Puducherry Technological University,
Puducherry –605014
(A Technological University of Government of Puducherry)

Curriculum and Syllabi
for
First Year B.Tech. Degree Programme
(Effective from Academic year 2024-25)

(Approved in the Fourth Academic Council Meeting held on 23rd December 2024)

CURRICULUM AND SYLLABUS

The Curriculum of B.Tech. is designed to fulfil the Program Outcomes (PO) listed below.

PROGRAM OUTCOMES (PO)

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Semester-wise First Year Courses and Credits

Curriculum for First Year B.Tech. Degree Courses

Semester I

Group-I (EC1, EC2, ME1, ME2, MT1, CH1)

Course Code	Course	CCC	Periods			Credits
			L	T	P	
	3 weeks compulsory Induction Program					
MAUC101	Mathematics I	BSC	3	1		4
XXUC1xx	Professional Core I	PCC	3	1		4
PHUC101	Physics	BSC	3			3
MEUC101	Engineering Graphics	ESC	1		4	3
HSUA101	English for Communication	AEC	2			2
GEUS101	Basic Engineering Skills Laboratory - I	SEC	1		4	3
GEUV101	NSS, Yoga and Health	VAC			2	1
PHUC102	Physics Laboratory	BSC			2	1
Total			13	2	12	-
			27			21

Group-II (CS1, CS2, IT1, EE1, EI1, CE1, CE2)

Course Code	Course	CCC	Periods			Credits
			L	T	P	
	3 weeks compulsory Induction Program					
MAUC101	Mathematics I	BSC	3	1		4
XXUC1xx	Professional Core I	PCC	3	1		4
CYUC101	Chemistry	BSC	3			3
CSUC101	Programming for Problem Solving	ESC	2			2
HSUA101	English for Communication	AEC	2			2
GEUS102	Basic Engineering Skills Laboratory - II	SEC	1		4	3
GEUV102	Essence of Indian Traditional Knowledge	VAC	1			1
CYUC102	Chemistry Laboratory	BSC			2	1
CSUC102	Computer Programming Laboratory	ESC			2	1
Total			15	2	8	
			25			21

XX – Department Code
xx- serial number

Semester II

Group-I (EC1, EC2, ME1, ME2, MT1, CH1)

Course Code	Course	CCC*	Periods			Credits
			L	T	P	
MAUC102	Mathematics II	BSC	3	1		4
XXUC1xx	Professional Core II	PCC	3	1		4
CYUC101	Chemistry	BSC	3			3
CSUC101	Programming for Problem Solving	ESC	2			2
HSUA101	Professional English	AEC	2			2
GEUS102	Basic Engineering Skills Laboratory - II	SEC	1		4	3
GEUV102	Essence of Indian Traditional Knowledge	VAC	1			1
CYUC102	Chemistry Laboratory	BSC			2	1
CSUC102	Computer Programming Laboratory	ESC			2	1
Total			15	2	8	
			25			21

Group-II (CS1, CS2, IT1, EE1, EI1, CE1, CE2)

Course Code	Course	CCC*	Periods			Credits
			L	T	P	
MAUC102	Mathematics II	BSC	3	1		4
XXUC1xx	Professional Core II	PCC	3	1		4
PHUC101	Physics	BSC	3			3
MEUC101	Engineering Graphics	ESC	1		4	3
HSUA102	Professional English	AEC	2			2
GEUS101	Basic Engineering Skills Laboratory - I	SEC	1		4	3
GEUV101	NSS, Yoga and Health	VAC			2	1
PHUC102	Physics Laboratory	BSC			2	1
Total			13	2	12	
			27			21

Exit Option for the students who opt to exit after completion of first year of B.Tech Programme and have secured a minimum of 42 credits will be awarded a UG certificate in a discipline if, in addition they complete one vocational course of 4 credits during the summer vacation of the first year

Professional Core Courses:

Department of Civil Engineering:

1. CEUC101 Applied Mechanics
2. CEUC102 Building Technology

Department of Mechanical Engineering

1. MEUC102 Engineering Mechanics
2. MEUC103 Engineering Thermodynamics

Department of Electronics and Communication Engineering

1. ECUC101 Electronic Device and Circuits
2. ECUC102 Analog Communications

Department of Computer Science and Engineering

1. CSUC103 Fundamentals of Computer Organization
2. CSUC104 Software Engineering

Department of Electrical and Electronics Engineering

1. EEUC101 Elements of Electrical Engineering
2. EEUC102 Electronic Devices and Circuits

Department of Electronics and Instrumentation Engineering

1. EIUC101 Fundamentals of Instrumentation
2. EIUC102 Basics of Industrial Automation and Control

Department of Chemical Engineering

1. CHUC101 Basics of Chemical Engineering
2. CHUC102 Process Calculations

Department of Information Technology

1. ITUC101 Information Technology Essentials
2. ITUC102 Digital Logic Design

Department of Mechatronics Engineering

1. MTUC101 Basics of Mechatronics
2. MTUC102 Basics of Sensors and Measurements

3 weeks compulsory Induction Program

Induction program for students to be offered right at the start of the first year. The Induction program contains.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

Department : **Mathematics**		Programme: **B.Tech.**						
Semester : **First**		Course Category Code: **BSC**			Semester Exam Type: **TY**			
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
MAUC101	**Mathematics-I**	3	1	-	4	40	60	100
Prerequisite:	-							

Course Outcome At the end of the course Students will be able to		
	CO1	**Apply** differential calculus to notions of curvature, evolutes and utilize Beta and Gamma functions to solve improper integrals.
	CO2	**Make use of** mathematical tools in evaluating multiple integrals and their applications.
	CO3	**Solve** problems of first order differential equations of various types.
	CO4	**Determine** solution of higher order ODE and simultaneous differential equations.
	CO5	**Estimate** gradient, divergence, curl and use Gauss, Stokes and Green's theorem to simplify evaluation of integrals.

UNIT-I	**Differential Calculus**	**Periods: 12**
Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.		**CO1**
UNIT-II	**Multi variable calculus**	**Periods: 12**
Multiple Integrals, change of order of integration in double integrals, Applications: Plane areas (double integration), Change of variables (Cartesian to polar), Double and triple integrations, Volumes by triple integration.		**CO2**
UNIT-III	**First order Ordinary Differential Equation**	**Periods: 12**
Exact equations, First order linear equations, Bernoulli's equation, Equations not of first degree, equations solvable for p, equations solvable for y, equations solvable for x - Clairaut's type - simple applications, orthogonal trajectories, growth and decay.		**CO3**
UNIT-IV	**Higher Order Ordinary Differential Equation**	**Periods: 12**
Linear differential equations of higher order - with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, simultaneous linear differential equations.		**CO4**
UNIT-V	**Vector Calculus**	**Periods: 12**
Gradient, divergence and curl. Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integral, Theorems of Stokes and Gauss divergence (without proof). Simple applications involving cubes and rectangular parallelopipeds (only planar surface).		**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:- 00**	**Total Periods: 60**

Reference Books:

1. Veerarajan T, Engineering Mathematics I , McGraw-Hill Education(India) Private Limited, 2014
2. Veerarajan T, Engineering Mathematics II , McGraw-Hill Education(India) Private Limited, 2015
3.Venkataraman M.K., Engineering Mathematics, Vol. I&II, The National Publishing Company, Chennai, 2008.
4.Erwin Kreyszig, Advanced Engineering Mathematics (9th Ed), John Wiley & Sons, New Delhi, 2011.
5.Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, Eleventh Reprint, 2018.
6.Bali N. and Goyal M., Advanced Engineering Mathematics, Laxmi Publications Pvt. Ltd., New Delhi, 9th Edition, 2011.

