Text Book of Engineering Physics, S. Chand & Co

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

COURSE OUTCOMES:

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

CO	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 behaviour of polarised light, their production detection and application.

	Application of superconductivity.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**						**1**	**2**			**1**
CO2	**3**	**2**						**1**	**2**			**1**
CO3	**3**	**2**						**1**	**2**			**1**
CO4	**3**	**2**						**1**	**2**			**1**
CO5	**3**	**2**						**1**	**2**			**1**
CO6	**3**	**2**						**1**	**2**			**1**

4	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices and understanding various types of statistics and its applications.
5	Apply the knowledge of ultrasonic in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy environment
6	Apply the comprehended knowledge about laser and fiber optic communication systems in various engineering applications

CO-PO-PSO MAPPING:

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**PO1**	**3**	Apply the idea of oscillation in various contexts and use the idea of resonance and waves in various situations.
	PO2	**2**	Analyze the working of various types of oscillators.
	PO8	**1**	Understand the norms used in design of different types of oscillators.
	PO9	**2**	Gather ability to communicate regarding waves and oscillators.
	PO12	**1**	Understand the application of oscillators and waves and will be able to address the issues about the same.
CO2	**PO1**	**3**	Apply the idea of interference and diffraction and recognize the natural patterns of the same.
	PO2	**2**	Analyze the working of various interference and diffraction devices.
	PO8	**1**	Understand the norms used in design of air wedge, Newton's rings and spectrometer.
	PO9	**2**	Gather ability to communicate regarding interference and

			diffraction.
	PO12	**1**	Understand the application of interference and diffraction.
CO3	**PO1**	**3**	Apply polarisation and superconductivity for understanding the working of devices.
	PO2	**2**	Analyze the working of various types of polarisation devices, types of superconductors, and their application.
	PO8	**1**	Understand the norms used in use of polarisation materials and superconducting materials.
	PO9	**2**	Gather ability to communicate regarding polarisation and superconductivity.
	PO12	**1**	Understand the application of polarisation and superconductivity and will be able to address the issues about the same.
CO4	**PO1**	**3**	Apply quantum mechanics and statistical mechanics for understanding the working of devices.
	PO2	**2**	Analyze the formulation of various theories in quantum mechanics, statistical mechanics and its application.
	PO8	**1**	Understand the norms used in solving of quantum mechanical problems, use of statistical characteristics.
	PO9	**2**	Gather ability to communicate regarding quantum mechanics and statistical mechanics.
	PO12	**1**	Understand the application of quantum mechanics and statistical mechanics and will be able to address the issues about the same.
CO5	**PO1**	**3**	Apply the knowledge of ultrasonics and acoustics in daily life and understand its role in design of oscillators and buildings.
	PO2	**2**	Analyze the working of different types of superconducting materials, communications systems, photo sensors and fiber optic sensors.
	PO8	**1**	Understand the norms used in design of different types of buildings and ultrasonic oscillators.
	PO9	**2**	Gather ability to communicate regarding ultrasonic oscillators and building acoustics.
	PO12	**1**	Understand the application of ultrasonic oscillators and building acoustics. Students will be able to address the issues about the same.
CO6	**PO1**	**3**	Apply the knowledge of and fiber optic communication.
	PO2	**2**	Analyze the working of different types of superconducting materials, communications systems, photo sensors and fiber optic sensors.
	PO8	**1**	Understand the norms used in design of different types of superconducting materials, photo detectors and communication system.
	PO9	**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 about the same.

CY100 ENGINEERING CHEMISTRY

COURSE INFORMATION SHEET:

Program: **ECE,EEE,CSE,CE,ME**	Degree : **B-Tech**
Course**: Engineering Chemistry**	Course code**: CY100**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	Spectroscopy: Introduction, Beer Lamberts Law (worked out examples) UV-visible spectroscopy - Principle, Instrumentation and applications. IR spectroscopy - Principle and applications1H NMR spectroscopy - Principle, chemical shift - spin - spin splitting andapplications including MRI
II	Electrochemistry: Different types of electrodes (general) – SHE, Calomel electrode, Glass electrode and determination of E0 using SHE & Calomel electrodeElectrochemical series and its applications.Nernst equation for an electrode-Derivation, application &numericalsPotentiometric titration - Acid-base and redox titration Lithium ion cell and Fuel cell.
III	Instrumental Methods: Thermal analysis - Principle, instrumentation and applications of TGA and DTA.Chromatographic methods - Basic principles, column, TLC. Instrumentation and principles of GC and HPLC.Conductivity - Measurement of conductivity
IV	Chemistry of Engineering Materials: Copolymers - BS, ABS - Structure and Properties. Conducting Polymers - Polyaniline, Polypyrrole - Preparation, Structure and Properties. OLED – An introductionAdvanced Polymers – Kevlar, Polybutadiene rubber and silicone rubber: Preparation, Structure and Properties.Nanomaterials – Definition, Classification, chemical methods of preparation- hydrolysis and reduction Properties and Applications – Carbon Nano Tubes and fullerenes.

V	Fuels and Lubricants: Fuels - Calorific Value, HCV and LCV - Determination of calorific value of a solid and liquid fuel by Bomb calorimeter - Dulongs formula and Numericals.Liquid fuel - Petrol and Diesel - Octane number & Cetane numberBiodiesel - Natural gas.Lubricant - Introduction, solid, semisolid and liquid lubricants.Properties of lubricants - Viscosity Index, Flash point, Fire point, Cloud point, Pour point and Aniline point.
VI	Water Technology: Types of hardness, Units of hardness, Estimation of Hardness – EDTA method. Numericals based on the aboveWater softening methods - Ion exchange process - Principle. Polymer ion exchange.Reverse Osmosis - Disinfection method by chlorination and UVDissolved oxygen, BOD and COD.Sewage water Treatment - 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	Ahad J., "Engineering Chemistry", Jai Publication, 2019.
2	Dara S S Engineering Chemistry S Chand Publications
3	Fernandez A Engineering Chemistry Owl Book Publishers ISBN9788192863382
4	Jain and Jain Engineering Chemistry, Dhanpat Rai Publishers
J5	Kaurav Engineering Chemistry with Laboratory Experiments,PHIisbn 9788120341746
6	Manjooran K S, Modern Engineering Chemistry Kannatheri Publications
7	Seymour, R.B, "Introduction to Polymer Chemistry, McGrawHill
8	Rath P, Engineering Chemistry Cengage Learning, ISBN 9788131526699
9	Wiley India Engineering Chemistry ISBN 9788126543205

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 and to take up chemistry related topics as a part of project works during higher semesters of the course.
2	To familiarize the students with different application oriented topics like spectroscopy, electrochemistry, instrumental methods, nanochemistry etc.
3	To familiarize the students with topics like corrosion prevention, advanced polymers, waste water treatment, fuels and lubricant properties 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.	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
2.	Apply the basic concepts of electrochemistry to explore its possible applications in various engineering fields.
3.	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound.
4.	Apply the knowledge of conducting polymers and advanced polymers in engineering. Learn about the basics of Nanotechnology in engineering field.
5.	Understand the importance and applications of Fuels and Lubricants in engineering field.
6.	Study various types of water treatment methods to develop skills for treating wastewater.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1		1	2							
CO2	1	2	1									
CO3	1	1		1	2							
CO4	1	1		1	2							
CO5	1	2	1									
CO6	1			1			3					

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**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.
	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.
CO2	**PO1**	**1**	Apply the knowledge of science and engineering fundamentals like electrochemistry.
	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 energy conservation under environmental considerations.
CO3	**PO1**	**1**	Apply the knowledge of Instrumental methods.
	PO2	**1**	Identify, formulate and analyze engineering problems to arrive at substantiated conclusions using different chromatographic methods and thermal analysis.

	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 and modern engineering tools including chemical separation techniques to complex engineering activities with an understanding of the limitations.
CO4	**PO1**	**2**	Apply the knowledge of advanced polymers ad nanomaterials
	PO2	**1**	Identify, formulate and analyze the applications of advanced and conducting polymers and nanochemistry
	PO4	**1**	Use research based knowledge including nanoscience and interpretation of data and synthesis of the information to provide valid conclusions.
	PO5	**2**	Create, select and apply appropriate techniques, resources and modern engineering tools including nanomaterials and advanced polymers to complex engineering activities with an understanding of the limitations.
CO5	**PO1**	**1**	Apply the knowledge of Fuels and Lubricants.
	PO2	**2**	Identify, formulate and analyze the applications and efficient handling of Fuels and lubricants
	PO3	**1**	Design solutions to meet the specifications with consideration for the public health and safety like energy conservation by efficient fuel usage under environmental considerations.
CO6	**PO1**	**1**	Apply the knowledge of Waste water treatment.
	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.
	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.

BE 100 ENGINEERING MECHANICS

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Engineering Mechanics**	Course code**: BE 100**
L-T-P**: 3-1-0**	Credit**: 4**

SYLLABUS:

MODULE	CONTENT
I	Statics: Fundamental concepts and laws of mechanics – Rigid body – Principle of transmissibility of forces Coplanar force systems - Moment of a force – Principle of moments Resultant of force and couple system Equilibrium of rigid body – Free body diagram – Conditions of equilibrium in two dimensions – Two force and three force members.
II	Types of supports – Problems involving point loads and uniformly distributed loads only. Force systems in space – Degrees of freedom – Free body diagram – Equations of equilibrium – Simple resultant and Equilibrium problems.
III	Properties of planar surfaces – Centroid and second moment of area (Derivations not required) - Parallel and perpendicular axis theorem – Centroid and Moment of Inertia of composite area. Polar Moment of Inertia – Radius of gyration – Mass moment of inertia of cylinder and thin disc (No derivations required). Product of inertia – Principal Moment of Inertia (conceptual level). Theorems of Pappus and Guldinus.

IV	Friction – Characteristics of dry friction – Problems involving friction of ladder, wedges and connected bodies. Definition of work and virtual work – Principle of virtual work for a system of connection bodies – Problems on determinate beams only.
V	Dynamics: Rectangular and Cylindrical co-ordinate system Combined motion of rotation and translation – Concept of instantaneous centre – Motion of connecting rod of piston and crank of a reciprocating pump. Rectilinear translation – Newton's second law – D'Alembert's Principle – Application to connected bodies (Problems on motion of lift only).
VI	Mechanical vibrations – Free and forced vibration - Degree of freedom. Simple harmonic motion – Spring-mass model – Period – Stiffness – Frequency – Simple numerical problems of single degree of freedom.

TEXT BOOKS:

1	Shames, I. H., Engineering Mechanics - Statics and Dynamics, Pearson Prentice
2	Timoshenko, S. & Young D. H., Engineering Mechanics, McGraw Hill

REFERENCES:

1	Babu, J., Engineering Mechanics, Pearson Prentice Hall
2	Beer and Johnson, Vector Mechanics for Engineers - Statics and Dynamics, Tata McGraw Hill Publishing Company Limited
3	Benjamin J., Engineering Mechanics, Pentex Book Publishers and Distributors
4	Bhavikkatti, S. S., Engineering Mechanics, New Age International Publishers
5	Hibbeler, R. C., Engineering Mechanics: Statics and Dynamics. Pearson Prentice Hall
6	Kumar, K. L., Engineering Mechanics, Tata McGraw Hill Publishing Company Limited
7	Merriam J. L. and Kraige L. G., Engineering Mechanics – Vol. I and II, John Wiley
8	Rajasekaran S. and Sankarasubramanian, G., Engineering Mechanics, Vikas Publishing House Private Limited
9	Tayal, A. K., Engineering Mechanics- Statics and Dynamics, Umesh Publications

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To apply the principles of mechanics to practical engineering problems
2	To develop simple mathematical model for engineering problems and carry out static analysis
3	To carry out kinematic and kinetic analyses for particles and system of particles

4	To identify appropriate structural system for studying a given problem and isolate it from its environment

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Solve problems dealing with forces and determine the resultant and will be able to identify the forces acting on a body and draw the free body diagram
2	Determine support reactions of beams subjected to concentrated loads and uniformly distributed loads and solve problems on forces acting on a body using vector approach
3	Determine the centroid and moment of inertia of composite areas
4	Analyse the concept of friction to solve problems of bodies placed on rough surfaces and solve problems on support reactions of beams using principle of virtual work.
5	Make use of the concept of Newton's second law to solve problems on bodies in motion and apply the concept of instantaneous centre to bodies having combined translation and rotation.
6	Solve the problem using the concept of Simple Harmonic Motion

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	0	0	0	0	0	0	0	0	0	0	1	0
CO2	3	3	0	0	0	0	0	0	0	0	0	0	1	0
CO3	3	3	0	0	0	0	0	0	0	0	0	0	1	0
CO4	3	3	0	0	0	0	0	0	0	0	0	0	1	0
CO5	3	3	0	0	0	0	0	0	0	0	0	0	1	0
CO6	3	3	0	0	0	0	0	0	0	0	0	0	1	0

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION

CO1	PO1	2	Recalling the principles of rigid body mechanics and applying its knowledge for the solution of fundamental static problems and analysis of a given force system to determine its resultant involves problem analysis.
	PO2	2	The concept of free body diagram, i.e isolating a given body and the forces acting on it is direct application of a student's engineering knowledge andApplying the knowledge of students in finding resultant and resolution of given system of forces
CO2	PO1	3	To analyse different beams for equilibrium to obtain the reactions at the supports improves the problem solving skills of a student and analyse different beams for equilibrium to obtain the reactions at the supports improves the problem solving skills of a student
	PO2	3	Vector approach is an important and easier alternative to the traditional scalar approach for engineering problems
C03	PO1	3	The idea of the properties of different cross sections that an engineer has to encounter throughout his professional life is important engineering knowledge
	PO2	3	To determine the properties of the different cross sections using the principles of basic integration helps improve problem solving skills of the student
C04	PO1	3	How harmful friction can be eliminated and useful friction can be utilized is important engineering knowledge and Solving problems on friction involves the development of concepts of free body diagram, Newton's laws etc
	PO2	3	Analysing the virtual work done by a body on giving it a virtual displacement involves application of the basic problem solving skills.
C05	PO1	3	Newton's Laws of motion are the foundation of many engineering subjects and hence it is important that the student knows how to apply them
	PO2	3	Concept of instantaneous centre involves the concepts of combined motion and theory of no-slip
C06	PO1	3	Concept of Simple harmonic motion involves solution to the acceleration and velocity at any instant
	PO2	3	The practical applications of the concept of Simple Harmonic motion involves the mechanism of simple pendulum

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	Level	JUSTIFICATION
C01	PSO1	1	After completing the course, the students may be able to solve real-time problems in mathematical model for engineering problems and carry out static,kinematic and kinetic analyses for particles and system of particles
C02	PSO1	1	

C03	PSO1	1	
C04	PSO1	1	
C05	PSO1	1	
C06	PSO1	1	

BE 110 ENGINEERING GRAPHICS

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Engineering Graphics**	Course code**: BE 110**
L-T-P**: 1-1-3**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	6 exercises Introduction to Engineering Graphics: Need for engineering drawing. Drawing instruments; BIS code of practice for general engineering drawing. Orthographic projections of points and lines:-Projections of points in different quadrants; Projections of straight lines inclined to one of the reference planes, straight lines inclined to both the planes; True length and inclination of lines with reference planes; Traces of lines.
II	12 exercises Orthographic projections of solids:-Projections of simple solids* in simple positions, projections of solids with axis inclined to one of the reference planes and axis inclined to both the reference planes.
III	12 exercises Isometric Projections:-Isometric projections and views of plane figures simple* and

	truncated simple* solids in simple position including sphere and hemisphere and their combinations.Freehand sketching: Freehand sketching of real objects, conversion of pictorial views into orthographic views and vice versa.
IV	6 exercises Introduction to Computer Aided Drafting - familiarizing various coordinate systems and commands used in any standard drafting software - drawing of lines, circle, polygon, arc, ellipse, etc. Creating 2D drawings.Transformations: move, copy, rotate, scale, mirror, offset and array, trim, extend, fillet, chamfer. Dimensioning and text editing. Exercises on basic drafting principles, to create technical drawings. Creation of orthographic views of simple solids from pictorial views. Creation of isometric views of simple solids from orthographic views. Solid modelling and sectioning of solids, extraction of 2D drawings from solid models. (For internal examination only, not for University Examination).
V	9 exercises Sections and developments of solids: - Sections of simple* solids in simple vertical positions with section plane inclined to one of the reference planes - True shapes of sections. Developments of surfaces of these solids..
VI	6 exercise Intersection of surfaces: - Intersection of prism in prism and cylinder in cylinder - axis bisecting at right angles only.Perspective projections: - perspective projections of simple* solids

REFERENCES:

1	Agrawal, B. and Agrawal, C. M., Engineering Drawing, Tata McGraw Hill Publishers Anilkumar, K. N., Engineering Graphics, Adhyuth Narayan Publishers
2	Benjamin, J., Engineering Graphics, Pentex Publishers
3	Bhatt, N., D., Engineering Drawing, Charotar Publishing House Pvt Ltd.
4	Duff, J. M. and Ross, W. A., Engineering Design and Visualization, Cengage Learning, 2009 John, K. C., Engineering Graphics, Prentice Hall India Publishers
5	Kirstie Plantenberg, Engineering Graphics Essentials with AutoCAD 2016 Instruction, 4th Ed.,
6	SDC Publications
7	Kulkarni, D. M., Rastogi, A. P. and Sarkar, A. K., Engineering Graphics with AutoCAD, PHI 2009
8	Luzadder, W. J. and Duff, J. M., Fundamentals of Engineering Drawing, PHI 1993
9	Parthasarathy, N. S., and Murali, V., Engineering Drawing, Oxford University Press Varghese, P. I., Engineering Graphics, V I P Publishers
10	Venugopal, K., Engineering Drawing & Graphics, New Age International Publishers

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To enable the student to effectively perform technical communication through graphical representation as per global standards.

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	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	0	0	0	0	0	0	0	0	0	0	0	0	3
CO2	3	0	0	0	0	0	0	0	0	0	0	0	0	3
CO3	3	1	0	0	0	0	0	0	0	0	0	0	0	3
CO4	3	0	0	0	0	0	0	0	0	1	0	0	0	3
CO5	3	0	0	0	0	0	0	0	0	2	0	0	0	3
CO6	3	0	0	0	3	0	0	0	0	3	0	0	0	3

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	Level	JUSTIFICATION
C01	PO1	3	Students should have a strong base in projections of objects for analysing and solving complex engineering problems.
CO2	PO1	3	Ability to draw the projections of solids shall be useful to the solution of engineering problems.
C03	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.

C04	PO1	3	Students will be able to use the knowledge in isometric projections for the analysis and solution of complex engineering problems.
	PO10	1	Knowledge in perspective projections will help in communicating effectively the proposed views of various objects.
C05	PO1	3	Knowledge in orthographics projections of various objects is very much required in many cases of solving engineering problems.
	PO10	2	Conversion of 3D drawing into 2D drawing is very much essenstial in communicating with the manufactures of various oblejcts.
C06	PO1	3	Students will be able to use the knowledge in CAD Software for the solution of complex engineering problems.
	PO5	3	Knowledge in CAD will help in creating and analysing models of complex engineering problems.
	PO10	3	Use of Computer aided designing softwares will help in communicating effectively the proposed design with high level of accuracy and in less time.

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	Level	JUSTIFICATION
C01	PSO2	3	Knowledge in projections, sections and development of solids will be helpful in designing and analysing various mechanical systems.
C02	PSO2	3	
C03	PSO2	3	
C04	PSO2	3	
C05	PSO2	3	
C06	PSO2	3	

BE102 DESIGN AND ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course: **Design and Engineering**	Course code**: BE 102**
L-T-P**: 2-0-2**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Design and its objectives; Design constraints, Design functions, Design means and Design from; Role of Science, Engineering and Technology in design; Engineering as a business proposition; Functional and Strength Designs. Design form, function and strength; How to initiate creative designs? Initiating the thinking process for designing a product of daily use. Need identification; Problem Statement; Market survey- customer requirements; Design attributes and objectives; Ideation; Brain storming approaches; arriving at solutions; Closing on to the Design needs. An Exercise in the process of design initiation. A simple problem is to be taken up to examine different solutions- Ceiling fan? Group Presentation and discussion.
II	Design process- Different stages in design and their significance; Defining the design

	space; Analogies and "thinking outside of the box"; Quality function deployment- meeting what the customer wants; Evaluation and choosing of a design. Design Communication; Realization of the concept into a configuration, drawing and model. Concept of "Complex is Simple". Design for function and strength. Design detailing- Material selection, Design visualisation- Solid modelling; Detailed 2D drawings; Tolerancing; Use of standard items in design; Research needs in design; Energy needs of the design, both in its realization and in the applications. An exercise in the detailed design of two products (Stapler/ door/clock)
III	Prototyping- rapid prototyping; testing and evaluation of design; Design modifications; Freezing the design; Cost analysis. Engineering the design – From prototype to product. Planning; Scheduling; Supply chains; inventory; handling;manufacturing/construction operations; storage; packaging; shipping; marketing; feed-back on design. List out the standards organizations. Prepare a list of standard items used in any engineering specialization. Develop any design with over 50% standard items as parts.
IV	Design for "X"; covering quality, reliability, safety, manufacturing/construction, assembly, maintenance, logistics, handling; disassembly; recycling; re-engineering etc. List out the design requirements(x) for designing a rocket shell of 3 meter diameter and 8 meter length. Design mineral water bottles that could be packed compactly for transportation.
V	Product centred and user centred design. Product centred attributes and user centred attributes. Bringing the two closer. Example: Smart phone. Aesthetics and ergonomics. Value engineering, Concurrent engineering, Reverse engineering in design; Culture based design; Architectural designs; Motifs and cultural background; Tradition and design; Study the evolution of Wet grinders; Printed motifs; Role of colours in design. Make sharp corners and change them to smooth curves- check the acceptance. Examine the possibility of value addition for an existing product.
VI	Modular design; Design optimization; Intelligent and autonomous products; User interfaces; communication between products; autonomous products; internet of things; human psychology and the advanced products. Design as a marketing tool; Intellectual Property rights – Trade secret; patent; copy-right; trademarks; product liability. Group presentation of any such products covering all aspects that could make or mar it.

REFERENCES:

1	Balmer, R. T., Keat, W. D., Wise, G., and Kosky, P., Exploring Engineering, Third Edition: An Introduction to Engineering and Design - [Part 3 - Chapters 17 to 27], ISBN- 13: 978-0124158917 ISBN-10: 0124158919
2	Dym, C. L., Little, P. and Orwin, E. J., Engineering Design - A Project based introduction
	Wiley, ISBN-978-1-118-32458-5
3	Eastman, C. M. (Ed.), Design for X Concurrent engineering imperatives, 1996, XI, 489 p. ISBN 978-94-011-3985-4 Springer
4	Haik, Y. And Shahin, M. T., Engineering Design Process, Cengage Learning, ISBN-13: 978-0-495-66816-9
5	Pahl, G., Beitz, W., Feldhusen, J. and Grote, K. H., Engineering Design: A Systematic
	Approach, 3rd ed. 2007, XXI, 617p., ISBN 978-1-84628-319-2

6	Voland, G., Engineering by Design, ISBN 978-93-325-3505-3, Pearson India

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To excite the student on creative design and its significance .
2	To make the student aware of the processes involved in design.
3	To make the student understand the interesting interaction of various segments of humanities, sciences and engineering in the evolution of a design.
4	To get an exposure as to how to engineer a design.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Able to appreciate the different elements involved in good designs and to apply them in practice when called for.
2	Students will be able to discover the product oriented and user oriented aspects that make the design a success.
3	Students will be capable of formulating innovative designs incorporating different segments of knowledge gained in the course.
4	Students will have a broader perspective of analyzing designs covering function, cost, environmental sensitivity, safety factors along with engineering analysis.
5	Students will be able to think of different design solutions and evaluate them to choose the optimum solution.
6	Encourage students to observe and analyse the different designs around them and think creatively.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PS04
CO1	**2**	**1**	**3**	2	2	2	1		1		1	1		1			
CO2	**1**	**2**	3	**1**	**2**	**1**											
CO3			**3**	**2**	**1**												
CO4		**3**		**2**													
CO5	1	**1**															
CO6				**1**	**1**												

CO-PO MAPPING JUSTIFICATION

CO's	PO's	LEVEL	JUSTIFICATION

CO1	**PO1**	**2**	Appreciate the different elements involved in good designs and apply them for engineering fundamentals, and engineering specialization to the solution of complex engineering problems.
	PO2	**1**	analyze engineering problems to arrive at substantiated conclusions by using good design
	PO3	**3**	design system components, processes to meet the specifications with consideration for the public health and safety by using different elements in design.
	PO4	**2**	Use the good design to analyze and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO5	**2**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to appreciate the different elements involved in good designs .
	PO6	**2**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues to build a good design and apply them in practice
	PO7	**1**	Understand the impact of the professional engineering solutions in societal and environmental contexts for the good design
	PO9	**1**	Function effectively as an individual, and as a member or leader in teams for the better design and practice
	PO11	**1**	Manage projects in multidisciplinary environments for the better design and practice
	PO12	**1**	For the better design and practice need life-long learning in the broadest context of technological change.
CO2	**PO1**	**1**	Apply the knowledge of engineering fundamentals, and engineering specialization to discover the product oriented and user oriented aspects that make the design a success.
	PO2	**2**	Students will be able to discover problems to arrive at substantiated conclusions using engineering sciences.
	PO3	**3**	Processes to meet the specifications with consideration for the public health and safety and user oriented aspects that make the design a success.
	PO4	**1**	Use research-based knowledge to discover the product oriented and user oriented aspects that make the design a success.
	PO5	**2**	Students will be able to discover the product oriented design to create, select, and apply appropriate techniques, resources for design
	PO6	**1**	Apply reasoning informed by the contextual knowledge to discover the product oriented service
CO3	**PO3**	**3**	Students will be capable of formulating innovative designs solutions for complex engineering problems
	PO4	**2**	Use research-based knowledge for formulating innovative design with different segments of knowledge gained in the course
	PO5	**1**	Modeling complex engineering activities with an understanding of the limitations with different segments of knowledge gained in the course.
CO4	**PO2**	**3**	Students will have a broader perspective of analyzing designs and analyze engineering problems to arrive at substantiated conclusions

	PO4	**2**	Use research-based knowledge to include safety factors along with engineering analysis.
CO5	**PO1**	**1**	Students will be able to think of different design solutions for complex engineering problems.
	PO2	**1**	Choose the optimum solution to arrive at substantiated conclusions in design aspects
CO6	**PO4**	**1**	Analyse the different designs around them and think creatively and synthesis of the information to provide valid conclusions
	PO5	**1**	Modeling complex engineering activities with an understanding of the limitations and encouraging students to analyse the different designs around them and think creatively.

CO-PSO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION
BE 102	**CO1**	**PSO1**	**1**	Solve real-time problems in Design and recognize potential risks and provide creative solutions.

BE 103 INTRODUCTION TO SUSTAINABLE ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Introduction to Sustainable Engineering**	Course code**: BE 103**
L-T-P**: 2-0-1**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Sustainability - Introduction, Need and concept of sustainability, Social- environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Environmental legislations in India - Water Act, Air Act. Students may be assigned to do at least one project eg: a) Identifying/assessment of sustainability in your neighbourhood in education, housing, water resources, energy resources, food supplies, land use, environmental protection etc. b) Identify the threats for sustainability in any selected area and explore solutions for the same
II	Air Pollution, Effects of Air Pollution; Water pollution- sources, Sustainable wastewater

	treatment, Solid waste - sources, impacts of solid waste, Zero waste concept, 3 R concept. Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues. Carbon credits and carbon trading, carbon foot print. Students may be assigned to do at least one project for eg: a) Assessing the pollution status of a small area b) Programmes for enhancing public environmental awareness c) Observe a pond nearby and think about the different measures that can be adopted for its conservation
III	Environmental management standards, ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India. Students may be assigned to do at least one project eg: a) Conducting LCA of products (eg.Aluminium cans, PVC bottles, cars etc. or activities (Comparison of land filling and open burning) b) Conducting an EIA study of a small project (eg. Construction of a building)
IV	Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport. Students may be assigned to do at least one project eg: a) Consider the design aspects of a sustainable building for your campus b) Explore the different methods that can be adopted for maintaining a sustainable transport system in your city.
V	Energy sources: Basic concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy. Students may be assigned to do at least one project eg: a) Find out the energy savings that can be achieved by the installation of a solar water heater b) Conduct a feasibility study for the installation of wind mills in Kerala
VI	Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis. Students may be assigned to do a group project eg: a) Collect details for instances of climate change in your locality b) Find out the carbon credits you can gain by using a sustainable transport system (travelling in a cycle or car pooling from college to home) c) Have a debate on the topics like: Industrial Ecology is a Boon or Bane for Industries?/Are we scaring the people on Climate Change unnecessarily?/Technology enables Development sustainable or the root cause of unsustainability?

REFERENCES:

1	Allen,D. T. andShonnard, D.R., SustainabilityEngineering:Concepts, DesignandCaseStudies,PrenticeHall.
2	Bradley.A.S; Adebayo,A.O.,Maria,P. Engineeringapplicationsin sustainable designanddevelopment,Cengagelearning
3	EnvironmentImpactAssessmentGuidelines,NotificationofGovernmentofIndia,2006

4	Mackenthun,K.M.,BasicConceptsinEnvironmentalManagement,LewisPublication,London,1998
5	ECBCCode2007, Bureau ofEnergyEfficiency,New Delhi BureauofEnergyEfficiencyPublications-RatingSystem,TERIPublications-GRIHARatingSystem
6	Nibin Chang,Systems AnalysisforSustainable Engineering:Theory andApplications,McGraw-HillProfessional.
7	Twidell,J.W.andWeir,A.D.,RenewableEnergyResources,EnglishLanguageBookSociety(ELBS).