CO – PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2												
CO 2	3	3	2												
CO 3	3	3	3												
CO 4	3	3	3												
CO 5	3	3	2												

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Mathematics**			Programme : **B. Tech.**						
Semester : **Second**			Course Category Code: **BSC**			Semester Exam Type: **TY**			
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
MAUC102	**Mathematics-II**		3	1	-	4	40	60	100
Prerequisite:	-								
Course Outcome At the end of the course Students will be able to	**CO1**	Define and explain the basic concepts of Matrices and make use of it to solve system of equations.							
	CO2	Analyze the continuous and discrete functions in terms of Fourier series expansion.							
	CO3	Explain the concept of Fourier Transform and make use of it to evaluate Integrals.							
	CO4	To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.							
	CO5	Explain the concepts of complex integration techniques and contour integration techniques which can be used in real integrals.							
UNIT-I	**Matrices**					**Periods: 12**			
Inverse and rank of a matrix, System of linear equations, Symmetric, Skew Symmetric and Orthogonal matrices, Eigenvalues and Eigenvectors of a real matrix, Characteristic equation, Cayley-Hamilton Theorem (statement only), Diagonalization of matrices.									**CO1**
UNIT-II	**Fourier Series**					**Periods: 12**			
Dirichlet's conditions - Expansion of periodic functions into Fourier series- Change of interval- Half-range Fourier series. Complex form of Fourier series - Root mean square value - Parseval's theorem on Fourier coefficients - Harmonic analysis.									**CO2**
UNIT-III	**Fourier Transform**					**Periods: 12**			
Fourier transform, Inverse Fourier transform, definition and properties - Evaluation of integrals- Fourier cosine and sine transform, definitions and evaluation of integrals using cosine and sine transforms.									**CO3**
UNIT-IV	**Complex Valued function and Conformal Mapping**					**Periods: 12**			
Definition of a Complex valued function f(z) and its derivative - Analytic functions - Necessary condition for a function f(z) to be analytic (in Cartesian) - Cauchy-Riemann equation - statement of C-R equation in polar form -sufficient condition for f(z) to be analytic(statement only)- harmonic function- Harmonic and orthogonal properties of analytic function – Construction of analytic functions. Conformal mapping – Simple and standard transformations like w = z+c, cz, sinz, cosz, 1/z, Bilinear transformation (excluding Schwarz-Christoffel transformation).									**CO4**
UNIT-V	**Complex Integration**					**Periods:12**			
Cauchy's Integral theorem, Taylor's and Laurent's theorem (without proof), Classification of singularities. Residues and evaluation of residues – Cauchy's Residue theorem, Contour integration – Evaluation of real integrals – unit circle and semi-circular contour (excluding poles on boundaries).									**CO5**
Lecture Periods: 45	**Tutorial Periods: 15**		**Practical Periods: 00**			**Total Periods: 60**			
Reference Books:									
1. Veerarajan T., Engineering Mathematics II , McGraw-Hill Education(India) Private Limited, 2018									

2. Veerarajan T., Transforms and Partial Differential Equations , McGraw-Hill Education(India) Private
Limited, 2016
3. Venkataraman M.K., Engineering Mathematics, Vol. II and III, The National Publishing Company, 2008.
4. Erwin Kreyszig, Advanced Engineering Mathematics (Ninth Edition), John Wiley & Sons, New Delhi, 2011
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, Eleventh Reprint, 2018.
6. Bali N. and Goyal M., Advanced Engineering Mathematics, Laxmi Publications Pvt. Ltd., New Delhi, Ninth Edition, 2011.

CO – PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2												
CO 2	3	3	2												
CO 3	3	3	2												
CO 4	3	3	2												
CO 5	3	3	2												

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Physics**		Programme: **B. Tech.**						
Semester : **First/Second**		Course Category Code: **BSC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
PHUC101	**Physics**	3	–	–	3	40	60	100

Prerequisite:	NIL	
Course Outcomes: At the end of the course, the students should be able to	**CO1**	Recall and Illustrate the basic concepts of physics in various fields like electromagnetism, dielectric, ultrasonic & acoustics, matter waves, optics and lasers.
	CO2	Develop the skills to analyse and solve the problems related to field theory of electricity and magnetism, mechanism of polarization, wave equation, Sabine's formula, absorption coefficient, optical phenomena and laser actions.
	CO3	Interpret the basic concepts of electrostatics and magnetostatics, types of polarization, ultrasonic techniques, time dependent and independent Schrödinger wave equations, resolving power of prism/grating and types of lasers.
	CO4	Assess the acquired information in the respective topics like electromagnetism, dielectric, ultrasonic & acoustics, matter waves, optics and lasers.
	CO5	Compile the basic physics laws and principles in the respective field for different applications.

UNIT-I	**Electromagnetic Theory**	**Periods: 09**
Electrostatic field – Electric potential – Divergence of Electrostatic Field – Gauss Law and its applications - Field due to spherical charge distribution. Biot-Savart Law – Divergence and Curl of Static Magnetic Field – Ampere's Circuital Law in Differential form – Magnetic Vector Potential, Applications.		**CO1-CO5**

UNIT-II	**Dielectrics**	**Periods: 09**
Dielectric Polarization and its Mechanisms – Dielectric Loss – Dielectric Breakdown – Calculation of Electronic and Ionic Polarizabilities – Temperature and Frequency Dependence of Polarization – Internal field in Solids – Claussius-Mossotti Relation.		**CO1-CO5**

UNIT-III	**Ultrasonics and Acoustics**	**Periods: 09**
Ultrasonics: Piezo-electric Effect – Piezo-electric Generator – Magnetostriction Effect– Magnetostriction oscillator – Industrial Applications of Ultrasonics. **Acoustics**: Reverberation time – Sabine's formula – Determination of Absorption co-efficient.		**CO1-CO5**

UNIT-IV	**Quantum Mechanics**	**Periods: 09**
Matter Waves – de Broglie hypothesis – Uncertainty Principle – Schrödinger wave equations – time dependent – time independent – Physical Significance of Wave Function – Application to Particle in a one-dimensional Potential Box – Concept of Quantum Mechanical Tunnelling (without derivation) – Applications of Tunneling (qualitative).		**CO1-CO4**

UNIT-V	**Optics and Lasers**	**Periods: 09**
Interference: Air-wedge – Newton's rings – Michelson's interferometer – Determination of Wavelength of a Monochromatic Light Source. **Diffraction**: Rayleigh's criterion – resolving power of grating and prism. **Lasers:** Principles of laser – Spontaneous and Stimulated emissions – Einstein's theory of Matter Radiation interaction – A and B coefficients – Types of Lasers – GaAs laser.		**CO1-CO5**

Lecture Periods: 45	**Tutorial Periods: –**	**Practical Periods: –**	**Total Periods: 45**
Text Books:			

1. V. Rajendran, Engineering Physics, 2nd Edition, TMH, New Delhi 2011.
2. Avadhanulu M. N., Engineering Physics, S. Chand & Co., 2007.

Reference Books:

1. David Griffiths, Introduction to Electrodynamics, 3rd Edition, Eastern Economy Edition, 2011.
2. D. J. Griffiths, Quantum mechanics, Pearson Education, 2014.
3. A.S. Vasudeva, Modern Engineering Physics, S. Chand & Co., 2006.
4. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, Willey publications, 2013.
5. H. J. Pain, The physics of vibrations and waves, Wiley publications, 2005.
6. Ajoy Ghatak, Optics, 5th Edition TMH, New Delhi, 2012.
7. K. Thyagarajan and Ajoy Ghatak, Lasers Fundamentals and Applications, 2nd Edition, Springer 2010.
8. Avadhanulu M. N., P. G. Kshirsagar, A text book of Engineering Physics, Radiant publishers, 2017.

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Physics**		Programme: **B.Tech.**						
Semester : **First/Second**		Course Category Code: **BSC**				Semester Exam Type: **Practical**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
PHUC102	**Physics Laboratory**	–	–	2	1	40	60	100
Prerequisite:	NIL							

Course Outcomes: At the end of the course, the students should be able to		
	CO1	Recall the physical parameters related to Physics theory.
	CO2	Extend the concepts and executing the experimental setup.
	CO3	Experiments with optics, thermal and electrical conductivity, magnetic field and laser.
	CO4	Analyse and interpret the results through calculations.
	CO5	Conclude the experimental findings.

Choice of any 10 experiments from the following	
1. Radius of curvature of lens – Newton's Ring 2. Thickness of an object – Air wedge 3. Resolving power of Prism – Spectrometer 4. Resolving power of Grating – Spectrometer 5. Specific rotatory power – Lorentz's half shade polarimeter 6. Wavelength of laser source using grating and determination of particle size 7. Determination of numerical aperture & acceptance angle of an optical fiber 8. Wavelength of laser beam – Michelson's interferometer 9. Coefficient of thermal conductivity – Lee's disc method 10. Coefficient of thermal conductivity – Radial flow method	CO1-CO5
11. Electrical conductivity of semiconductor – Two probe method 12. Field along the axis of a coil carrying current 13. Magnetic dipole moment – Deflection magnetometer 14. Young's modulus – Uniform bending 15. Acceleration due to gravity – Compound pendulum	CO1-CO5

Lecture Periods: –	**Tutorial Periods: –**	**Practical Periods: 30**	**Total Periods: 30**

Reference Book:

1. Physics Laboratory manual prepared by Department of Physics, PTU

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Chemistry**		Programme : **B.Tech**						
Semester : **First/Second**		Course Category Code: **BSC**			Semester Exam Type: **TY**			
Course Code	Course	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CYUC101	**Chemistry**	3	-	-	3	40	60	100
Prerequisite:	-							

Course Outcome		
	After completion of the course, the students will be able to:	
	CO1	Explain the concepts of Water Chemistry in the context of industrial usage.
	CO2	Discover the fundamental concepts of electrode potential in view of practical applications
	CO3	Analyse chemical structures in terms of chemical bonding
	CO4	Illustrate the organic reaction mechanisms with respect to the synthesis of drugs
	CO5	Interpret the fundamental principle of spectroscopy and electrochemistry towards proper applications

UNIT-I	**Water chemistry**	**Periods: 9**
Water chemistry-hard and soft water, Determination of hardness by EDTA method Disadvantages of hard water- Boiler Scales, sludges, Softening of water: Internal conditioning, External conditioning - ion exchange and zeolite processes. Desalination-Reverse osmosis.		**CO1**
UNIT-II	**Electrochemical cells and corrosion**	**Periods: 9**
Electrode potential, electromotive force, reference electrodes-hydrogen, Ag/AgCl, calomel and glass electrodes. Nernst equation and applications. Batteries- Dry cell, alkaline battery, Ni-Cd battery and lead-acid battery. Fuel Cell-Hydrogen-oxygen fuel cell. Corrosion-dry and wet corrosion, mechanism and types of electrochemical corrosion. Corrosion control methods		**CO2**
UNIT-III	**Chemical bonding**	**Periods: 9**
Chemical bonding-valence bond theory, overlapping of orbitals. Hybridization in carbon compounds-sp, sp^2 and sp^3. Electron pair repulsion. Hybridization and shape of water and ammonia molecules. Molecular orbital theory- combination of atomic orbitals. Bond order. Molecular orbital diagrams for homonuclear diatomic molecules- (hydrogen to neon). Factors influencing Chemical reaction - homolytic and heterolytic bond fission. Reaction intermediates-carbonium ion, carbanion, free radicals and carbenes. Electrophiles and nucleophiles		**CO3**
UNIT-IV	**Reaction mechanism**	**Periods: 9**
Mechanism of free radical substitution-chlorination of methane. Mechanism of electrophlic substitution-bromination of benzene. Nucleophilic substitution-S_N2-hydrolysis of methyl bromide, S_N1-hydrolysis of t-butyl bromide. Elimination reactions-E1 and E2. Addition reactions-nucleophilic and electrophilic. Synthesis of aspirin, paracetamol, sulfanilamide and chloroquine.		**CO4**
UNIT-V	**Analytical techniques**	**Periods: 9**
Absorption and emission of radiation. Beer-Lamberts law. Ultraviolet and visible spectroscopy-basic principles and instrumentation. Conductivity-equivalent and molar conductance, cell constant. Conductometric titration-types of conductometric titrations. Potentiometry-principle of acid base titration. Chromatography- Principles and instrumentation of gas Chromatograph.		**CO5**

Lecture Periods: 45	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods: 45**

Reference Books

1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi, 17 ED, (2020-21).
2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S. Chand and Company Ltd, New Delhi, 28th ED, 2020.
3. Arun Bahl and B.S. Bahl, A Text Book of Organic Chemistry, S. Chand and Company Ltd, New Delhi, 22nd ED, 2016.
4. G.R. Chatwal and S.K. Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House Pvt Ltd, New Delhi, 2011.
5. D.A. Skoog, F.J. Holler and T.A. Nieman, Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd, Singapore, 5th ED, 2005.

CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2									
CO2	3	3	2									
CO3	3	3	-									
CO4	3	3	-									
CO5	3	3	2									
Average	3	3	2									

Department : **Chemistry**		Programme : **B.Tech.**						
Semester : **First/Second**		Course Category Code: **BSC**				Semester Exam Type: **LB**		
Course Code	Course	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CYUC102	**Chemistry Laboratory**	-	-	2	1	40	60	100
Prerequisite		-						

Course Outcome	After completion of the course, the students will be able to:	
	CO1	Determine the rate constants and order of chemical reactions.
	CO2	Examine the molecular/system properties such as hardness of water and adsorption.
	CO3	Test for the quality parameters by Titrimetry methods.
	CO4	Estimate the quality parameters by conductometry and potentiometry.
	CO5	Analyse the inorganic salt in terms of appropriate cations and anions

Choice of 10-12 experiments from the following:

1. Kinetic study of acid hydrolysis of ethyl acetate	**CO1**
2. Total hardness of water - Determination by EDTA method 3. Freundlich adsorption isotherm - Adsorption of acetic acid on charcoal	**CO2**
4. Chloride content of water - Determination by Mohr's method 5. Determination of oxalic acid by permanganometry 6. Determination of ferrous by permanganometry 7. Determination of carbonate and bicarbonate in a mixture 8. Beer-Lamberts law - Determination of ferrous by colorimetry 9. Magnesium content in water - Determination by EDTA method 10. Acetic acid content in vinegar 11. Dissolved oxygen content in water - Determination by Winkler's method. 12. Determination of available chlorine in bleaching powder.	**CO3**
13. Conductometric titration 14. Potentiometric titration	**CO4**
15. Chemical analysis of salt for cations and anions	**CO5**

Lecture Periods:	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods: 30**

Reference Books

1. Lab Manual, Department of Chemistry, Puducherry Technological University, Puducherry, 2018.
2. V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 2012
3. J. Mendham, R.C. Denney, J.D. Barnes and M. Thomas, Vogel's Text Book of Quantitative Chemical nalysis, PearsonEducation, New Delhi, 6th ED, 2009.