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To have an increased awareness among students on issues in areas of sustainability .
2	To understand the role of engineering and technology within sustainable development
3	To know the methods, tools, and incentives for sustainable product -service system development .
4	To establish a clear understanding of the role and impact of various aspects of engineering and engineering decisions on environmental, societal, and economic problems.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to define and describe concept and importance of sustainability.
2	Students will be able to identify, describe, classify, explain and interpret the different types of environmental pollution problems and their sustainable solutions.
3	Students will be able to apply Life cycle analysis and environmental impact assessment.
4	Students will be able to survey the current Habitat problems, point out issues and hence suggest improvements for attaining sustainability
5	Students will be able to compare various types of conventional and non-conventional energy sources assess the significance of renewable energy sources.
6	Students will be able to understand green engineering concept & develop sustainable solutions for Engineering problems

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	0	0	0	0	2	3	0	0	0	0	0	0	0
CO2	2	2	0	0	0	2	3	1	0	0	0	0	1	1
CO3	0	2	3	0	0	2	3	2	0	0	0	0	1	1
CO4	1	1	3	0	0	2	3	1	0	0	0	0	0	0
CO5	1	0	0	0	0	2	3	2	0	0	0	0	0	0
CO6	1	1	3	0	0	1	3	1	0	0	0	0	0	2

CO-PO MAPPING JUSTIFICATION

CO's	PO's	LEVEL	JUSTIFICATION
CO1	PO1	1	Fundamental awareness about the concept and importance of sustainability is essential for the existence in future world
	PO6	2	Social sustainability is a major part of sustainable development
	PO7	3	Environmental sustainability is a major part of sustainable development
CO2	PO1	2	Definition of pollution and its impacts
	PO2	2	Environmental pollution problems could be identified
	PO6	2	New designs should be developed such that the pollution is less.
	PO7	3	The environment will be sustainable if all types of pollutions are restricted within the carrying limit of the nature
	PO8	2	The impacts on environment due to a product or process could be identified
C03	PO2	3	An engineer should not compromise his ethical values in environmental issues.
	PO3	2	Best products or processes could be designed so that the impact is minimum. .
	PO6	3	Social responsibility of an Engineer in designing the product
	PO7	2	The environment will be sustainable if the products or processes make minimum impact.
	PO8	3	Professional ethics and responsibilities for best sustainable practices .
C04	PO1	1	Identifying green materials for sustainable buildings
	PO2	1	Buildings designed green
	PO3	3	Green building materials are nontoxic and less polluting and long lasting
	PO6	2	Green building materials are sustainable & produce less environmental impact
	PO7	3	Green buildings & ethics
	PO8	1	Concept of renewability of energy sources
C05	PO1	1	Energy resources and social concerns
	PO6	2	Sustainability of energy sources
	PO7	3	Ethics in energy consumption
	PO8	2	Concept of green engineering
C06	PO1	1	Analysis of flaws in current industrial scenario and corrective measures
	PO2	1	Green solutions for engineering problems

	PO3	3	Industrialization & social concerns
	PO6	1	Ethics and sustainable engineering

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
C02	PSO1	1	Better designs and developments in industries to ensure social, environmental and economic sustain abilities
C03	PSO1	1	
C06	PSO2	2	

BE101-01 INTRODUCTION TO CIVIL ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course: **Introduction to Civil Engineering**	Course code**: BE 101 -01**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	General introduction to Civil Engineering - History of Civil Engineering - Relevance of Civil Engineering in the overall infrastructural development of the country. Types and classification of structures - buildings, towers, chimneys, bridges, dams, retaining walls, water tanks, silos, roads, railways, runways and pipelines (Brief description only) Definition and types of buildings as per National Building Code of India (brief description only). Selection of site - Components of a building and their functions - Setting out of a building.
II	Stones: Classification of stones - Qualities of good building stones - Quarrying - Dressing - Tests - Specifications - Uses of common building stones. Bricks: Composition of good brick earth - Classification - Qualities of good bricks - Field and laboratory tests - Specifications. Tiles: Classification - Manufacture - Properties - Tests - Specifications
III	Cement: Basic Ingredients – Manufacturing process - Grades - Properties - Tests - Specifications.

	Aggregates: Fine and coarse aggregate - Properties - Uses - Tests. Cement Mortar: Types and preparation.
IV	Stone Masonry: Types - Details of Ashlar, Random Rubble, Coarse Rubble and Dry Rubble Masonry. Brick Masonry: Types - Bond - Introduction to all types of bonds - English bond in detail (1, 1½ and 2 brick walls) - Comparison of stone and brick masonry.
V	Timber: Properties - Uses - Classification - Seasoning - Defects - Preservation - Tests; Hard board and Particle board - Manufacture and use. Steel: Structural steel and steel as reinforcement - Types - Properties - Uses - Market forms.
VI	Floors and Flooring materials: Different types and selection of floors and floor coverings. Roofs and roof coverings: Different types of roofs - Suitability - Types and selection of roofing materials.

REFERENCES:

1	Chen, W. F. and Liew, J. Y. R., (Eds.), The Civil Engineering Handbook, Second Edition, CRC Press (Taylor and Francis)
2	Dalal, K. R., Essentials of Civil Engineering, Charotar Publishing House
3	Gopi, S., Basic Civil Engineering, Pearson Publishers
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	McKay, W. B. and McKay, J. K., Building Construction Volumes 1 to 4, Pearson India Education Services
7	Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
8	Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To provide the students an overview of the profession of civil engineering.
2	To provide the students an illustration of the use and properties of various building materials and explain the building construction aspects.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Describe the role of civil engineer in society to relate the various disciplines of Civil Engineering and explain classification of buildings and structures.
2	Explain different classification and properties of building materials like stone, brick and tile.
3	Explain different preparation, uses and properties of building materials like cement, aggregate and mortar.

4	Describe different masonry types and bonds in masonry.
5	Explain the preparation, uses and properties of building materials like timber and steel.
6	Explain different types and selection of roofing and flooring materials.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	2	2	-	-	-	-		-	3	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-		3	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-		3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-		3	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-		3	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-	-		3	-	-

CO-PO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION
BE 101 01	CO1	PO1	3	A thorough knowledge on civil engineering as well as civil engineer will be obtained and a basic knowledge on buildings, building classification.
		PO6	3	The consequent responsibilities of a civil engineer relevant to the professional engineering practice will understand and can be applied to assess societal, health, safety, legal and cultural issues.
		PO7	2	Knowledge on the impact of professional civil engineering will helps to bring a sustainable developed society.
		PO8	2	Keeping the ethics and responsibilities of professional civil engineering.
	CO2	PO1	3	A thorough knowledge on different types and properties of building materials on civil engineering as well as civil engineer will be obtained and a basic knowledge on buildings, building classification.
	CO3	PO1	3	A basic knowledge on different preparation, uses and properties of building materials like cement, aggregate and mortar.
	CO4	PO1	3	A basic knowledge on masonry types like stone masonry and brick masonry and different bonds in brick work.
	CO5	PO1	3	Knowledge on different building materials its preparation, uses and properties of materials like timber and brick.
	CO6	PO1	3	A basic knowledge on different types and selection of roofing and flooring materials.

CO-PSO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION
BE 101 01	CO1	PSO2	3	Graduates will have a broad understanding of economical, environmental, societal and safety factors involved in infrastructural development through the thorough knowledge on civil engineering as well as civil engineer.
		PSO3	1	Graduates will have ability to function within multidisciplinary teams with competence in modern tool usage in all civil engineering aspects.
	CO2	PSO1	3	Graduates shall demonstrate sound knowledge in different types of buildings, building components, building materials and building construction and construction aspects of civil engineering infrastructure.
	CO3	PSO1	3	Graduates shall demonstrate sound knowledge in the preparation, uses and properties of building materials like cement, aggregate and mortar.
	CO4	PSO1	3	Graduates shall demonstrate sound knowledge in different masonry types and bonds in masonry.
	CO5	PSO1	3	Graduates shall demonstrate sound knowledge in the preparation, uses and properties of building materials like timber and steel.
	CO6	PSO1	3	Graduates will have ability in selection of roofing and flooring materials.

BE101-02 INTRODUCTION TO MECHANICAL ENGINEERING SCIENCES

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course: **Introduction to Mechanical Engineering Sciences**	Course code**: BE 101 -02**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	**Thermodynamics**:Natureandscopeofthermodynamics;Basicconcepts;Lawsofthermodynamics-Discovery,Significance&Applications;QualitativeideasonEntropy,Availableenergy,Irreversibility,ClausiusInequality,Principleofincreaseofentropy&Carnotengine;Limitationsof Thermodynamics;Sourcesofpower;historyofpowerproduction;powerproductioninthefuture.
II	**ThermalEngineering:**Historicaldevelopmentofsteamengine,steamturbines,gasturbinesandhydraulicturbines;Principleofturbomachinery; HistoryofICengines;twostrokeandfourstrokeengines-working,applications;Aircompressors-typesanduses;PrinciplesofRocketpropulsion,chemicalrockets,Indianspaceprogramme
III	**Refrigeration&AirConditioning:**History&scopeofrefrigeration;applicationsofrefrigeration;Foodpreservation,refrigeratedstorage;applicationsinchemicalandprocessindustries;specialapplications;Airconditioning-

	Principles&systems;scopeofairconditioning;Psychrometricpropertiesofair;Humancomfort;comfortstandards.
IV	**Automobile&AeronauticalEngineering**:IntroductiontoanAutomobile;historyoftheautomobile;IndianAutomobiles;Typesofautomobiles;Majorcomponentsandtheirfunctions;ManufacturersofmotorvehiclesinIndia;Fundamentalsofaerodynamics;drag force and lift force;jetengines-typesandapplications.
V	**Engineering Materials:** Introduction and history of materials; basics of crystallography; metals, alloys, composites, ceramics, polymers; mechanical properties and testing of engineering materials.
VI	**ManufacturingEngineering:**Method of manufacturing ; casting , forging, rolling, extrusion;machining operations- soldering, brazing and welding; Introduction to CNC machines (elementary idea only); examples of typical poducts manufactured by the above methods.

REFERENCES:

1	Dossat, R. J., Principles of Refrigeration, PHI
2	Heywood, J., Internal Combustion Engine Fundamentals, McGraw Hill Publishers Holman, J. P., Thermodynamics, McGraw Hill Co.
3	Jain, K. K. and Asthana, R. B., Automobile Engineering, TTTI Bhopal
4	Jonathan Wickert, Introduction to Mechanical Engineering, Cengage Learning Kalpakjian, S. and Schmid, S. R., Manufacturing Processes for Engineering Materials, Pearson education
5	Maines, R., Landmarks in Mechanical Engineering, ASME Peng, W. W., Principles of Turbomachinery, John Wiley & Sons Pita, E. G., Air Conditioning Principles & Systems, PHI.
6	Spalding, D. B. and Cole, E. H., Engineering Thermodynamics, ELBS & Edward Arnold (Pub) Ltd.
7	Stone, R. and Ball, T. K., Automotive Engineering Fundamentals, SAE International Sutton, G. P. and Ross, D. M., Rocket Propulsion Elements, John Wiley & Sons
8	Von Karman, T., Aerodynamics: Selected Topics in the Light of Their Historical Development, Courier Corporation
9	Online course on Refrigeration & Air conditioning, IIT Kharagpur www.nptel.ac.in

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To introduce different disciplines of Mechanical Engineering
2	To kindle interest in Mechanical Engineering
3	To impart basic mechanical engineering principles

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Acquire knowledge on fundamental concepts of thermodynamics and laws of thermodynamics
2	Acquire knowledge on energy conservation devices

3	Acquire knowledge on refrigeration and air conditioning systems
4	Develop basic ideas of the different parts, working of automobile and fundamentals of aerodynamics
5	Preparation and ability to engage in independent and life-long learning in the context of knowledge on engineering materials.
6	Acquire knowledge on different manufacturing methods

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	3								1		3
CO2	3	3	2	2								1		3
CO3	2	2	3	2								1		3
CO4	1	2		2								2		3
CO5	1	2										3		3
CO6		2	2	2								3		3

CO-PO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION
C01	PO1	1	As students could use their acquired knowledge in basic mathematics to solve engineering problems of thermodynamics
	PO2	2	Knowledge in principles of operations helps the students to identify many problems related to thermodynamics
	PO3	2	Knowledge in principles of thermodynamics helps the students design system components or process that meet the specified needs.
	PO4	3	As students could use their acquired knowledge design of experiments, analysis and interpretation of data.
	PO12	1	Become aware of the requirement for advanced knowledge by prolonged learning.
CO2	PO1	3	Apply the knowledge of mechanical Engineering to the solution of energy conversion device
	PO2	3	Identify and analyse complex engineering problems reaching substantiated conclusions
	PO3	2	Design solutions for design of systems and process are made with social and environmental considerations
	PO4	2	Will be able to use knowledge and methods to provide valid conclusions.

	PO12	1	Recognize the need for engage in independent and life-long learning.
CO3	PO1	2	As students could use their acquired knowledge in basic of thermodynamics to solve engineering problems
	PO2	2	Identify and analyse engineering problems of refrigeration and air conditioning systems reaching substantiated conclusions
	PO3	3	Design solutions for design of systems and process with consideration for the public health and safety.
	PO4	2	As they could use their acquired knowledge design of experiments, analysis and interpretation of data.
	PO12	1	Become aware of the requirement for advanced knowledge by prolonged learning.
CO4	PO1	1	As they could use their acquired knowledge to solve engineering problems related to automobile and Aerodynamics
	PO2	2	Develop and implement new ideas/ modern concepts with reference to given application/situation for problem analysis and reaching substantiated conclusions.
	PO4	2	As they could use new ideas/ modern concepts for analysis and interpretation of data.
	PO12	2	Recognize the need for engage in independent and life-long learning for develop and implement new ideas/ modern concepts.
CO5	PO1	1	As they could use their acquired knowledge in basic sciene to develop ideas of engineering materials
	PO2	2	Students could identify, formulate, research literature, and analyze different materials using the principles of natural and engineering sciences
	PO12	3	Recognize the need for and ability to engage in independent and life-long learning in the context of technological change in engineering materials
CO6	PO2	2	Develop and implement new ideas/ modern concepts with reference to given application/situation for problem analysis and reaching substantiated conclusions.
	PO3	2	Develop and implement new ideas/ modern concepts with reference to given application/situation for problem analysis and reaching substantiated conclusions.
	PO4	2	As they could use new ideas/ modern concepts for analysis and interpretation of data.
	PO12	3	Recognize the need for engage in independent and life-long learning for develop and implement new ideas/ modern concepts.