CO-PO Mapping												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2									
CO2	3	3	2									
CO3	3	3	2									
CO4	3	3	2									
CO5	3	3	2									
Average	3	3	2									

Semester : **First**					Course Category: AEC	Semester Exam Type: TY		
Course Code	Course Name	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
HSUA101	**English for Communication**	2	-	-	2	40	60	100
Prerequisite	Basic English							
At the end of the course, students will be able to	**CO1**	Develop the grammatical structures for effective communication.						
	CO2	Analyse reading comprehension passages.						
	CO3	Construct effective sentences in English thereby improving the writing skills.						
	CO4	Demonstrate effective speaking skills through clear and coherent articulation.						
	CO5	Apply various strategies to foster good communication skills.						
UNIT-I	**BASICS OF GRAMMAR**				**Hours: 06**			
Articles – Voice – Preposition– Importance of punctuation- Subject-Verb Agreement-Error detection - Synonyms, Antonyms- Acronyms.								**CO1**
UNIT-II	**ART OF COMMUNICATION**				**Hours: 06**			
. Definition - Importance - Process- Types- – Barriers- Strategies to become good communicators								**CO4, CO5**
UNIT-III	**READING COMPREHENSON**				**Hours: 06**			
Intensive and Extensive Reading- predicting the content- skimming the text- identifying the topic sentence- guessing the meaning of words from context- scanning- summarizing								**CO2**
UNIT-IV	**PRACTICE IN WRITING**				**Hours: 06**			
Coherence and Clarity in Writing – Principles of Paragraph writing- Essay writing- Describing – Defining – classifying.								**CO1,CO3**
UNIT-V	**SPEAKING PRACTICE**				**Hours: 06**			
Importance of Pronunciation — Short conversations and Dialogues – role plays- extempore speaking.								**CO4**
Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: -**			**Total Periods: 30**			

Reference Books:

1. Sudarshana, N.P and C. Savitha. English for Technical Communication. Noida: CUP, 2016.
2. Shoba, K N and Lourdes Joavani Rayen. ***Communicative English***. Chennai: CUP, 2017.
3. Rizvi, Ashraf, M. Effective Technical Communication. New Delhi: McGraw, 2017.
4. Michael Swan. Practical English Usage. Oxford: OUP,2014
5. Dignen, B. Fifty Ways to Improve your Presentation Skills in English. Orient Blackswan, 2014.
6. Dutt, Kiranmai P and Geetha Rajeevan. Basic Communication Skills. New Delhi: CUP, 2013.
7. Mohan, Krishna and Meera Banerji. Developing Communication Skills. Delhi: Macmillan, 2012.

CO-PO Mapping

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

Department : HSS		Programme: **B.Tech.**						
Semester : Second		Course Category Code: AEC				Semester Exam Type: TY		
HSUA102	PROFESSIONAL ENGLISH	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
Prerequisite	Basic English	2	-	-	2	40	60	100

At the end of the course, students will be able to		
	CO1	Enhance the professional communication skills.
	CO2	Articulate effectively in various contexts and become good communicators
	CO3	Write effectively with clarity.
	CO4	Interpret reading materials, thereby improving comprehension skills
	CO5	Develop good vocabulary skills

UNIT-I	**PROFESSIONAL COMMUNICATION**	**Periods: 06**
Clarity and effectiveness in communication – aspects of body language (proxemics, kinesics, haptics, chronemics) – paralanguage - feedback in communication		**CO1, CO2**

UNIT-II	**SPEAKING SKILLS**	**Periods: 06**
Presentation skills – Group Discussion and practice- Preparing for Interviews- Types of Interviews- Skills assessed in interviews		**CO2**

UNIT-III	**PROFESSIONAL WRITING**	**Periods: `06**
SWOT analysis –Job application letter and Resume writing - Agenda and Minutes of a meeting- E-mail etiquette and writing – Online writing.		**CO3,CO1**

UNIT-IV	**READING STRATEGIES**	**Periods: 06**
Reading different kinds of texts- active and passive reading- SQ3R Reading technique – drawing inferences and conclusions- critical reading.		**CO4**

UNIT-V	**VOCABULARY DEVELOPMENT**	**Periods: 06**
Idioms and phrases - Homophones and homonyms – Sentence improvement – Verbal analogy – One word substitution - Words often confused- Sentence completion.		**CO5**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods:-**	**Total Periods: 30**

Reference Books:

1. Bikram, K. Das. ***Functional Grammar and Spoken and Written Communication in English***. Orient Black swan, 2018.
2. K.N. Shoba and Lourdes Joavani Rayen. ***Communicative English: A Workbook***. Cambridge University Press, 2018.
3. Mohan Das, N. K. ***Writing Today***. Orient Blackswan, 2016.
4. E. Suresh Kumar, P. Sreehari, J. Savithri. ***Essential English***. Orient Blackswan, 2015.
5. Alvinder, Dhillon and Parmod Kumar Singla. Textbook of English and Communication Skills-1. Abhishek Publications, 2017.
6. Barun K. Mitra. ***Personality Development and Soft Skills***. Oxford University Press, 2017.

CO-PO Mapping

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

Department :**HSS**		Programme: **B.Tech.**						
Semester : **I/II**		Course Category Code: **VAC**			Semester Exam Type:			
GEUV101	NSS, Yoga and Health	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
		-		2	1	100	-	100

Prerequisite:	NIL	
Course Outcome: At the end of the course students will be able to	CO1	Understand the Foundations and Practices of Community Service and Holistic Well-being:
	CO2	Engage in Fitness Activities for Personal Development and Physical Fitness
	CO3	Cultivate Competence in Sports Training Principles and Injury Prevention
	CO4	Promote Health Education and Community Engagement

UNIT-I	**NSS**	**Periods: 06**
Introduction to NSS History, philosophy, aim and objectives of NSS.Organization of NSS, funding, regular activities, special camping, adopted village, maintain records, collaboration government, agencies NGOs, NSS Moto, NSS logo, NSS day.NSS Community service;		**CO1, CO4**

UNIT-II	**Yoga**	**Periods: 06**
Definition of yoga,– Classifications of yoga - Mudras. – Importance of meditation – Mental wave frequency –Assanas from Common Yoga Portal - breathing practices – pranayama-. Relaxation-Simplified Yoga - Knowing the relation among self, nature and society - Analysis of Thoughts Moralisation of Desire - Neutralisation of Anger - Eradication of Worries - Realisation of Self - Harmony in Life		**CO1, CO2**

UNIT-III	**Health**	**Periods: 06**
Components of health & wellness-. Relationship between health and physical activity-. Factors affecting health -. Diet and nutrition for health - Essential components of balanced diet - Role of nutrients for healthy life -Introduction to AYUSH- concepts of alkaline and acidic food, Healthy Habits to be followed day to day life		**CO3, CO4**

UNIT-IV	**Fitness**	**Periods: 06**
Fitness activities - types of fitness activities- outdoor activities - basic movement pattern- Indoor activity -. Aerobics / dance fitness- resistance training for fitness benefits of physical fitness – development of physical fitness.		**CO2, CO3**

UNIT-V	**Sports**	**Periods:06**
Meaning, Definition Sports Training – Meaning and Significance of Warming Up and Warming Down – Types of Warming Up. Principles of Sports Training and Conditioning – Fist Aids		**CO2, CO4,**

Lecture Periods: 0	**Tutorial Periods: 0**	**Practical Periods:-30**	**Total Periods: 30**

Reference Books:

1. NSS Manual 2016, Ministry of sports and youth affairs, GOI,
2. Yoga for Moden Age by Vethathiri Maharishi, Vethathiri Publication,
3. Health & Wellness, Yoga Education, Sports & Fitness- A Complete Guide By Prof. Arulnidhi Suraj, M.A.(Yoga), Ph.D. ,Dr. G. Dhanalakshmy,, 2024, SURAJ PUBLICATIONS Puducherry
4. Deck, Frank W, “Sports Training and Principles” London Lepus Books, 1980.
5. Fox, Edward L, “Sports Physiology” Halt CBS College Publishing, 1984.
6. Singh, Hardayal, “Science of Sports Training” New Delhi: DVS Publications, 1991.

7. Shaver, Larry G, “Essential of Exercise Physiology of Sports and Exercise” Champaign. Human Kinetics, 1982.
8. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell. 2. Mental Health workbook by Emily Attached &MarziaFernadez, 2021.

CO-PO Mapping

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

<table>
<tr><td colspan="3">Department : Humanities and Social Sciences</td><td colspan="5">Programme: B.Tech.</td></tr>
<tr><td colspan="3">Semester : First/Second</td><td colspan="3">Subject Category: VAC</td><td colspan="2">Semester Exam Type: -</td></tr>
<tr><td rowspan="2">Course Code</td><td rowspan="2">Course Name</td><td colspan="3">Period/Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>SE</td><td>TM</td></tr>
<tr><td>GEUV102</td><td>Essence of Indian Traditional Knowledge</td><td>1</td><td>-</td><td>-</td><td>1</td><td>100</td><td>-</td><td>100</td></tr>
<tr><td>Prerequisite</td><td colspan="8">-</td></tr>
<tr><td rowspan="4">Course Outcome</td><td colspan="8">The course will enable the student to:</td></tr>
<tr><td>CO1</td><td colspan="7">To understand the importance of Yoga for health care and explain basics of Indian traditional knowledge in modern scientific perspective.</td></tr>
<tr><td>CO2</td><td colspan="7">Analyze the relation between orthodox and Heterodox Indian philosophical tradition.</td></tr>
<tr><td>CO3</td><td colspan="7">Interpret the effect of traditional knowledge from linguistic and artistic perspectives.</td></tr>
<tr><td>UNIT-I</td><td colspan="5"></td><td colspan="3">Periods: 5</td></tr>
<tr><td colspan="7">Basic structure of Indian knowledge system, Modern science and Indian knowledge system, Yoga and holistic health care.</td><td>CO1</td></tr>
<tr><td>UNIT-II</td><td colspan="5"></td><td colspan="3">Periods: 5</td></tr>
<tr><td colspan="7">Indian philosophical tradition, Orthodox (Hindu school), Heterodox (Non-Hindu schools).</td><td>CO2</td></tr>
<tr><td>UNIT-III</td><td colspan="5"></td><td colspan="3">Periods: 5</td></tr>
<tr><td colspan="7">Indian linguistic tradition and Indian artistic tradition.</td><td>CO3</td></tr>
<tr><td colspan="2">Lecture Periods: 15</td><td colspan="3">Tutorial Periods: -</td><td colspan="3">Practical Periods: -</td><td>Total Periods: 15</td></tr>
<tr><td colspan="9">Reference Books:</td></tr>
<tr><td colspan="9">1. N. Sivaramakrishnan (Ed.) Cultural Heritage of India – Course Material, Bharatiya Vidya Bhavan, Mumbai 5th edition, 2014.
2. Swami Jitatmanand, Modern Physics and Vedanta, Bharatiya Vidya Bhavan.
3. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta.
4. R.N. Jha, Science of Consciousness Psychotherapy and yoga Practices, Vidyanidhi Prakashan, Delhi 2016.
5. S.C Chaterjee and D.M Datta, An Introduction to Indian Philosophy, University of Calcutta, 1984. 7. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.</td></tr>
</table>

CO – PO Mapping

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

Score: **3** – High; **2** – Medium; **1** – Low

Department : Civil Engineering		Programme: **B.Tech.**						
Semester : First		Course Category Code: PCC				Semester Exam Type: TY		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CEUC101	**APPLIED MECHANICS**	3	1	--	4	40	60	100
Prerequisite:	NIL							

Course Outcome	**CO1**	Able to Calculate the Resultant of a given force system. Identify the equilibrium of a system.
	CO2	Able to draw the free body diagram of various problems to find the unknown forces by applying equilibrium and Newton's Laws of Equations.
	CO3	Compute the Properties of Sections for both static and dynamic problems of Structural elements
	CO4	Use the principles of dynamics of particles to Civil Engineering Applications
	CO5	Explaining the applications of rigid body dynamics in Civil Engineering

UNIT-I	**Periods: 12**	
Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non-concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, applications in solving the problems on static equilibrium of bodies		**CO1**
UNIT-II	**Periods: 12**	
Structural member: definition, Degree of freedom, concept of free body diagrams, types of supports and reactions, types of loads, Analysis of Trusses-method of joints, method of sections. Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges		**CO2**
UNIT-III	**Periods: 12**	
Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia		**CO3**
UNIT-IV	**Periods: 12**	
Equations of motion - Rectilinear motion, curvilinear motion, Relative motion, D'Alembert's principle, work- Energy equation – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.		**CO4**
UNIT-V	**Periods: 12**	
Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum		**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:0**	**Total Periods: 60**

Reference Books:

1. Rajasekaran, S and Sankara Subramanian, G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2016.
2. Palanichamy, M.S. Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill,2001.
3. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol.2 Dynamics, McGraw – Hill International Edition, 2022
4. Bhavikatti,S.S and K.G.Rajashekarappa, Engineering Mechanics, New Age International (P) Ltd, New Delhi,2010

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : Civil Engineering			Programme: **B.Tech.**						
Semester : Second			Course Category Code:				Semester Exam Type: TY		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
CEUC102	**BUILDING TECHNOLOGY**		3	1	0	4	40	60	100
Prerequisite:									
Course Outcome	**CO1**	Able to acquire knowledge on building materials and products for the construction.							
	CO2	Able to acquire knowledge on selection of the building finishing materials and Ferro Cement applications for the building construction.							
	CO3	Able to Acquire knowledge on the masonry, building transport and the termite treatment.							
	CO4	Able to Acquire knowledge on the building services, maintenance, building acoustics and sound insulation materials.							
	CO5	Able to Acquire knowledge on the energy efficient buildings, disaster resistance and cost-effective construction techniques							

UNIT-I	**Functional Requirements of Buildings**	**Periods: 12**
Classification of Buildings based on Occupancy as per National Building Code (NBC). NBC provisions for the Residential Building components and their functions: Open Spaces, Living Room, Bedroom, Kitchen, Bathroom, and Water Closet. NBC provisions for Lighting and Ventilation aspects in buildings. Noise and Noise Control in Buildings. Building Bye Laws.		**CO1**
UNIT-II	**Building Materials**	**Periods: 12**
Natural Materials-Stones, aggregates, timber, Lime. Man-made materials-Bricks, Cement, Steel, Concrete, Plastics, fly ash, GGBS, Bio ashes, silica fume, M-sand, Tiles, Insulation materials, Paints, Varnishes, Distemper, Water Proofing and Damp Proofing materials, Glass, Aluminum, Reinforced Cement Concrete and Ferrocement.		**CO2**
UNIT-III	**Building Services**	**Periods: 12**
Plumbing Services, Electrical Services, Air Conditioning, Acoustics and Sound Insulation, Fire Protection measures, Lift, Escalators, Building security and Control system.		**CO3**
UNIT-IV	**Technologies of Construction**	**Periods: 12**
Masonry- Stone, Brick, Lintels and Arches. Flooring, Roofing, Stairs, Scaffolding, Painting, Plastering, Pointing, Special Construction Techniques- Shoring, Under Pinning.		**CO4**
UNIT-V	**Construction Tools and Machinery**	**Periods: 12**
Construction Tools-Plumb bob, Spirit Level, Level Tube, Rammer, Spade, Shovels, Straight Edge, Mortar Pans, Sieves, Trolley, Vibrators, Bulldozers, Draglines, Cableways, Belt Conveyors. Machinery-Batching Plants, Transit Mixers and Vibrating Trucks for Ready Mixed Concrete, Pumps, Air Compressors, Hoists and Cranes, Choice of Construction Equipment for different types of works.		**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:0**	**Total Periods: 60**

Reference Books:

1. Bhavikatti.S.S., Building Materials, Vikas Publishing House Pvt. Ltd., New Delhi, 2012.
2. Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, Building Construction, Laxmi Publishing (P).Ltd., New Delhi-2, 2012.
3. Bhavikatti.S.S., Building Technology, Vikas Publishing House. Pvt. Ltd., New Delhi, 2013.
4. National Building Code of India, Bureau of Indian Standards, 2005
5. Rajput, R.K., Engineering Material, S.Chand&Co. Ltd., New Delhi, 2008.
6. Shrivastava.U.K, Building Materials Technology, Galgotia Publications Pvt., Ltd., 2012.