CO-PSO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION

C01	PSO2	3	Preparation and ability to engage in independent and life-long learning in the context of thermodynamics and successfully apply for the implementation of mechanical systems/processes
C02	PSO2	3	Preparation and ability to engage in independent and life-long learning in the context of thermal engineering and successfully apply for the implementation of mechanical systems/processes
C03	PSO2	3	Preparation and ability to engage in independent and life-long learning in the context of refrigeraion and air conditioning and successfully apply for the implementation of mechanical systems/processes
C04	PSO2	3	Preparation and ability to engage in independent and life-long learning in the context of auomobile engineering and successfully apply for the implementation of mechanical systems/processes
C05	PSO2	3	Preparation and ability to engage in independent and life-long learning in the context of technological change and successfully apply for the implementation of mechanical systems/processes
C06	PSO2	3	Preparation and ability to engage in independent and life-long learning in the context of technological change and successfully apply for the implementation of mechanical systems/processes

BE 101-03 INTRODUCTION TO ELECTRICAL ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Introduction to Electrical Engineering**	Course code**:BE 101-03**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Fundamental Concepts of Circuit Elements and Circuit variables: Electromotive force, potential and voltage. Resistors, CapacitorsInductors- terminal V-I relationsElectromagnetic Induction: Faraday's laws, Lenz's law, statically and dynamically induced EMF, self and mutual inductance, coupling coefficient-energy stored in inductanceReal and Ideal independent voltage and current sources, V-I relations. Passive sign conventionNumerical Problems (Module I)
II	Basic Circuit Laws: Kirchhoff's current and voltage laws, analysis of resistive circuits-mesh analysis –super mesh analysisNode analysis-super node analysis, star delta transformationNumerical problems (Module II)
III	Magnetic Circuits: Magneto motive force, flux, reluctance, permeability -comparison

	of electric and magnetic circuits, analysis of series magnetic circuitsParallel magnetic circuits, magnetic circuits with air-gaps.Numerical problems (Module III)
IV	Alternatingcurrentfundamentals:-GenerationofAlternatingvoltages-waveforms,Frequency,Period,RMS andaveragevalues, peak factorand formfactor ofperiodicwaveforms (puresinusoidal)and compositewaveformsPhasor Concepts,Complex representation (exponential, polar and rectangular forms) of sinusoidal voltageand currents phasor diagramsComplex impedance - series and parallel impedances and admittances, Phasor analysis of RL, RC, RLC circuitsNumerical problems. (Module IV)
V	Complex Power : Concept of Power factor: active , reactive and apparent power Resonance in series and parallel circuits Energy, bandwidth and quality factor, variationof impedance and admittance in series and parallel resonant circuits Numerical problems (Module V)
VI	Threephasesystems:Star and deltaconnections,three-phasethreewire andthree phasefour-wiresystemsAnalysis ofbalancedandunbalanced star anddeltaconnectedloads Powerin three-phasecircuits.Active and Reactivepowermeasurement byone, two, andthree wattmetermethodsNumericalproblems (ModuleVI)

REFERENCES:

1	Bhattacharya, S. K., Basic Electrical & Electronics Engineering, Pearson
2	Bird, J., Electrical Circuit Theory and Technology, Routledge, Taylor & Francis Group Edminister, J., Electric Circuits, Schaum's Outline Series, Tata McGraw Hill
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	Parker and Smith, Problems in Electrical Engineering, CBS Publishers and Distributors Sudhakar and Syam Mohan, Circuits and Networks Analysis and Synthesis, Tata
6	McGraw Hill
7	Suresh Kumar, K. S, Electric Circuits and Networks, Pearson Education

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To set a firm and solid foundation in Electrical Engineering with strong analytical skills
2	Conceptual understanding of basic laws and analysis methods in electrical and Magnetic circuits

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to acquire fundamental knowledge of Electrical circuits and can solve

	circuit related Problems.
2	Students will be able to recall and state ideas about magnetic circuits.
3	Students will be able to explain the fundamentals of AC circuits.
4	Students will be able to analyze three phase systems.
5	Students will be able to compare and contrast various types of resonance circuits.
6	Students will be able to identify and differentiate between various methods of Power measurement.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**3**													**3**		
CO2	**3**													**1**		
CO3	**3**					**1**								**2**	**1**	
CO4	**2**						**1**							**2**	**1**	
CO5	**3**													**3**		
CO6	**3**													**3**		

CO-PO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION
CO1	**PO1**	**3**	Students will be able to apply the knowledge of mathematics and science to solve various fundamental problems in electric circuits
CO2	**PO1**	**3**	Students will be able to apply knowledge of magnetic circuits to solve engineering problems.
CO3	**PO1**	**3**	Students will be able to Identify, formulate, review research literature, and analyze complex Engineering problems using state space analysis
	PO6	**1**	Students will be able to formulate and analyze complex Engineering problems using the principles of mathematics
CO4	**PO1**	**2**	Students will be applying the knowledge of electrical engineering to analyze three phase systems.
	PO7	**1**	Students will be able to understand the need of three phase circuits for sustainable development of society.
CO5	**PO1**	**3**	Students will be able to and contrast various types of resonance circuits.

CO6	**PO1**	**3**	Students will be able to identify and differentiate between various methods of Power measurement.

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**PSO1**	**3**	Graduates will be able to identify, Analyze & Design the problems associated in the field of electric circuits.
CO2	**PSO1**	**1**	Graduates will be able to identify, Analyze, Design and simulate the problems associated in the field of Control systems
CO3	**PSO1**	**2**	Graduates will able to gain the fundamental knowledge about ac circuits
	PSO2	**1**	Graduates will be able to explore the technical knowledge and development of professional methodologies in ac circuits
CO4	**PSO1**	**2**	Graduates will able to gain the fundamental knowledge about three phase ac circuits
	PSO2	**1**	Graduates will be able to explore the technical knowledge and development of professional methodologies in three phase ac circuits
CO5	**PSO1**	**3**	Graduates will able to apply the learned Knowledge in resonance ac circuits.
CO6	**PSO1**	**3**	Graduates will able to differentiate the various methods of Power measurement.

BE 101-04 INTRODUCTION TO ELECTRONICS ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Introduction to Electronics Engineering**	Course code**:BE 101-04**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Evolution of Electronics, Impact of Electronics in industry and in society.Resistors, Capacitors: types, specifications. Standard values, marking, colour coding. Inductors and Transformers: types, specifications, Principle of working. Electro mechanical components: relays and contactors.
II	Diodes: Intrinsic and extrinsic semiconductors, PN junction diode, barrier potential, V-I characteristics, Effect of temperature. Equivalent circuit of a diode. Piece wise linear model.Specification parameters of diodes and numbering.Zener diode, Varactor diodes, characteristics, working principle of LED,photo diode, solar cell.

III	Bipolar Junction Transistors: Structure, typical doping, Principle of operation, concept of different configurations. Detailed study of input and output characteristics of common base and common emitter configuration, current gain, comparison of three configurations.Concept of load line and operating point. Need for biasing and stabilization, voltage divider biasing, Transistor as amplifier, switch, RC coupled amplifier and frequency responseSpecification parameters of transistors and type numbering
IV	Junction Field Effect Transistors: Structure, principle of operation, characteristics, comparison with BJT.MOSFET: Structure, principle of operationofEnhancement type MOSFET, Current voltage characteristics, Depletion-type MOSFET. Principle of operation of Photo transistor, UJT, SCR.
V	Diode circuits and power supplies: Series and parallel diode circuits, Clippers, Clampers, Voltage multipliersHalf-wave and full wave (including bridge) rectifiers, Derivation of Vrms,Vdc, ripple factor, peak inverse voltage, rectification efficiency in eachcase, capacitor filter, working and design of a simple zener voltageregulator.Block diagram description of a DC Power supply, Principle of SMPS
VI	Electronic Measurements and measuring Instruments.Generalized performance parameters of instruments: error, accuracy,sensitivity, precision and resolution. Principle and block diagram of analog and digital multimeter, Block diagram of CRO, Measurements using CRO, Lissajous patterns, Principle and block diagram of DSO, function generator.Testing of Electronic components.

REFERENCES:

1	Bell, D. A., Electronic Devices and Circuits, Oxford University Press
2	Boylested, R. L. and Nashelsky, L., Electronic Devices and Circuit Theory, Pearson Education
3	Kal, S., Basic Electronics: Devices, Circuits and its Fundamentals, PHI Learning
4	Millman, J., Halkias, C. and Parikhu, C. D., Integrated Electronics, Tata Mc Graw Hill
5	Neaman, D. A., Electronic Circuits Analysis and Design, McGraw Hill
6	Sedra, A. S. and Smith, K. C., Microelectronic Circuits, Oxford University Press

PREREQUISITE: Nil

COURSE OBJECTIVES

1	Provide an overview of evolution of electronics and introduce the working principle and fundamental electronic circuits
2	Provide an overview evolution of communication systems, and introduce the basic concepts in radio communication.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Understand the various types of passive and active components.
2	Summarize the working of various types of diodes.
3	Describe the structure of transistor, need for biasing, how transistor work as an amplifier.
4	Summarize the working of various types of transistors.
5	Analyze the structure, creation and working of rectifiers.
6	Identify different measurement system.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**3**	**2**												**3**	**2**	
CO2	**3**	**2**												**3**	**2**	
CO3	**2**		**2**											**3**	**2**	
CO4	**3**	**2**												**3**	**2**	
CO5	**3**	**2**			**2**									**3**	**2**	
CO6	**3**	**2**												**3**	**2**	

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**PO1**	**3**	Apply the knowledge of various types of passive and active components
	PO2	**2**	Analyze the various types of passive and active components
CO2	**PO1**	**3**	Apply the knowledge of various types of diodes .
	PO2	**2**	Analyze the working of various types of diodes .
CO3	**PO1**	**2**	Analyze the need for biasing a transistor and working of transistor as an amplifier.
	PO3	**2**	Recognize the need for biasing a transistor and working of transistor as an amplifier.
CO4	**PO1**	**3**	Apply the knowledge of various types of transistors.
	PO2	**2**	Analyze the working of various types of transistors.
CO5	**PO1**	**3**	Apply the knowledge on structure, creation and working of rectifiers.
	PO2	**2**	Analyze the structure, creation and working of rectifiers.
	PO5	**2**	Apply modern tools of simulation to study the characteristics of rectifiers.

CO6	**PO1**	**3**	Apply the working of various electronic instruments .
	PO2	**2**	Analyze the various working principles of various electronic instruments.

CO-PSO MAPPING JUSTIFICATION

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**PSO1**	**3**	Graduates will be able to provide novel approaches to knowledge of various types of passive and active components
	PSO2	**2**	Graduates will able to apply the learnt knowledge to identify variousvarioustypes of passive and active components
CO2	**PSO1**	**3**	Graduates will be able to provide novel approaches about various types of diodes .
	PSO2	**2**	Graduates will be aware about the of various types of diodes.
CO3	**PSO1**	**3**	Graduates get an idea of transistor biasing, how transistor work as an amplifier.
	PSO2	**2**	Graduates get an idea of designing a circuit for transistor as an amplifier
CO4	**PSO1**	**3**	Graduates will be able to provide novel approaches about various types of transistors.
	PSO2	**2**	Graduates will be aware about the of various types of transistors.
CO5	**PSO1**	**3**	Graduates will be able to analyze the rectifier circuit.
	PSO2	**2**	Graduates will be able to design the rectifier circuit.
CO6	**PSO1**	**3**	Analyze the working of measurement circuit.
	PSO2	**2**	Design the working of measurement circuit.

BE101-05 INTRODUCTION TO COMPUTING AND PROBLEM SOLVING

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Introduction to Computing and Problem Solving**	Course code**: BE 101-05**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Introduction to programming methodologies – structured approach, stepwise refinement techniques, programming style, documentation – analysis of algorithms: frequency count, definition of Big O notation, asymptotic analysis of simple algorithms. Recursive and iterative algorithms
II	Abstract and Concrete Data Structures- Basic data structures – vectors and arrays. Applications, Linked lists:- singly linked list, doubly linked list, Circular linked list,

	operations on linked list, linked list with header nodes, applications of linked list: polynomials.
III	Applications of linked list (continued): Memory management, memory allocation and de-allocation. First-fit, best-fit and worst-fit allocation schemes. Implementation of Stacks and Queues using arrays and linked list, DEQUEUE (double ended queue). Multiple Stacks and Queues, Applications.
IV	String: - representation of strings, concatenation, substring searching and deletion. Trees: - m-ary Tree, Binary Trees – level and height of the tree, complete-binary tree representation using array, tree traversals (Recursive and non-recursive), applications. Binary search tree – creation, insertion and deletion and search operations, applications.
V	Graphs – representation of graphs, BFS and DFS (analysis not required) applications. Sorting techniques – *Bubble sort, Selection Sort,* Insertion sort, Merge sort, Quick sort, Heaps and Heap sort. Searching algorithms (Performance comparison expected.Detailed analysis not required)
VI	Linear and Binary search. (Performance comparison expected. Detailed analysis not required)Hash Tables – Hashing functions – Mid square, division, folding, digit analysis, collusion resolution and Overflow handling techniques

REFERENCES:

1	Samanta D., Classic Data Structures, Prentice Hall India, 2/e, 2009.
2	Richard F. Gilberg, Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, 2/e, Cengage Learning, 2005.
3	Horwitz E., S. Sahni and S. Anderson, Fundamentals of Data Structures in C, University Press (India), 2008.
4	Aho A. V., J. E. Hopcroft and J. D. Ullman, Data Structures and Algorithms, Pearson Publication,1983.
5	Tremblay J. P. and P. G. Sorenson, Introduction to Data Structures with Applications, Tata McGraw Hill, 1995.
6	Peter Brass, Advanced Data Structures, Cambridge University Press, 2008 Lipschuts S., Theory and Problems of Data Structures, Schaum's Series, 1986. Wirth N., Algorithms + Data Structures = Programs, Prentice Hall, 2004.
7	Hugges J. K. and J. I. Michtm, A Structured Approach to Programming, PHI, 1987.
8	Martin Barrett, Clifford Wagner, And Unix: Tools For Software Design, John Wiley, 2008 reprint.

PREREQUISITE:

C.CODE	COURSE NAME	DESCRIPTION	SEM
B101-05	Introduction to Computing and Problem Solving	Fundamentals of Python programming	S1
	Fundamentals of C programming language	Bridge Course	

COURSE OBJECTIVES:

1	To impart a thorough understanding of linear data structures such as stacks, queues and their applications.
2	To impart a thorough understanding of non-linear data structures such as trees, graphs and their applications.
3	To impart familiarity with various sorting, searching and hashing techniques and their performance comparison.
4	To impart a basic understanding of memory management.

COURSE OUTCOMES:

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

CO	Description
C205.1	Compare different programming methodologies and define asymptotic notations to analyze performance of algorithms.
C205.2	Use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
C205.3	Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
C205.4	Illustrate and compare various techniques for searching and sorting.
C205.5	Illustrate various hashing techniques.

CO-PO-PSO MAPPING:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P010	PO 11	PO 12	PSO 1	PSO 2	PSO 3
C205.1	-	-	2	2	-	-	-	-	-	-	-	-	2	1	1
C205.2	1	-	3	-	-	-	-	-	-	-	-	-	3	-	-
C205.3	2	-	3	2	-	-	-	-	-	-	-	-	3	1	-
C205.4	1	-	2	3	-	-	-	-	-	-	-	-	2	-	1
C205.5	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
C205															
CS 205(overall level)	**-**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**2**

CO-PO MAPPING JUSTIFICATION:

COPO	LEVEL (LOW/MEDI	JUSTIFICATION

	UM/HIGH)	
C205.1-PO3	M	The knowledge in programming methodologies helps in designing solutions for complex engineering problems.
C205.1-PO4	M	The knowledge of asymptotic notations helps in analysis of performance of solutions to complex problems
C205.1-PSO1	M	The knowledge in programming methodologies and asymptotic notations help in designing solutions and analyzing its complexity.
C205.1-PSO2	L	This knowledge helps to design good and efficient algorithms.
C205.1-PSO3	L	These concepts are fundamental to CS and can be used in research and other innovative ideas.
C205.2-PO1	L	The knowledge of arrays, linked lists, stacks and queues can be applied to solve complex engineering problems.
C205.2-PO3	H	The knowledge of arrays, linked lists, stacks and queues can be applied to design solutions to complex engineering problems.
C205.2-PSO1	H	The knowledge of arrays, linked lists, stacks and queues can be appliedtodesignsolutionstocomplexengineeringproblemsin multidisciplinaryareas.TheybelongtothecoreconceptsofCS.
C205.3-PO1	M	The knowledge of non linear data structures like trees and graphs can be applied to solve complex engineering problems.
C205.3-PO3	H	This knowledge can be used to design efficient solutions to complex problems.
C205.3-PO4	M	This knowledge helps in representation, analysis and interpretation of data to provide valid conclusions.
C205.3-PSO1	H	The knowledge of non linear data structures like trees and graphs can be applied to design solutions to complex engineering problems.
C205.3-PSO2	L	This knowledge helps in designing efficient algorithms using appropriate data structure.
C205.4-PO1	L	This basic knowledge of sorting and searching can be used in solutions to complex engineering problems.
C205.4-PO3	M	This basic knowledge of sorting and searching can be used in designing solutions to complex engineering problems.
C205.4-PO4	H	This concept is fundamental in conducting investigations and interpretations of data.
C205.4-PSO1	M	This basic knowledge of sorting and searching can be used in designing solutions to complex multidisciplinary engineering problems.
C205.4-PSO3	L	The concept of sorting and searching are fundamental to theCS discipline and can be used research and other innovativeideas.
C205.5-PO1	L	The knowledge of various hashing techniques can be applied in designing solutions to complex engineering problems.
C205.5-PSO1	L	The knowledge of various hashing techniques can be applied in designing solutions to complex multidisciplinary engineering problems.