7. Varghese, P.C, Building Materials, Prentice-hall of India Pvt.Ltd., 2013.
8. Deodhar S.V., “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2014
9. Robert L. Peurifoy, Clifford J. Schexnayder, Robert Schmitt, Aviad Shapira, “Construction Planning, Equipment and Methods”, McGraw Hill Co.,New York, 2018

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Mechanical Engineering**			Programme : **B.Tech.**						
Semester : **First/Second**			Course Category Code: **ESC**				Semester Exam Type**: TY**		
Course Code	Course Name		Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
MEUC101	**Engineering Graphics**		**1**		**4**	**3**	**40**	**60**	**100**
Prerequisite	**-**								
Course Outcome At the end of the course students will be able to	**CO1**	Properly dimension and annotate engineering drawings as per standards of engineering drawing practice and understand simple projection concept using simple basic geometrical entities.							
	CO2	Prepare projections of simple regular solids at different position and orientation.							
	CO3	Draw projections of simple regular solids sectioned by sectioned plane oriented in different angle. Also create development surface of simple and sectioned solids.							
	CO4	Visualize and draw projections of two intersecting simple regular solids and present the given 3D simple blocks in orthographic views.							
	CO5	Present the given orthographic views of simple blocks and combination of simple solids in 3D views							

UNIT-I	**Periods: 15**
ENGINEERING DRAWING STANDARDS Introduction-Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning, Orthographic projection- principles-Principal planes-First angle projection-projection of points. **PROJECTIONS OF STRAIGHT LINES AND PLANES** Projection of straight lines (only First angle projections) inclined to both the principal planes Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object Method.	**CO1**
UNIT-II	**Periods: 15**
PROJECTIONS OF SOLIDS Projections of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.	**CO1, CO2**
UNIT-III	**Periods: 15**
SECTIONS OF SOLIDS Sectioning of simple regular solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other — obtaining true shape of section. **DEVELOPMENT OF SURFACES** Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.	**CO1, CO2, CO3**
UNIT-IV	**Periods: 15**
INTERSECTION OF SOLIDS Intersection of solids and curves of intersection – prism with cylinder, cylinder & cylinder, cone and cylinder with normal intersection of axes and with no offset. **ISOMETRIC VIEW TO ORTHOGRAPHIC VIEWS** Conversion of isometric view of simple blocks to orthographic views	**CO4**
UNIT-V	**Periods: 15**
ISOMETRIC PROJECTION Principles of isometric projection — isometric scale — isometric projections of simple solids	**CO1 CO5**

and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions **CONVERSION OF ORTHOGRAPHIC VIEWS TO ISOMETRIC VIEW** Conversion of orthographic views of simple blocks to isometric view			
Lecture Periods:**15**	Tutorial Periods: **-**	Practical Periods: **60**	Total Periods:**75**

Text Books

1. K.Venugopal, '*Engineering Drawing + Auto CAD'*, New Age International Publisher, 2011.
2. K.V. Natarajan, '*A Text Book of Engineering Graphics'*, Dhanalakshmi Publishers, 2018.

Reference Books

1. K.R. Gopalakrishna, '*Engineering Drawing'* (Vol I &II), Subhas Publications, Bangalore, 2017.
2. Engineering drawing practice for schools & colleges SP 46:2003.
3. T. Jeyapoovan, '*Engineering Graphics using AUTOCAD'*, VIKAS Publishing House Pvt., 2015.
4. N.D. Bhatt and Panchal VM, '*Engineering Drawing'*, Charotar Publishing House, 2019.
5. C M Agrawal and Basant Agrawal, '*Engineering Graphics'*, McGraw Hill Edu. Publication,2017
6. V.P Kumar, '*Engineering Graphics'*, Full Marks Pvt Ltd Publications, 2017

CO-PO 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**
CO 1	3		1					1	2	3		1	3	2
CO 2	3		1						2	3		1	3	2
CO 3	3		1						2	3		1	3	2
CO 4	3		1						2	3		1	3	2
CO 5	3		1						2	3		1	3	2

Score: 3-High; 2-Meium; 1-Low

Department : Mechanical Engineering			Programme : B.Tech.						
Semester : First			Course Category Code: PCC				Semester Exam Type: TY		
Course Code	Course Name		Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
MEUC102	Engineering Mechanics		3	1	0	4	40	60	100
Prerequisite									
Course Outcome At the end of the course students will be able to	**CO1**	Interpret the vectorial and scalar representation of forces and moments, by identifying the components and magnitude of each force and moment.							
	CO2	Analyze the equilibrium of rigid bodies, by applying the principles of statics and calculating the forces and moments acting on a rigid body.							
	CO3	Apply the laws of friction to determine the friction force and its effects on the motion of a body, by using the relevant equations and formulas.							
	CO4	Evaluate the properties of surfaces and solids, by analyzing their physical and mechanical characteristics and determining their suitability for specific applications							
	CO5	Synthesize the knowledge of dynamic forces exerted on rigid bodies, by applying the principles of dynamics and calculating the forces and moments acting on a body in motion.							

UNIT-I	**Periods: 12**
STATICS OF PARTICLES Introduction – fundamental Laws of Mechanics – Vector operations of forces - dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces.	**CO1**
UNIT-II	**Periods: 12**
EQUILIBRIUM OF RIGID BODIES Types of supports –Action and reaction forces – Free body diagram - stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions.	**CO1, CO2**
UNIT-III	**Periods: 12**
FRICTION Friction force – Laws of dry friction – equilibrium analysis of simple systems – Wedges and Screws – Screw Jack - Rolling resistance.	**CO1, CO2, CO3**
UNIT-IV	**Periods: 12**
PROPERTIES OF SURFACES AND SOLIDS Centroids and Centre of Gravity – Area moments of inertia of plane areas of two-dimensional body – primitive shapes - Parallel axis theorem and perpendicular axis theorem – Mass moment of inertia – for primitive solids – Relation between mass and area moments of inertia - Principal axes and Principal moment of inertia.	**CO4**
UNIT-V	**Periods: 12**
DYNAMICS OF PARTICLES Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion -Newton's laws of motion – Angular momentum – Impulse and Momentum - Impact of bodies.	**CO1,CO2, CO5**
Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: 0 Total Periods: 60	

TEXT BOOKS

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2019 by McGraw-Hill Education.

2. S. Rajasekaran and G. Sankarasubramanian, "Engineering Mechanics, Statics and Dynamics, Vikas Publishing House Pvt Ltd New Delhi- 110055,(2016)

REFERENCE BOOKS

1. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
2. Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
3. R. C. Hibbeler "Engineering Mechanics", Copyright © 2017 by Pearson India Education Services Pvt Ltd
4. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
5. Dr.R.K Bansal, "A Text Book of Engineering Mechanics", Lakshmi Publications (P) Ltd, New Delhi,2004

CO-PO 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
CO 1	3	2											2	1
CO 2	3	3	2	1									1	1
CO 3	2	2	2										3	1
CO 4	2	2	1	1									2	1
CO 5	3	3	3	2									2	2

Score: 3-High; 2-Meium; 1-Low

Department : Mechanical Engineering		Programme : B.Tech						
Semester : Second		Course Category Code: PCC				Semester Exam Type: TY		
Course Code	Course Name	Periods/week			Credit	Maximum Marks		
MEUC103	Engineering Thermodynamics	L	T	P	C	CA	SE	TM
		3	1	-	4	40	60	100
Prerequisite	-							

Course Outcome At the end of the course students will be able to		
	CO1	Define the laws of thermodynamics signifying energy interactions.
	CO2	Demonstrate the application of laws of thermodynamics to problems involving energy interactions.
	CO3	Solve problems by applying the principles of thermodynamics.
	CO4	Develop correlations among the various functions which are studied in thermodynamics.
	CO5	Make use of data handbooks, charts, etc., for determining thermodynamic properties.

UNIT-I	**Periods: 12**
INTRODUCTION AND ZEROTH LAW Continuum – microscopic and macroscopic approach – thermodynamic systems, property and its types, process and its types, state – thermodynamic equilibrium – path and point functions – temperature and its measurement scales – zeroth law of thermodynamics – energy – stored forms and transitional forms of energy and their types – **FIRST LAW OF THERMODYNAMICS** first law of thermodynamics applied to closed and open systems – steady and unsteady processes – first law efficiency.	**CO1, CO2, CO3**

UNIT-II	**Periods: 12**
SECOND LAW OF THERMODYNAMICS AND ENTROPY Limitations of first law of thermodynamics – heat engines – heat pumps – thermal reservoirs – various statements of second law of thermodynamics – reversibility – Clausius inequality – entropy – entropy change in processes – entropy generation principle and its applications – entropy balance of closed and open systems. **EXERGY** Exergy – reversible work, useful work for closed and open systems – decrease of exergy in processes – dead state – irreversibility – second law efficiency of thermal devices.	**CO1, CO2, CO3**

UNIT-III	**Periods: 12**
GAS LAWS Ideal and real gases – gas laws, various equations of state – law of corresponding states – compressibility factor and charts. **PURE SUBSTANCES** Mixture of gases – laws – property correlations – entropy – Gibbs function. Pure substances – phase change process – dryness fraction – property tables – 2D and 3D charts – Mollier diagram.	**CO1, CO2, CO3, CO5**

UNIT-IV	**Periods: 12**
THERMODYNAMIC PROPERTIES Thermodynamic properties correlations – Maxwell's correlations – Tds equations – inversion temperature – Joule Kelvin effect – Clausius Clapeyron equation. **PSYCHROMETRY** Psychrometry – air and water vapour mixture – property tables and charts – adiabatic saturation temperature – psychrometric processes.	**CO4, CO5**

UNIT-V	**Periods: 12**

COMBUSTION Combustion – Stoichiometry – air/fuel ratio – enthalpy of formation – enthalpy of combustion –first law of thermodynamics applied to combustion – heating values. **COMPRESSIBLE FLOW** Compressible flow – stagnation states – Mach number – relations for stagnation fluid properties – isentropic flows through nozzles.	**CO2, CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods: 60**

TEXT BOOK

1. Nag.P.K., *"Engineering Thermodynamics"*, 6th Edition, McGraw Hill India, New Delhi, 2017.

REFERENCE BOOKS

1. Yunus A. Cengel, Michael A. Boles, Mehmet Kanoglu *"Thermodynamics - An Engineering Approach"*, 9th edition, McGraw Hill India, New Delhi, 2019.
2. C.P.Arora, *"Thermodynamics"*, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2003.
3. Rathakrishnan E, *"Fundamentals of Engineering Thermodynamics",* 2nd Edition, PHI Learning Pvt. Ltd., New Delhi, 2006.
4. Claus Borgnakke & Richard E. Sonntag, "*Fundamentals of Thermodynamics",* 7th Edition John Wiley and Sons Inc. New York, 2009.

CO-PO Mapping

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

3- High, 2-Medium, 1-Low

Department: **Electronics and Communication Engineering**		Programme: **B.Tech**						
Semester:**First**		Course Category Code: **PCC**			Semester Exam Type: **TY**			
Course Code	Course	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
ECUC101	**Electronic Devices and Circuits**	3	1	-	4	40	60	100
Prerequisite	-							

Course Outcome	Upon completion of the course, the students will be able to
	CO1 Demonstrate the understanding of DC circuits, AC circuits and resonance
	CO2 Demonstrate the understanding of the operation and characteristics of diodes, BJT, FET
	CO3 Explain the various applications of diodes.
	CO4 Design biasing circuits for the BJT and FET
	CO5 Analyze the small signal, low and high frequency characteristics of BJT and FET amplifiers

UNIT-I	**DC and AC Circuits**	**Periods:12**
Electrical circuit elements (R, L and C) - Definition of Voltage, Current, Power and Energy – Ohm's law, Kirchoff current and voltage laws, analysis of simple circuits with DC voltage – Division of current in series and parallel circuits–Node and mesh method analysis of DC circuits - Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Steady state Analysis of single-phase ac circuits consisting of R, L, C, RL, RC and RLC series combinations. Series and parallel resonance.		**CO1**

UNIT-II	**Semiconductor Diodes and Applications**	**Periods:12**
Introduction to semiconductors – PN junction diode-construction and working–Capacitance effects in diode-current equation –VI characteristics- Breakdown in diodes-Applications : Half Wave Rectifier, Centre tapped and Bridge rectifiers–Ripple factor derivation with and without capacitance filter– Rectifier Efficiency and PIV-Zener diode–Regulator–varactor diode-Schottky diode.		**CO2 , CO3**

UNIT-III	**BJT and FET Characteristics**	**Periods:12**
Construction, working and characteristics of CE, CB and CC configurations–Early effect-Thermal runaway–Transistor as an amplifier. Construction, working and characteristics of JFET and MOSFET (enhancement mode and depletion mode).		**CO2**

UNIT-IV	**Bias Stabilization and Compensation Circuits**	**Periods:12**
BJT biasing and Stabilization: Operating point– DC loadline-Bias Stabilization circuits: Fixed bias, collector to base bias and potential divider bias. Bias compensation circuits using thermistor and sensistor. Biasing of JFET: Fixed bias, Self bias.		**CO1, CO4**

UNIT-V	**Low Frequency and High Frequency Analysis of Small Signal Amplifiers**	**Periods:12**
Transistor hybrid model -h-parameters-Analysis of CE amplifier using h-parameter model. Low frequency analysis of Common Source amplifier. Hybrid pi model-Analysis of CE transistor amplifier using hybrid pi model, Analysis of Common Source FET amplifier at high frequency.		**CO1, CO5**

Lecture Periods:45	**Tutorial Periods:15**	**Practical Periods:-**	**Total Periods:60**

Text Books

1. D.P.Kothari and L.J.Nagrath, "Basic Electrical Engineering",4th Edition, McGraw Hill Edition, 2019.
2. C. Millman, Halkias and Satyabrata,"Electronic devices and Circuits", Third edition, Mc GrawHill, 2010.

Reference books:

1. D. C. Kulshreshtha, "Basic Electrical Engineering", 2nd Edition, Tata McGraw Hill, 2019.
2. Robert L. Boylested and Louis Nashelsky, "Electron Devices and Circuits Theory", Prentice Hall of India, 11th Edition, 2013.
3. David A.Bell," Electronic Devices and Circuits", Prentice Hall of India, 5th Edition, 2008.
4. S.Salivahanan et al,"Electronic Devices and Circuits",Tata Mc Graw Hill, 5th Edition, 2022.