CE 100 BASICS OF CIVIL ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Basics of Civil Engineering**	Course code**: CE 100**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	General Introduction to Civil Engineering - Various disciplines of Civil engineering, Relevance of Civil engineering in the overall infrastructural development of the country. Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings – office / factory / software development office / power house /electronic equipment service centre (any one related to the branch of study) Students have to visit one such building and submit an assignment about the features of any one of the listed building related to their branch (Not included for exam).
II	Building planning - Introduction to planning of residential buildings- Site plan, Orientation of

	a building, Open space requirements, Position of doors and windows, Size of rooms; Preparation of a scaled sketch of the plan of a single storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area / built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.
III	Surveying - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging (direct ranging only) – instruments used for ranging. Levelling - Definitions, principles, Instruments (brief discussion only) - Level field book - Reduction of levels - problems on levelling (height of collimation only). Modern surveying instruments – Electronic distance meter, digital level, total station, GPS (Brief discussion only).
IV	Building materials - Bricks, cement blocks - Properties and specifications. Cement – OPC, properties, grades; other types of cement and its uses (in brief). Cement mortar – constituents, preparation. Concrete – PCC and RCC – grades. Steel - Use of steel in building construction, types and market forms.
V	Building construction – Foundations; Bearing capacity of soil (definition only); Functions of foundations, Types - shallow and deep (sketches only). Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only). Roofs – functions, types, roofing materials (brief discussion only). Floors – functions, types; flooring materials (brief discussion only). Decorative finishes – Plastering – Purpose, procedure. Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).
VI	Basic infrastructure and services - Elevators, escalators, ramps, air conditioning, sound proofing (Civil engineering aspects only) Towers, Chimneys, Water tanks (brief discussion only). Concept of intelligent buildings.

REFERENCES:

1	Chudley,R.,ConstructionTechnology,Vol.ItoIV,LongmanGroup,England
2	Chudley,R.andGreeno,R.,BuildingConstructionHandbook,AddisonWesley,LongmanGroup,England
3	Gopi,S.,BasicCivilEngineering,PearsonPublishers
4	Kandya,A.A.,ElementsofCivilEngineering,CharotarPublishinghouse
5	Mamlouk,M.S.,andZaniewski,
6	McKay,W.B.andMcKay,J.K.,BuildingConstructionVolumes1to4,PearsonIndiaEducationServices
7	Minu,S.,BasicCivilEngineering,KarunyaPublications
8	Rangwala,S.C.,EssentialsofCivilEngineering,CharotarPublishingHouse
9	Rangwala,S.C.andDalal,K.B.,EngineeringMaterials,CharotarPublishinghouse
10	Rangwala,S.C.andDalal,K.B.,BuildingConstruction,CharotarPublishinghouse

PREREQUISITE: Nil

COURSE OBJECTIVES

This course will help students to achieve the following objective:

1	To inculcate the essentials of Civil Engineering field to the students of all branches of Engineering.
2	To provide the students an illustration of the significance of the Civil Engineering Profession in satisfying societal needs.

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 different planning and orientation of building and introduction on various building area terms.
3	Describe the importance, objectives and principles of surveying.
4	Explain different types of building materials for construction.
5	Explain different building construction works like masonry, roofing, flooring and finishing works.
6	Summarize the basic infrastructure services and discusstheMaterials,energysystems,watermanagementandenvironmentfor green Buildings.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	-	-	-	-	3	2	2	-	-	-	-		-	3	3
CO2	2	-	-	-	1	-	1	-	-	-	-	-		1	1	-
CO3	3	2	-	1	3	-	-	3	-	-	-	-		3	-	-
CO4	3	2	-	1	3	-	-	3	-	-	-	-		3	-	-
CO5	3	-	-	-	-	3	3	-	-	-	-	-		-	2	-
CO6	3	2	-	-	3	-	-	-	2	-	-	-		2	-	-

CO-PO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION
CE100	CO1	PO1	3	A thorough knowledge on civil engineering as well as civil engineer will be obtained and A basic knowledge on buildings, building components, materials including modern building materials and building constructionwill be obtained.
		PO6	3	The consequent responsibilities of a civil engineer relevant to the professional engineering practice will understand and can be applied to assess societal, health, safety, legal and cultural issues.
		PO7	2	Knowledge on the impact of professional civil engineering will helps to bring a sustainable developed society.
		PO8	2	Keeping the ethics and responsibilities of professional civil engineering.
	CO2	PO1	2	Course will give clarity on different planning and orientation of building and various building area terms in civil engineering.

		PO5	**1**	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts applicable for drafting of building plans as well as in its orientation.
		PO7	**1**	Knowledge on different planning and orientation of building and various building area terms in civil engineering will helps to bring a sustainable developed society.
	CO3	**PO1**	**3**	Course will give clarity on importance, objectives and principles of surveying and can analyze problems on various civil engineering constructions to arrive at substantiated conclusions using the science of civil engineering survey.
		PO2	**2**	The course can analyze problems on building materials and construction to arrive at substantiated conclusions using the science of civil engineering.
		PO4	**1**	Experiments, analysis and interpretation of data on building materials and the information can provide valid conclusions will be applicable to real engineering practice.
		PO5	**3**	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts.
		PO8	**3**	Keeping the ethics and responsibilities of professional civil engineering in all construction practices.
	CO4	**PO1**	**3**	Course will give clarity on importance, objectives and principles of surveying and can analyze problems on various civil engineering constructions to arrive at substantiated conclusions using the science of civil engineering survey.
		PO2	**2**	The course can analyze problems on building materials and construction to arrive at substantiated conclusions using the science of civil engineering.
		PO4	**1**	Experiments, analysis and interpretation of data on building materials and the information can provide valid conclusions will be applicable to real engineering practice.
		PO5	**3**	Course has great scope to Create, select, and apply appropriate techniques, resources, and modern engineering concepts.
		PO8	**3**	Keeping the ethics and responsibilities of professional civil engineering in all construction practices.
	CO5	**PO1**	**3**	A basic knowledge various building construction works like masonry works, roofing, flooring and finishing works like plastering, white washing, painting etc.
		PO6	**3**	Offers the knowledge about different construction works considering all the societal, health, safety, legal and cultural issues relevant to the professional engineering practice.
		PO7	**3**	Knowledge on infrastructure services and modern technologies in civil engineering will helps to bring a sustainable developed society.
	CO6	**PO1**	**3**	A basic knowledge on basic infrastructure services like MEP, HVAC, elevators, escalators and ramps can be acquired and a basic introduction and information on Green buildings, its materials,energysystems,watermanagementandenvironment.
		PO2	**2**	Knowledge on basic infrastructure services, can analyze problems on various civil engineering constructions to arrive at substantiated conclusions.
		PO5	**3**	Offers chances to Create, select, and apply appropriate techniques, resources, and modern engineering concepts in infrastructure services of civil engineering constructions.
		PO9	**2**	Scope to function as a member or leader in teams on infrastructure services.

CO-PSO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION

CE 100	**CO1**	**PSO2**	**3**	Graduates will have a broad understanding of economical, environmental, societal and safety factors involved in infrastructural development through the thorough knowledge on civil engineering as well as civil engineer.
		PSO3	**3**	Graduates will have ability to function within multidisciplinary teams with competence in modern tool usage in all civil engineering aspects.
	CO2	**PSO1**	**1**	Graduates shall demonstrate sound knowledge in different planning and orientation of building and introduction on various building area terms.
		PSO2	**1**	Graduates will have a broad understanding of different planning and orientation of building and introduction on various building area terms.
	CO3	**PSO1**	**3**	Graduates shall demonstrate sound knowledge in importance, objectives and principles of surveying.
	CO4	**PSO1**	**3**	Graduates shall demonstrate sound knowledge in different types of buildings, building components, building materials and building construction and construction aspects of civil engineering infrastructure.
	CO5	**PSO2**	**2**	Graduates will have a broad understanding of different building construction works like masonry, roofing, flooring and finishing works.
	CO6	**PSO1**	**2**	Graduates shall demonstrate sound knowledge in the importance, objectives and principles of surveying through the basic science of civil engineering survey.

ME 100 BASICS OF ELECTRICAL ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Basics of Mechanical Engineering**	Course code**: ME 100**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Thermodynamics: LawsofThermodynamics,significanceandapplicationsoflawsofthermodynamics;entropy,availableenergy;Clausiusinequality;principleofincreaseofentropy;Idealandrealgasequations; Analysis ofCarnot cycle, Ottocycle,Diesel cycleandBraytoncycle;Efficiencyofthesecycles.
II	Energy conversion devices: Boilers, Steam turbines, Gas turbines. Working principle of two stroke and four stroke I.C. Engines (SI and CI), fuels,CRDI, MPFI, hybrid engines, Reciprocating pumps, centrifugal pumps and hydraulic turbines (elementary ideas only)

III	Refrigeration and Air Conditioning: Vapourcompression refrigeration systems, heat pumps, COP, Study of household refrigerator, Energy Efficiency Rating, Psychrometry, Psychrometric processes, window air conditioner, split air conditioner. Refrigerants and their impact on environment.
IV	Automobiles and Power Transmission Devices, Different types of engines used in automobiles, types of power units in automobiles; major components and their functions (brief description only); Belts and belt drives; Chain drive; Rope drive; Gears and gear trains; friction clutch (cone and single plate), brakes (types and applications only); Applications of these devices.
V	Materials and manufacturing processes: Engineering materials, Classification, properties, Alloys and their Applications; Casting, Sheet metal forming, Sheet metal cutting, Forging, Rolling, Extrusion, Metal joining processes -Soldering, Brazing and Welding; Powder metallurgy (elementary ideas only)
VI	Machine Tools (Basic elements, Working principle and types of operations) Lathe, Drilling Machine, Shaper, planer, slotter, Milling Machine, Grinding machine, Introduction to CNC machines.

1	Balachandran,BasicMechanicalEngineering,OwlBooks
2	Benjamin,J.,BasicMechanicalEngineering,PentexBooks
3	Clifford,M.,Simmons,K.andShipway,P.,AnIntroductiontoMechanicalEngineeringPartI-CRCPress
4	Crouse,AutomobileEngineering,TataMc-Graw-Hill,NewDelhi
5	Gill,SmithandZuirys,Fundamentalsof ICEngines,OxfordandIBHpublishingcompanyPvt.Ltd.NewDelhi.Crouse,AutomobileEngineering,TataMc-Graw-Hill,NewDelhi.
6	Nag,P.K.,BasicandAppliedThermodynamics,TataMcGraw-Hill
7	PravinKumar,BasicMechanicalEngineering
8	Royand Choudhary,ElementsofMechanical Engineering,MediaPromoters&PublishersPvt.Ltd.,Mumbai.
9	Sawhney,G.S.,FundamentalsofMechanicalEngineering,PHI

REFERENCES:

PREREQUISITE: Nil

COURSE OBJECTIVES

This course will help students to achieve the following objective:

1	To expose the students to the thrust areas in Mechanical Engineering and their relevance by covering the fundamental concepts.

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Analyse thermodynamic cycles and calculate its efficiency
2	Illustrate the working and features of Energy conversion devices
3	Explain the basic principles of Refrigeration and Air conditioning
4	Describe the working of Automobiles and Power Tansmission elements
5	Describe the basic manufacturing and metal joining processes.
6	Describe the machining processes and working of machine tools.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	0	0	0	0	0	0	0	0	0	0	0	1
CO2	3	1	0	0	0	0	0	0	0	0	0	0	0	1
CO3	3	1	0	0	0	0	0	0	0	0	0	0	0	1
CO4	3	1	0	0	0	0	0	0	0	0	0	0	0	1
CO5	3	1	0	0	0	0	0	0	0	0	0	0	0	1
CO6	3	0	0	0	0	0	0	0	0	0	0	0	0	1

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	PO1	3	Students should have a strong base in mathematics and engineering fundamentals to analyse thermodynamic cycles and calculation of efficiencies.
	PO2	2	Calculation of efficiencies, heat added, net work etc. involves problem analysis using principles of mathemetics and engineering sciences.
CO2	PO1	3	Study of IC engines, turbines and pumps requires strong knowledge in engineering fundamentals.
	PO2	1	Describing the efficiencies of energy conversion devices involves problem analysis using engineering sciences
C03	PO1	3	Strong knowledge in science and engineering fundamentals are needed to explain the basic principles of Refrigeration & Air Conditioning
	PO2	1	Design of refrigeration and air conditioning systems involves engineering problem analysis.
C04	PO1	3	Strong knowledge in science and engineering fundamentals are needed to describe the working ofAutomobiles and power transmission elements.
	PO2	1	Calculation of power transmitted, belt tension etc involves engineering problem analysis
C05	PO1	3	Strong knowledge in science and engineering fundamentals are needed to explain the basic manufacturing operations
C06	PO1	3	Describing basic machining processes and machine tools requires application of knowledge in engineering fundamentals

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
C01	PSO2	1	After completing the course, the students may be able to recognize the

C02	PSO2	1	importance of self-learning and can engage in continuous independent learning to become employees in mechanical engineering field.
C03	PSO2	1	
C04	PSO2	1	
C05	PSO2	1	
C06	PSO2	1	

EE 100 BASICS OF ELECTRICAL ENGINEERING

COURSE INFORMATION SHEET:

Program: **CE,CSE,ECE,EEE,ME**	Degree : **B-Tech**
Course**: Basics of Electrical Engineering**	Course code**:EE 100**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Elementary concepts of electric circuits: Kirchhoff's laws,constant voltage and current sources-ProblemsFormation of network equations by mesh current and node voltage methods-matrix representation-solution of network equations by matrix methods-problemsstar-delta conversion(resistive networks only-derivation is notneeded)-problems
II	Magnetic Circuits: MMF, field strength, fluxdensity,reluctance(definition only)-comparison between electric

	andmagnetic circuitsEnergy stored in magnetic circuits, magnetic circuits with airgap-Numerical problems on series magnetic circuitsElectromagnetic Induction: Faraday's laws, lenz's laws- staticallyinduced and dynamically induced emfs-self inductance and mutual inductance, coefficient of coupling (derivation not needed)
III	Alternating Current fundamentals: Generation of alternatingvoltages-waveforms, frequency, period, average , RMS values. and form factor of periodic waveform(puresinusoidal)- Numerical ProblemsAC Circuits: Phasor representation of alternating quantities- rectangular and polar representation. Analysis of simple AC circuits: concept of impedance, powerand power factor in ac circuits-active, reactiveand apparent powersolution of RL,RC and RLC series circuits-Numerical problemsThree phase systems: Generation of three phase voltages-advantages of three phase systems, star and delta connection (balanced only), relation between line and phase voltages, line and phase currentsthree phase power measurement by two wattmeter method(derivation is not required) - Numerical problems
IV	Generation of power: Block schematic representation ofgenerating stations- hydroelectric power plantsBlock schematic representation of Thermal and nuclear powerplants. Renewable energy sources: solar, wind, tidal and geothermal(Block diagram and working only- No Problems)Power transmission: Typical electrical power transmissionscheme-need for high voltage transmission-(Derivation is not needed, No Problems)Power Distribution: substation equipments, primary and secondary transmission and distribution systems- feeder, service mains
V	Electric Machines: DC Generator and Motor-Construction-working principle- Back EMFTypes of motor-shunt, series, compound (short and long)-principle of operation of dc motor, applications-numerical problems (voltage -current relations only)Transformer: Construction of single phase and three phaseTransformers (core type only)-EMF equationand related numerical problemsLosses and efficiency of transformer for full load – numericalproblems (no equivalent circuit)
VI	AC Motors: Three phase induction motor-squirrel cage and slipring induction motor Working principle-synchronous speed, slip and relatednumerical problems. (no equivalent circuit)AC Motors: Construction, principles of operation of singlephase induction motor (no equivalent circuit)Starting methods in single phase induction motors -split phase and capacitor start

REFERENCES:

1	Bhattacharya, S. K., Basic Electrical & Electronics Engineering, Pearson
2	Bird, J., Electrical Circuit Theory and Technology, Routledge, Taylor & Francis Group Del Toro,V.,Electrical Engineering Fundamentals, Prentice Hall of India.
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	Mehta, V.K. and Mehta,R., Basic Electrical Engineering, S. Chand Publishing
6	Parker and Smith, Problems in Electrical Engineering, CBS Publishers and Distributors Sudhakar and Syam Mohan, Circuits and Networks Analysis and Synthesis, Tata
7	McGraw Hill
8	Suresh Kumar, K. S, Electric Circuits and Networks, Pearson Education

PREREQUISITE: Nil

COURSE OBJECTIVES

This course will help students to achieve the following objective:

1	To impart a basic knowledge in Electrical Engineering with an understanding of fundamental concepts

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Students will be able to acquire fundamental knowledge of Electrical circuits and can solve circuit related problems.
2	Students will be able to recall and state ideas about magnetic circuits.
3	Students will be able to explain the fundamentals of AC circuits.
4	Students will be able to analyze three phase systems.
5	Students will be able to compare and contrast the various types of renewable energy sources.
6	Students will be able to identify and differentiate between various AC and DC machines.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**3**													**3**		
CO2	**3**													**1**		
CO3	**3**					**1**								**2**	**1**	
CO4	**2**						**1**							**2**	**1**	
CO5			**1**				**2**								**3**	**2**
CO6	**2**		**1**											**2**		

CO-PO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION
CO1	**PO1**	**3**	Students will be able to apply the knowledge of mathematics and science to solve various fundamental problems in electric circuits
CO2	**PO1**	**3**	Students will be able to apply knowledge of magnetic circuits to solve engineering problems.
CO3	**PO1**	**3**	Students will be able to Identify, formulate, review research literature, and analyze complex Engineering problems using state space analysis
	PO6	**1**	Students will be able to formulate and analyze complex Engineering problems using the principles of mathematics
CO4	**PO1**	**2**	Students will be applying the knowledge of electrical engineering to analyze three phase systems.
	PO7	**1**	Students will be able to understand the need of three phase circuits for sustainable development of society.
CO5	**PO3**	**1**	Students will be able to design solutions with appropriate consideration for safety and environmental issues.

	PO7	**2**	Students will be able to understand the impact of professional engineering solutions in the context of environmental development by utilizing renewable energy sources.
CO6	**PO1**	**2**	Students will be able to apply the knowledge of science and engineering fundamentals for identifying different electrical machines.
	PO3	**1**	Students will be able to develop solution using AC machines for the further development of society.

CO-PSO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION
CO1	**PSO1**	**3**	Graduates will be able to identify, Analyze & Design the problems associated in the field of electric circuits.
CO2	**PSO1**	**1**	Graduates will be able to identify, Analyze, Design and simulate the problems associated in the field of Control systems
CO3	**PSO1**	**2**	Graduates will able to gain the fundamental knowledge about ac circuits
	PSO2	**1**	Graduates will be able to explore the technical knowledge and development of professional methodologies in ac circuits
CO4	**PSO1**	**2**	Graduates will able to gain the fundamental knowledge about three phase ac circuits
	PSO2	**1**	Graduates will be able to explore the technical knowledge and development of professional methodologies in three phase ac circuits
CO5	**PSO2**	**3**	Graduates will able to apply the learned Knowledge for renewable energy systems
	PSO3	**2**	Graduates will Gain sufficient competence to understand the technologies in renewable energy systems
CO6	**PSO1**	**2**	Graduates will able to apply the learned knowledge in electrical machines.

EC 100 BASICS OF ELECTRONICS ENGINEERING

COURSE INFORMATION SHEET:

Program: **CSE, ECE,EEE,CE,ME**	Degree : **B-Tech**
Course**: Basics Of Electronics Engineering**	Course code**: EC100**
L-T-P**: 2-1-0**	Credit**: 3**

SYLLABUS:

MODULE	CONTENT
I	Evolution of Electronics, Impact of Electronics in industry and in society. Resistors, Capacitors: types, specifications. Standard values, marking, colour coding. Inductors and Transformers: types, specifications, Principle of working.Electro mechanical components: relays andcontactors.

II	PN Junction diode: Intrinsic and extrinsicsemiconductors, Principle of operation, V-I characteristics, principle of working of Zenerdiode, Photo diode, LED and Solar cell. Bipolar Junction Transistors: PNP and NPN structures, Principle of operation, input and output characteristics of common emitter configuration (npn only).
III	Rectifiers and power supplies: Block diagramdescription of a dc power supply ,Half wave and full wave (including bridge) rectifier, capacitorfilter, working of simple zener voltage regulator.Amplifiers and Oscillators: Circuit diagram andworking of common emitter amplifier, Block diagram of Public Address system, concepts of feedback, working principles of oscillators, circuitdiagram & working of RC phase shift oscillator.
IV	Analogue Integrated circuits: Functional block diagram of operational amplifier, ideal operational amplifier, inverting and non-invertingAmplifier.Digital ICs: Logic Gates.Electronic Instrumentation: Principle and blockdiagram of digital multimeter, digital storage oscilloscope, and function generator.
V	Radio communication: principle of AM & FM, frequency bands used for various communication systems, block diagram of super heterodyne receiver.Satellite communication: concept of geo- stationary Satellite system.
VI	Mobile communication: basic principles of cellular communications, concepts of cells, frequency reuse.Optical communication: block diagram of the optical communication system, principle of light transmission through fiber, advantages of optical communication systems.Entertainment Electronics Technology: Basic principles and block diagram of cable TV, CCTV, DTH system.

TEXT BOOKS:

1	Bell, D. A., Electronic Devices and Circuits, Oxford University Press
2	Tomasy, W., Advanced Electronic Communication system, PHI Publishers

REFERENCES:

1	Boylested, R. L. and Nashelsky, L., Electronic Devices and Circuit Theory, Pearson Education
2	Frenzel, L. E., Principles of Electronic Communication Systems, Mc Graw Hill Kennedy, G. and Davis, B., Electronic Communication Systems, Mc Graw Hill
3	Rajendra Prasad, Fundamentals of Electronic Engineering, Cengage Learning

PREREQUISITE: Nil

COURSE OBJECTIVES

1	To get basic idea about types, specification and common values of passive and active components.
2	To familiarize the working of diodes, transistors, MOSFETS and integrated circuits.
3	To understand the working of rectifiers, amplifiers and oscillators.
4	To get a basic idea about measuring instruments.
5	To get a fundamental idea of basic communication systems and entertainment electronics

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Understand the various types of passive and active components.
2	Summarize the working of various types of diodes and transistors.

3	Analyze the structure, creation and working of rectifiers, amplifiers and oscillators
4	Analyze the working of OP-Amps , various electronic instruments etc.
5	Summarize the concept of satellite and radio communication.
6	Apply various concepts about optical communication and entertainment electronics.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	2												3	2	
CO2	3	2												3	2	
CO3	3	2			2									3	2	
CO4	3	2												3	2	
CO5	3	2			2									3	2	
CO6	3	2			2									3	2	3

CO PO MAPPING JUSTIFICATION:

CO	PO	LEVEL	JUSTIFICATION
CO1	PO1	3	Apply the knowledge of various types of passive and active components
	PO2	2	Analyze the various types of passive and active components
	PO1	3	Apply the knowledge of various types of diodes and transistors.
CO2	PO2	2	Analyze the working of various types of diodes and transistors.
CO3	PO1	3	Apply the knowledge on structure, creation and working of rectifiers, amplifiers and oscillators.
	PO2	2	Analyze the structure, creation and working of rectifiers, amplifiers and oscillators.
	PO5	2	Apply modern tools of simulation to study the characteristics of rectifiers, amplifiers and oscillators
CO4	PO1	3	Apply the working of OP-Amps , various electronic instruments etc.
	PO2	2	Analyze the various working principles of OP-Amps , various electronic instruments etc.
CO5	PO1	3	Apply the knowledge concept of satellite and radio communication to real world applications.
	PO2	2	Analyze the various modes of operation in satellite and radio communication
	PO5	2	Use of modern simulation tools to simulate the data obtained from satellite and radio communication .

CO6	PO1	3	Apply the knowledge of optical communication and entertainment electronics to real world applications.
	PO2	2	Analyze the various modes of operation in optical communication and entertainment electronics to real world applications.
	PO5	2	Use modern simulation tools to simulate the data obtained from optical communication and entertainment electronics to real world applications.

CO PSO MAPPING JUSTIFICATION

CO's	PO's	LEVEL	JUSTIFICATION
CO1	PSO1	3	Graduates will be able to provide novel approaches to knowledge of various types of passive and active components
	PSO2	2	Graduates will able to apply the learnt knowledge to identify various various types of passive and active components
CO2	PSO1	3	Graduates will be able to provide novel approaches about various types of diodes and transistors
	PSO2	2	Graduates will be aware about the of various types of diodes and transistors
CO3	PSO1	3	Graduates will Identify various types of rectifiers, amplifiers and oscillators.
	PSO2	2	Graduates will able to apply the learnt knowledge about rectifiers, amplifiers and oscillators to real world applications
CO4	PSO1	3	Graduates will be able to provide novel approaches of analysis to different types of OP-Amps , various electronic instruments etc.
	PSO2	2	Graduates will able to apply the learnt knowledge about different types of OP-Amps , various electronic instruments etc. to real world applications
C05	PSO1	3	Graduates will be able to provide novel approaches satellite and radio communication
	PSO2	2	Graduates will able to apply the learnt knowledge about satellite and radio communication to real world applications
C06	PSO1	3	Graduates will be able to provide novel approaches about, optical communication and entertainment electronics
	PSO2	2	Graduates will able to apply the learnt knowledge about the optical communication and entertainment electronics to real world applications

PH 110 ENGINEERING PHYSICS LAB

COURSE INFORMATION SHEET:

Program: **ECE,EEE,CSE,CE,ME**	Degree : **B-Tech**
Course**: Engineering Physics Lab**	Course code**: PH110**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

SL.No:	LIST OF EXPERIMENTS
	Basics
1	Study of application of Cathode Ray Oscilloscope (CRO) for Frequency and Amplitude

	measurements. Lissajeous figures (useful for different types of polarized light.)
2	Temperature measurement – Thermocouple
3	Measurement of strain using strain gauge and Wheatstones bridge.
	Waves, Oscillations and Ultrasonics
4	Wave length and velocity measurement of ultrasonic waves in a liquid using ultrasonic diffractometer.
5	The LCR Circuit – Forced and damped harmonic oscillations.
6	Meldes string apparatus. Measurement of frequency in the transverse and longitudinal mode.
	Interference
7	Wave length measurement of a monochromatic source of light using Newton's Rings method.
8	Determination of refractive index of a liquid using Newton's Rings apparatus.
9	Determination of diameter of a thin wire or thickness of a thin strip of paper using air wedge method.
	Diffraction
10	To determine the slit or pinhole width.
11	To measure wavelength using a millimeter scale as a grating.
12	Determination the wavelength of He-Ne laser or any standard laser using diffraction grating.
13	To determine the wavelength of monochromatic light using grating.
14	Determination of dispersive power and resolving power of a plane transmission grating.
	Polarisation
15	Kerr Effect - To demonstrate the Kerr effect in nitrobenzene solution and to measure the light intensity as a function of voltage across the Kerr cell using photo detector.
16	To measure the light intensity of plane polarised light as a function of the analyzer position.
17	Laurent's Half Shade Polarimeter -To observe the rotation of the plane of polarization of monochromatic light by sugar solution and hence to determine the concentration of solution of optically active substance.
	LASER and Photonics
18	To determine the speed of light in air using laser.
19	Calculate the numerical aperture and study the losses that occur in optical fiber cable.
20	Determination of the particle size of lycopodium powder.
21	I-V characteristics of solar cell
22	To measure Planck's constant using photo electric cell.
23	Measurement of wavelength of laser using grating.

REFERENCES:

1	Avadhanulu, M. N., Dani, A. A. and Pokley, P. M., Experiments in Engineering Physics,
	S. Chand & Co.
2	Gupta, S. K., Engineering Physics Practicals, Krishna Prakashan Pvt. Ltd.
3	Koser, A. A., Practical Engineering Physics, Nakoda Publishers and Printers India Ltd
4	Rao, B. S. and Krishna, K. V., Engineering Physics Practicals, Laxmi Publications
5	Sasikumar, P. R. Practical Physics, PHI

PREREQUISITE: Higher secondary level Physics

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.
3	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.
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	Understand formation of waves in Melde's apparatus use it to measure frequency of tuning fork.
7	Temperature measurement using thermocouple.
8	Laurent's half shade polarimeter – To observe the rotation of the plane of polarisation of monochromatic light by sugar solution and hence to determine the concentration of solution of optically active substance.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				2			1	2			1
CO2	3				2			1	2			1
CO3	3				2			1	2			1
CO4	3				2			1	2			1
CO5	3				2			1	2			1
CO6	3				2			1	2			1

COURSE OBJECTIVES:

COURSE OUTCOMES:

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

CO	DESCRIPTION
1	Apply modern instruments like CRO, strain gauge to measure the basic physical quantities
2	Viz. frequency and amplitude of a wave pattern, strain etc. Determination of temperature using thermocouple. Measurement of strain using wheat stone bridge and strain gauge.
3	Measurement of velocity and wavelength of waves using ultrasonic diffractometer. Forced and damped oscillations using LCR circuit. Measurement of frequency values of stretched string using a Melde's string apparatus.
4	Determine the wavelength of monochromatic beam of light, thickness of micro-thin object, refractive index of liquid etc. by forming Newton's rings pattern and an air wedge fringe pattern.
5	Carryout the measurement of wavelength by diffraction of plane transmission grating and the spectra formed by a monochromatic beam of light and a laser. Using diffraction grating to determine the width of pinhole, slit, wavelength of light, dispersive power or resolving power.
6	To observe the rotation of the plane of polarisation of monochromatic light by sugar solution and hence to determine the concentration of solution of optically active substance, measure the intensity of light transmitted in relation to analyzer, and to demonstrate Kerr effect in nitrobenzene.
7	Determine the speed of light in air, calculate numerical aperture of optical fiber, particle size of lycopodium powder, I- V characteristics of solar cell, determination of plank's constant and wavelength determination.

CO-PO-PSO MAPPING:

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**PO1**	**3**	Apply strain gauge to measure strain.
	PO5	**2**	Understand the use of modern tool like strain gauge to measure strain acting on a cantilever.
	PO8	**1**	Understand the norms used in design of strain gauge.
	PO9	**2**	Gather ability to communicate information about strain in strain gauge.
	PO12	**1**	Understand the application of strain measuring devices.
CO2	**PO1**	**3**	Apply Melde's apparatus as transverse wave generator and longitudinal

			wave generator and use it to measure the frequency.
	PO5	**2**	Understand the use of modern tool like Melde's apparatus in measuring frequency of a tuning fork.
	PO8	**1**	Understand the norms used in design of transverse and longitudinal waves.
	PO9	**2**	Gather ability to communicate information about frequency calculation in Melde's apparatus.
	PO12	**1**	Understand the application of strain measuring devices.
CO3	**PO1**	**3**	Use interference patterns in Newton's rings apparatus and Air wedge apparatus. Use it to find out the required data.
	PO5	**2**	Understand the use of modern tool like Travelling microscope and Newton's ring microscope to find required physical quantity.
	PO8	**1**	Understand the norms used in design of Newton's rings apparatus and air wedge apparatus.
	PO9	**2**	Gather ability to communicate information about use of Air wedge and Newton's ring apparatus for finding various physical quantities.
	PO12	**1**	Understand the application of thickness measuring devices.
CO4	**PO1**	**3**	Understand the diffraction pattern taking place in spectrometer and apply it to find wavelength of the given light, resolving power and dispersive power.
	PO5	**2**	Understand the use of modern tool like Grating and spectrometer in different applications.
	PO8	**1**	Understand the norms used in design of spectrometer, grating.
	PO9	**2**	Gather ability to communicate about spectrometer, grating , dispersive power, resolving power etc.
	PO12	**1**	Understand the variety applications of spectrometer in industry.
CO5	**PO1**	**3**	Understand the polarisation taking place in Laurent's half shade polarimeter and apply it to find optical rotation, specific rotation for sugar solution.
	PO5	**2**	Understand the use of modern tool like polarimeter in different applications.
	PO8	**1**	Understand the norms used in design of polarimeter.
	PO9	**2**	Gather ability to communicate about polarimeter, polarisation, Laurent's half shade device etc.
	PO12	**1**	Understand the application of polarimeter.
CO6	**PO1**	**3**	Apply the concepts of electronics to study the characteristics of solar cell.
	PO5	**2**	Understand and devise tools for studying characteristics.
	PO8	**1**	Understand the norms used in design of characteristics apparatus for solar cell.
	PO9	**2**	Gather ability to communicate solar cell characteristics.
	PO12	**1**	Understand the application of solar cell.

CY 110 ENGINEERING CHEMISTRY LAB

COURSE INFORMATION SHEET:

Program: **CE,ME,ECE,EEE,CSE**	Degree : **B-Tech**
Course**: Engineering Chemistry Lab**	Course code**: CY 110**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

SL NO.	LIST OF EXPERIMENTS
1.	Estimation of total hardness of water-EDTA method
2.	Estimation of iron in iron ore
3.	Estimation of copper in brass
4.	Estimation of dissolved oxygen by Winkler's method
5.	Estimation of chloride in water
6.	Synthesis of polymers (a) Urea-formaldehyde resin (b) Phenol-formaldehyde resin
7.	Determination of Flash point and Fire point of oil by Pensky Martin Apparatus
8.	Determination of wavelength of absorption maximum and colorimetric estimation of Fe^{3+} in solution

9.	Determination of molar absorptivity of a compound other tha Fe3+
10.	Analysis of IR spectra of any three organic compounds
11.	Analysis of 1H NMR spectra of any three organic compounds
12.	Calibration of pH meter and determination of pH of a solution
13.	Verification of Nernst equation for electrochemical cell
14.	Potentiometric titrations; acid - base and redox titrations
15.	Conductivity measurement of salt solutions
16.	Flame photometric estimation of Na+ to find out the salinity in sand

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, RinoLaly 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.
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.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3				2							3
CO2	3				3							3
CO3	3				3							3
CO4	3				3							3
CO5	3				1							3
CO6	3				1							3

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.
	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.
	PO12	3	Recognize the need for and have the preparation and ability for water treatment 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.
	PO5	3	Create select and apply appropriate techniques for the production of polymers.
	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.
	PO5	3	Create select and apply appropriate techniques of spectral analysis for structural determination to complex engineering activities with an understanding of the limitations.
	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.
	PO5	3	Create select and apply appropriate advanced instrumental techniques to complex engineering activities with an understanding of the limitations
CO5	PO12	3	Recognize the need for and have the preparation and ability of instrumentation in the broadest context of technological change.
	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.

	PO5	1	Create select and apply appropriate advanced titration techniques to complex engineering activities with an understanding of the limitations.
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
	PO5	1	Create select and apply appropriate advanced titration and preparation techniques to complex engineering activities with an understanding of the limitations.
	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.

CE110 CIVIL WORKSHOP

COURSE INFORMATION SHEET:

Program: **ECE,EEE,CSE,CE,ME**	Degree : **B-Tech**
Course**: Civil Workshop**	Course code**: CE110**
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

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 o f a building

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	1				2	1						2				
CO2	2								3	2		1				
CO3	1					2						1				
CO4	2								2	1		1				

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	**PO1**	**1**	Able to choose the tools required for civil engineering measurements which uses fundamentals of mathematics to get a solution
	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.

	PO12	**2**	Able to understand the drawbacks of tools, if any and can think of updating it to achieve the required outcome.
CO2	**PO1**	**2**	Applying the basic concepts of engineering knowledge in setting out of building is an important aspect in the engineering field.
	PO9	**3**	Able to work in a team since setting out ,evaluating natural profile etc. are all done in the field as team work
	PO10	**2**	Able to communicate with the society for getting different inputs in order to carry out the work
	PO12	**1**	Setting out, evaluating natural profile, plumbing etc. are important in knowing the position of building to be constructed in future
CO3	**PO1**	**1**	Able to apply the fundamentals of engineering in construction of different bonds in the masonry which is an important aspect in the engineering field.
	PO6	**2**	Able to choose different type of masonry and plumbing tools according to the need of society.
	PO12	**1**	In the construction field there is use of different types of masonry for acquiring the required aesthetic appearance and strength.
CO4	**PO1**	**2**	Apply fundamental aspects of engineering knowledge for the determination of the areas and volumes of different parts of a building.
	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 utilization of the available resources.
	PO12	**1**	In the engineering construction the need for area and volume calculation of different building components are recognised as an inevitable factor to know the material requirement which leads to proper utilization of resources

CO-PSO MAPPING JUSTIFICATION:

	CO's	**PSO's**	**LEVEL**	**JUSTIFICATION**
ESL120	**CO1**	**PSO1**	**3**	Graduates will have a sound knowledge in different types of tools required for the measurements of civil engineering field works
	CO2	**PSO1**	**3**	Graduates will have a thorough knowledge in setting out, evaluating natural profile of land, plumbing understanding simple construction works.
		PSO2	**2**	Graduates will be able to add the necessity of society in terms of economy and safety in setting out operation plumbing etc.
	CO3	**PSO1**	**3**	Graduates will have a good knowledge in different types of materials available in construction industry to make the work easier.
		PSO2	**2**	Graduates will able to choose the materials according to the necessity of the society as well as economy and safety of the project.
	CO4	**PSO1**	**3**	Graduates will be able to calculate the materials required for the

				construction of a building
		PSO2	**1**	Graduates will be able to make the project more feasible by calculating the materials required in more economical ways.

ME 110 MECHANICAL ENGINEERING WORKSHOP

COURSE INFORMATION SHEET:

Program: **ECE,EEE,CSE,CE,ME**	Degree : **B-Tech**
Course**: Mechanical Engineering Workshop**	Course code**: ME 110**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

EXERCISE	LIST OF EXPERIMENTS	
1	General	Studies of mechanical tools, components and their applications:
		(a) Tools: screw drivers, spanners, Allen keys, cutting pliers etc.
		And accessories
		(b) Components: Bearings, seals, O-rings, circlips, keys etc.
		Any one model from the following:

2	Carpentry	1. T-Lap joint 2. Cross lap joint 3. Dovetail joint 4. Mortise joint 2
		(a) Demonstrating the forgability of different materials (MS, Al, Alloy steel and Cast steel) in cold and hot states.
		(b) Observing the qualitative differences in the hardness of these
3	Smithy	materials
		(c) Determining the shape and dimensional variations of Al test specimen due to forging under different states by visual inspection and measurements
		Any one exercise from the following
4	Foundry	1. Bench moulding 2. Floor moulding 3. Core making
		Any one exercise from the following
5	Sheet Metal	Making 1. Cylindrical 2. Conical 3. Prismatic shaped jobs from
		sheet metal
		Any one exercise from the following
6	Welding	Making joints using Electric arc welding. Bead formation in
		horizontal, vertical and overhead positions
		Filing exercise and any one of the following exercises
		Disassembling and reassembling of 1. Cylinder piston assembly
7	Fitting and Assembly	2. Tail stock assembly 3. Time piece/clock 4. Bicycle or any
		machine.
8	Machines	Demonstration and applications of Drilling machine, Grinding machine, Shaping machine, Milling machine and lathe

PREREQUISITE: Nil

1	Introduction to basic manufacturing process like welding, moulding, fitting, assembling, smithy, carpentry works etc.
2	Familiarization of basic manufacturing hand tools and equipment's like files, hacksaw, spanner chisel hammers, etc.
3	Familiarization of various measuring devises like Vernier height gauge, Vernier calliper, steel rule etc.
4	Study of various machine tools like lathe, drilling machine, milling machine etc.

COURSE OBJECTIVES

COURSE OUTCOMES:

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

COs	Description
CO1	Acquire knowledge to explain the various manufacturing process in the basic mechanical engineering workshop sections- smithy, carpentry, assembling, welding etc.
CO2	Identify the various hand tools used in the basic mechanical engineering workshop sections-

	smithy, carpentry, assembling, welding etc.
CO3	Able to choose different measuring devices according to the work.
CO4	Ability to name and summarize the operations of various machine tools like lathe, milling, drilling and shaping machines.
CO5	Skill achieved to construct models by using basic mechanical workshop sections like welding, moulding, smithy, carpentry etc.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1		1						2	2				1
CO2			1						2	2				1
CO3			1						2	2				1
CO4	1		1						2	2				1
CO5	1		1						2	2				1

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO1	PO1	1	Knowledge in different manufacturing methods can be applied for solving realtime practical issues.
	PO3	1	Will achieve the ability to fabricate different components for solving realtime practical problems.
	PO9	2	Will understand the imporance of individuals working as a team to solve problems.
	PO10	2	By writing records and drawing sketches students can understand the importance of effective communication
CO2	PO3	1	Select and use tools of different kind to fabricate different systems.
	PO9	2	Will understand the imporance of individuals working as a team to solve problems.
	PO10	2	By writing records and drawing sketches students can understand the importance of effective communication
CO3	PO3	1	Knowledge in different tools will help for the manufacturing of components with accuracy.
	PO9	2	Will understand the imporance of individuals working as a team to solve problems.
	PO10	2	By writing records and drawing sketches students can understand the importance of effective communication
CO4	PO1	1	Acquired knowledge in principles of basic science and engineering can be used to learn operation of different machines
	PO3	1	Select and use machines of different kinds to fabricate different systems

	PO9	2	Will understand the imporance of individuals working as a team to solve problems.
	PO10	2	By writing records and drawing sketches students can understand the importance of effective communication
CO5	PO1	1	Acquired knowledge in principles of basic science and engineering can be used to solve real time engineering problems.
	PO3	1	Help to fabricate different systems to find solutions for real time problems.
	PO9	2	Will understand the imporance of individuals working as a team to solve problems.
	PO10	2	By writing records and drawing sketches students can understand the importance of effective communication

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
C01	PSO2	1	Students will identify the need of self-learning and continuous learning to develop required skill in using various tools for solving engineering related problems
C02	PSO2	1	
C03	PSO2	1	
C04	PSO2	1	
C05	PSO2	1	
C06	PSO2	1	

EE 110 ELECTRICAL ENGINEERING WORKSHOP

COURSE INFORMATION SHEET:

Program: **CE,ME,ECE,EEE,CSE**	Degree : **B-Tech**
Course**: Electrical Engineering Workshop**	Course code**:EE 110**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

Sl.No:	LIST OF EXPERIMENTS
1	Identify different types of cables/wires and switches and their uses.
2	Identify different types of fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage.
3	Wiring of simple light circuit for controlling light/fan point (PVC conduit wiring).
4	Wiring of light/fan circuit using Two way switches (Staircase wiring)
5	Wiring of fluorescent lamps and light sockets (6 A)

6	Wiring of Power circuit for controlling power device (16A socket)
7	Godown wiring / Tunnel wiring
8	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, Main switch and Energy meter.
9	Measurement of voltage, current and power in single phase circuit using voltmeter, ammeter and wattmeter. Calculate the power factor of the circuit.
10	Wiring of backup power supply including inverter, battery and load for domestic installations.
11	Demonstration and measurement of power consumption of electric iron, mixer grinder, single phase pump, exhaust fan, etc.
12	Energy meter reading and tariff calculation.

PREREQUISITE:

1	EE100-Introduction to Electrical Engineering

COURSE OBJECTIVES:

1	To familiarize the students with commonly used components, accessories and measuring equipment in Electrical installations.
2	The course also provides hands on experience in setting up of simple wiring circuits.

COURSE OUTCOMES:

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

CO	DESCRIPTION
1	Familiarity with supply arrangements and their limitations, knowledge of standard voltages and their tolerances, safety aspects of electrical systems and importance of protective measures in wiring systems.
2	Knowledge about the types of wires, cables and other accessories used in wiring. Creating awareness of energy conservation in electrical systems.
3	Students should be able to wire simple lighting circuits for domestic buildings, distinguish between light and power circuits.
4	To measure electrical circuit parameters and current, voltage and power in a circuit.
5	Familiarity with backup power supply in domestic installation.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**2**		**2**				**1**		**2**			**2**				
CO2	**2**		**1**		**1**		**1**		**1**			**2**		**1**		**1**
CO3	**2**		**1**		**1**		**1**		**1**			**2**		**1**		**1**
CO4	**2**		**1**		**1**		**1**		**1**			**2**		**1**		**1**
CO5	**2**		**1**		**1**		**1**		**1**			**2**		**1**		**1**

CO-PO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION
EE 110	CO1	PO1	2	With the basic knowledge, students will be able to demonstrate measures against electrical shocks
		PO3	2	Students will be able to identify different switches,fuses, circuit breakers.
		PO7	1	Students will be able to identify the tools used for electrical wiring
	CO2	PO1	2	Students will be able to make use of their basic knowledge on electrical equipments to identify the elements
		PO3	1	Students will be able to design circuits using the elements
		PO5	1	With the help of knowledge on electrical equipments, they will be able to extend the area to the modern wiring for many situations.
	CO3	PO1	2	The basic knowledge on wiring can help students to reach solutions in many problems
		PO3	1	Students will be able to design solutions in many areas
		PO5	1	Modern tools can be made use in many situations
		PO7	1	Students will be able to contribute electrical wiring in various domestic applications
		PO9	1	Will be able to contribute for the team work in reaching solutions for the problems im light and power circuits
		PO12	2	Students can build on their basics to go to the depths of knowledge
	CO4	PO1	2	Students will be able to make use of their basic knowledge to find solutions for engineering problems
		PO3	1	Students will be able to design solutions for the issues of society with their knowledge on circuit parameters such as power,current and voltage
		PO7	1	Students will be able to contribute power distribution arrangement
		PO12	2	Students will be able to build up their knowledge in advanced systems
	CO5	PO1	2	Students will be able to make use of their basic knowledge in back up power supply to find solutions for engineering problems
		PO3	1	Students will be able to design solutions for the issues of society with their knowledge on power system
		PO7	1	Students will be able to contribute for the sustainable development of the society.

CO-PSO MAPPING JUSTIFICATION:

	CO's	PO's	LEVEL	JUSTIFICATION
EE331	CO1	PSO1	3	To Apply the Engineering knowledge to identify, Analyze various types of wires,cables,fuses and circuit breakers
	CO3	PSO2	3	Explore the technical knowledge and development of professional methodologies in various wiring circuits
	CO4	PSO1	3	To Apply the Engineering knowledge to develop power distribution arrangement
	CO5	PSO2	3	Explore the technical knowledge and development of professional methodologies in wiring of domestic applications

EC 110 ELECTRONICS ENGINEERING WORKSHOP

COURSE INFORMATION SHEET:

Program: **CE,ME,ECE,EEE,CSE**	Degree : **B-Tech**
Course**: Electronics Engineering Workshop**	Course code**:EC 110**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

Sl.No:	LIST OF EXPERIMENTS
1	Identify different types of cables/wires and switches and their uses.
2	Identify different types of fuses & fuse carriers, MCB and ELCB, MCCB with ratings and usage.
3	Wiring of simple light circuit for controlling light/fan point (PVC conduit wiring).
4	Wiring of light/fan circuit using Two way switches (Staircase wiring)
5	Wiring of fluorescent lamps and light sockets (6 A)

6	Wiring of Power circuit for controlling power device (16A socket)
7	Godown wiring / Tunnel wiring
8	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, Main switch and Energy meter.
9	Measurement of voltage, current and power in single phase circuit using voltmeter, ammeter and wattmeter. Calculate the power factor of the circuit.
10	Wiring of backup power supply including inverter, battery and load for domestic installations.
11	Demonstration and measurement of power consumption of electric iron, mixer grinder, single phase pump, exhaust fan, etc.
12	Energy meter reading and tariff calculation.

PREREQUISITE: **Nil**

COURSE OBJECTIVES:

1	To identify the active and passive components
2	To get hands-on assembling, dismantling, testing, fabrication and repairing systems by utilizing the tools available in the workshop.

COURSE OUTCOMES:

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

CO	DESCRIPTION
1	Identify and test various electronic components and instruments.
2	Draw circuit schematics with EDA tools.
3	Demonstrate inter connection methods and soldering practice.
4	Assemble, test and dismantle electronic circuits on boards and familiarization of various electronic systems.
5	Understand PCB fabrication process.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	**2**	**1**			**1**							**2**				
CO2	**2**								**2**	**1**					**2**	
CO3			**1**													
CO4			**1**													
CO5			**1**													**1**

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION

CO1	**PO1**	**2**	Application of Ohm's law and other basics they study in IEC
	PO2	**1**	Identify the problems with their circuits and troubleshoot
	PO5	**1**	Familiarization of EDA tool- PSPICE
	PO12	**2**	Circuits can be implemented using PSpice
CO2	**PO1**	**2**	Familiarization of EDA tool- PSPICE
	PO9	**2**	Group work is essential for all the activities
	PO10	**1**	Effective communication required for group work
CO3	**PO3**	**1**	Able to develop circuits on breadboard.
CO4	**PO3**	**1**	Implement system components on PCB.
CO5	**PO3**	**1**	Understand PCB fabrication process.

CO-PSO MAPPING JUSTIFICATION:

CO's	PO's	LEVEL	JUSTIFICATION
CO2	**PSO2**	**2**	Graduates will be able to conduct experiments and develop applications using electronic design automation (EDA)tools
CO5	**PSO3**	**1**	Graduates will able to know Implementation & able to plan the process

CS 110 COMPUTER SCIENCE WORKSHOP

COURSE INFORMATION SHEET:

Program: **CSE**	Degree : **B-Tech**
Course**: Computer Science Workshop**	Course code**:CS 110**
L-T-P**: 0-0-2**	Credit**: 1**

SYLLABUS:

Sl.No:	EXERCISE
	Introduction: Familiarization of hardware components of a desktop computer (motherboard, cards, memory, slots, power, cables etc.) Familiarization of Operating systems and various tools, particularly those for scientific computing, open source tools etc.Programming exercises in Python based on the course Introduction to Computing-and Problem Solving (BE 101-05). The exercises may include programs using the following concepts-

1.	Decision making, branching and looping 1. Variables, Expressions & Conditionalstatements 2. Iterationstatements(While,Foretc.)
2.	Function & Function calls L Function calls, Mathfunctions 2. Parameters andarguments 3. Adding new functions,Recursion
3.	Strings 1. Stringtraversal 2. String searching,Comparison 3. Other important Stringmethods
4.	Lists, Tuples and Dictionaries 1.Traversing List, List Operations 2.Creation of Dictionary and Operations 3. Lists and Tuples

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Computer Fundamentals, Anita Goel, Pearson Education
T	Computer Basics and C Programming, V. Rajaraman, Prentice-Hall India
T	How to think like a Computer Scientist: Learning with Python, Allen Downey et al., Green Tea Press
R	Prelude to Programming: Concepts & Design, Stewart Venit and Elizabeth Drake, Pearson India.
R	Fundamentals of Computers, V. Rajaraman, Pretice Hall India
R	Problem Solving & Programming Concepts, Maureen Sprankle , Pearson India
R	Think Python, Allen Downey, Shroff Publisher Oreilly
R	Head First Python, Paul Barry, Oreilly Publishers
R	Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates Inc

PREREQUISITE: NIL

COURSE OBJECTIVES:

1	Ability to design algorithmic solution to problems.
2	Ability to convert algorithms to Python programs.
3	Ability to design modular Python programs using functions
4	Ability to design programs with Interactive Input and Output, utilizing arithmetic expression repetitions, decision making, arrays.
5	Ability to design programs using file Input and Output
6	Ability to develop recursive solutions

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

SL.NO	DESCRIPTION
1	Students will be able to analyze a problem
2	Find appropriate programming language construct to be used and implement Python program for the problem.

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P0 10	PO 11	PO 12
CO 1	2	2	2	2	-	-	-	-	2	-	-	1
CO 2	-	2	3	2	-	-	-	-	2	-	-	-
Overall	2	2	**2**	2	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**1**

CS 120 COMPUTER PROGRAMMING LAB

COURSE INFORMATION SHEET:

Program: **CSE**	Degree :**B-Tech**
Course**: Computer Programming Lab**	Course code**: CS 120**
L-T-P**:0-0-3**	Credit **: 1**

SYLLABUS:

Sl.No:	EXPERIMENTS
1	Decision making, branching and looping - if, if else statements - switch, goto statements - while, do, for statements
2	Arrays and strings - one-dimensional, two-dimensional, multidimensional arrays - reading/writing strings - operations on strings - string handling
3	Functions - user defined functions - function calls, arguments & return values - nesting of functions - recursive functions - passing arrays and strings to functions
4	Structures and unions - copying and comparing structure variables - arrays of structures - arrays within structures - structures with in structures - structures and functions - unions

5	Pointers - pointers and arrays - pointers and character strings - array of pointers - pointers and functions - pointers and structures
6	Files, memory allocation, bit-level programming -files -defining, opening/closing, input -output operations -command line arguments -memory allocation functions

REFERENCES:

1.	Rajaraman V Computer Basics and Programming in C, PHI
2.	Anita Goel and Ajay Mittal, Computer fundamentals and Programming in ., Pearson.
3.	Gotfried B.S., Programning with C, Schaum Series, Tata McCiraw Hill
4.	Horowitz and Sahni, Fundamentals of data structures Computer Science Press.
5.	Gary J. Bronson, ANSI C Programming, CENGAGE Learning India.
6.	Stewart Venit and Elizabeth Drake, Prelude to Programming Concepts & Design, Pearson.
7.	Dromy RG., How to Solve it by Computer, Pearson.
8.	Kernighan and Ritche D.M., The C. Programming Language, PHI.

PREREQUISITE:CS100 COMPUTER PROGRAMMING

COURSE OBJECTIVES:

1	To implement algorithms studied in the course Computer Programming
2	To learn the implementation of control structures, Iterations and recursive functions
3	To implement operations on different types of files

COURSE OUTCOMES:

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

CO s	DESCRIPTION
1	Students will be able to analyze a problem
2	Find appropriate programming language construct should be used & implement C program for the problem.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	2	2	2	2										1	1	
CO2		2	3	2	2									3		

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	**PO1**	Students can apply the knowledge of fundamentals to analyze a computational problem
	PO2	Students can analyse complex problems
	PO3	Students can develop solutions for complex problems
	PO4	Students can select appropriate C language construct for synthesis and interpretation of data
CO2	**PO2**	Select appropriate C language construct like looping , branching statements while analyzing engineering problems
	PO3	Develop Programming solutions for complex problems using looping , branching statements etc
	PO4	Design algorithms for synthesis and interpretation of data
	PO5	Choose appropriate C constructs for various software there by delivering quality products

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO1**	Students can appropriate analyse the problems, evaluate them and recognize potential risks and provide creative solutions in multi disciplinary areas
	PSO2	To use mathematical methodologies to solve problem using suitable mathematical analysis and suitable algorithm.
CO2	**PSO1**	Complex algorithms can be implemented using various C programming constructs

CS 100 COMPUTER PROGRAMMING

COURSE INFORMATION SHEET:

Program: **CSE**	Degree :**B-Tech**
Course**:Computer Programming**	Course code**: CS 100**
L-T-P**:2-1-0**	Credit**:3**

SYLLABUS:

MODULE	CONTENT	HOURS	UNIVERSITY % MARKS
I	Introduction to C Language: Preprocessor directives, header files, data types and qualifiers. Operators and expressions. Data input and output, control statements.	7	15
II	Arrays and strings- example programs. Two dimensional arrays - matrix operations. Structure, union and	8	15

	enumerated data type.		
III	Pointers: Array of pointers, structures and pointers. Example programs using pointers and structures.	6	15
IV	Functions – function definition and function prototype. Function call by value and call by reference. Pointer to a function –. Recursive functions.	7	15
V	Sorting and Searching : Bubble sort, Selection sort, Linear Search and Binary search. Scope rules Storage classes. Bit-wise operations.	7	20
VI	Data files – formatted, unformatted and text files. Command line arguments – examples.	7	20

TEXT BOOKS:

1.	Rajaraman V Computer Basics and Programming in C, PHI
2.	Anita Goel and Ajay Mittal, Computer fundamentals and Programming in ., Pearson.
3.	Gotfried B.S., Programning with C, Schaum Series, Tata McCiraw Hill
4.	Horowitz and Sahni, Fundamentals of data structures Computer Science Press.
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6.	Stewart Venit and Elizabeth Drake, Prelude to Programming Concepts & Design, Pearson.
7.	Dromy RG., How to Solve it by Computer, Pearson.
8.	Kernighan and Ritche D.M., The C. Programming Language, PHI.

PREREQUISITE:

NIL

COURSE OBJECTIVES:

1	To understand the fundamental concept of C programming and use it in problem solving

COURSE OUTCOMES:

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

CO's	DESCRIPTION
1	Identify appropriate C language constructs to solve problems.
2	Analyze problems, identify subtasks and implement them as functions/procedures
3	Implement algorithms using efficient C-programming techniques.
4	Explain the concept of file system for handling data storage and apply it for

	solving problems
5	Apply sorting & searching techniques to solve application programs

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1		1	2	2	1									2	2	1
CO2		1	2	2	1									2	2	1
CO3		2	2	2	1									2	2	1
CO4		1	2	2	1									2	2	1
CO5			1	1	1									3	3	1

CO-PO MAPPING JUSTIFICATION:

CO's	PO's	JUSTIFICATION
CO1	**PO2**	Students can select appropriate C language construct while analyzing engineering problems
	PO3	Students can develop solutions for complex engineering problems by selecting appropriate C language construct
	PO4	Students can select appropriate C language construct for synthesis and interpretation of data
	PO5	Students will be able to select appropriate techniques in C to model complex engineering activities
CO2	**PO2**	Students can analyze problems, identify subtasks and implement them as functions/procedures. while analyzing engineering problems
	PO3	Students can develop solutions for complex engineering problems by implementing them as functions
	PO4	Students can use functions for the design of experiments
	PO5	Complex problems can be subdivided into subtasks and can be implemented using functions
CO3	**PO2**	Students can develop algorithms leading to implementation of efficient C-programs while analyzing problems.
	PO3	Students can implement algorithms of complex engineering problems using efficient C programs
	PO4	Students can conduct investigation of complex problems by implementing the algorithms in C language
	PO5	Students can implement algorithms by selecting appropriate techniques and tools
CO4	**PO2**	Students can use the concept of file system for solving problems.
	PO3	Students can use files for handling data while implementing algorithms of complex problems
	PO4	Students can use files for the synthesis and interpretation of data

	PO5	Files can be used for storage while developing and using IT tools
CO5	**PO3**	Students will be able to use searching and sorting techniques for the development of solutions
	PO4	Students can apply various searching and sorting techniques for real time applications.
	PO5	Searching and Sorting techniques can be used for prediction and modeling of complex engineering activities

CO-PSO MAPPING JUSTIFICATION:

CO's	PSO's	JUSTIFICATION
CO1	**PSO1**	Students can select appropriate C language construct to design solutions for problems in multi disciplinary areas
	PSO2	Students can choose appropriate C constructs for various software there by delivering quality products
	PSO3	C fundamentals can be applied in research and development of innovative products
CO2	**PSO1**	Functions can be used to design solutions for complex engineering problems by dividing them into subtasks
	PSO2	Functions can be used to modularize a complex problem while developing quality software products meeting the demands of the industry
	PSO3	Many built in and user-defined functions can be used for research and development of innovative products
CO3	**PSO1**	Complex algorithms can be implemented using various C programming constructs
	PSO2	Students acquire the ability to design algorithms and implement it as programs by applying standard practices in software project development
	PSO3	Complex algorithms for research can be implemented using C programs
CO4	**PSO1**	Complex engineering solutions can be designed with the help of files for storing data and retrieving from them later
	PSO2	Files are widely used in quality software to store large amount of data
	PSO3	Different types of files can be used for storing the results of various stages of research
CO5	**PSO1**	Various searching and sorting methods are commonly used while designing solution to complex engineering problems
	PSO2	End products in various software can be enhanced using sorting methods thereby arranging thee result in a better way
	PSO3	Researchers widely use searching and sorting for better manipulation of data available with them.