CO-PO mapping

CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO11	PO1 2	PSO 1	PSO 2
CO1	3	3	3	1	–	–	–	–	–	–	–	–	2	1
CO2	2	2	2	1	–	–	–	–	–	–	–	–	2	1
CO3	2	2	2	1	–	–	–	–	–	–	–	–	2	1
CO4	2	2	2	1	–	–	–	–	–	–	–	–	2	1
CO5	2	2	2	1	–	–	–	–	–	–	–	–	2	1
ECUC10 1	2.2	2.2	2.2	1	–	–	–	–	–	–	–	–	2	1

Score: 3 – High; 2 – Medium; 1 – Low

Department: **Electronics and Communication Engineering**		Programme: **B.Tech**						
Semester: **Second**		Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
ECUC102	**Analog Communication**	3	1	-	4	40	60	100
Prerequisite	-							

Course Outcome	Upon completion of the course, the students will be able to
	CO1 Demonstrate the understanding of signals and noise
	CO2 Analyze the variants of Amplitude modulation and Frequency modulation schemes
	CO3 Demonstrate the understanding of the fundamentals of AM and FM demodulators
	CO4 Compare different transmitter and receiver architectures.
	CO5 Demonstrate the understanding of various pulse modulation schemes.

UNIT-I	**Signals and Noise**	**Periods:12**
Introduction of communication system, Block diagram, types of communication, modes of communication, signal bandwidth, channel bandwidth, frequency spectrum, Signal classification (continuous time signal, discrete time), Energy and power signal. Shot Noise- Thermal noise-White Noise–Noise Calculations–Equivalent Noise Bandwidth–Noise Figure–Effective Noise Temperature		**CO1**
UNIT-II	**Amplitude Modulation Systems**	**Periods:12**
Introduction–Need for modulation– Amplitude Modulation-Suppressed carrier systems– DSB-SC,SSB-SC -Bandwidth Requirements- Power relations - Generation and detection of AM waves – Generation and detection of DSB-SC waves - Balanced Modulator, Ring Modulator, Coherent detection –Costas Loop-Generation and detection of SSB-SC waves –Phase discrimination method, Coherent detection –Vestigial Sideband Modulation-Comparison of AM systems.		**CO2, CO3**
UNIT-III	**Angle Modulation Systems**	**Periods:12**
Introduction to Angle Modulation–FM and PM-Narrowband FM and Wideband FM–Bandwidth Requirements-Pre-emphasis, De-emphasis-Generation and demodulation of FM waves–Direct and Indirect FM generation, FM Demodulation- FM to AM Conversion-Balanced Frequency Discriminator and PLL demodulator, FM Stereo Multiplexing-Comparison of frequency modulation and Phase modulation system.		**CO2, CO3**
UNIT-IV	**Transmitters and Receivers**	**Periods:12**
Transmitters: Classification of transmitters - Block diagram of AM broadcasting transmitters- Low Level and High-Level transmitters-FM transmitters-Direct and Indirect FM systems. **Receivers:** Classifications of receivers-Block diagram–Receiver characteristics-Tuned radio frequency receiver–Superheterodyne receiver–AGC-Merits and demerits of different receivers. Block diagram of FM receiver-Automatic frequency control-Communication Receivers-Delayed AGC.		**CO4**
UNIT-V	**Pulse Analog Modulation Schemes**	**Periods:12**
Sampling process–Pulse-amplitude modulation–Pulse-Width modulation–Pulse Position Modulation-Methods of generation and detection-Bandwidth-noise tradeoff-FDM and TDM.		**CO1, CO5**

Lecture Periods:45	**Tutorial Periods: 15**	**Practical Periods:-**	**Total Periods: 60**

Text Books:

1. Simon Haykin, "Communication Systems", Wiley Publication, New Delhi, 5th Edition 2015.
2. Kennedy G," Electronic Communication systems", Tata Mc Graw Hill, New Delhi ,6th Edition 2017.

Reference Books:

1. Taub and Schilling, "Principles of Communication Systems", Mc Graw Hill International edition, New Delhi, 3rd Edition 2007.
2. Carlson A B ,Communication systems: An Introduction to signals and noise in electrical communication", Mc Graw Hill, New Delhi, 2002
3. Dennis John, Roddy and Coolen,“Electronic Communications”, Prentice Hall of India, New Delhi, 2003.

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	2	–	–	–	–	–	–	2	1
CO2	3	2	2	2	–	–	–	–	–	–	–	–	2	1
CO3	3	2	2	2	–	–	–	–	–	–	–	–	2	1
CO4	3	2	2	2	–	2	–	–	–	–	–	–	2	1
CO5	3	2	2	2	-	-	-	–	–	–	–	–	2	1
ECUC102	3	2.2	2.2	2.2	-	2	-	–	–	–	–	–	2	1

Score: 3 – High; 2 – Medium; 1 – Low

Department: **Computer Science and Engineering**			Programme: **B.Tech. (Common to all Branch)**						
Semester: **First/Second**			Course Category Code: **ESC**				Semester Exam Type: **TY**		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
CSUC101	**Programming for Problem Solving**		**2**	**0**	**0**	**2**	**40**	**60**	**100**
Prerequisite:	-								
Course Outcome	**CO1**	Ability to solve problems by writing programs using basic language constructs							
	CO2	Develop larger and complex programs with branching and looping statements							
	CO3	Formulate programs using Arrays, Structures and Union							
	CO4	Apply function-oriented approaches and pointers in C programs							
UNIT-I	**Program Development Lifecycle**					**Periods: 6**			
Problem Solving Techniques: Algorithm – Pseudocode - Flowchart – Generations of Programming Languages – Test cases – Compiler – Interpreter – Number System									**CO1**
UNIT-II	**Introduction to C**					**Periods: 6**			
C program structure – Token – Keyword – Identifier – Variable – Constants - Datatypes – Operators - Operator Precedence – Storage classes - Input Statement – Output Statement									**CO1, CO2**
UNIT-III	**C Statements**					**Periods:**			
Branching Statements: If, If-else, Else-if, Nested if – Switch case. Looping Statement: For loop – While loop – Do-While Loop. Jumping Statement: Break - Continue									**CO2, CO3**
UNIT-IV	**Array, Structure and Union**					**Periods: 6**			
Array: 1D – 2D – Declaration, Initialization and Accessing – String Array. Structures: Declaration, Initialization and Accessing – Nested Structure – Array of Structure - Union									**CO3**
UNIT-V	**Functions and Pointers**					**Periods: 6**			
Functions: user-defined - in-built (String, Math) - Call by Value – Call by Reference – Nested Function – Recursive Function. Pointers: Declaration, Initialization and Accessing.									**CO4**
Lecture Periods: 30	**Tutorial Periods: 00**	**Practical Periods: 00**	**Total Periods: 30**						

Reference Books:

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Eighth Edition, 2019.
2. Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publications, 19th Edition, 2022
3. Byron Gottfried & Jitender Chhabra, "Programming with C", Schaum's Outlines Series, 2017.
4. Brian W. Kernighan & Dennis Ritchie. "The C Programming Language", Pearson Education India; Second Edition,2015.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	3	2	2	-	-	-	-	-	-	2	-	-	-	-
CO 2	3	3	2	2	-	-	-	-	-	-	2	-	-	-	-
CO 3	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	3	2	-	-	-	-	-	-	-	2	-	-	-	-

Score: 3 – High; 2 – Medium; 1 – Low

Department: **Computer Science and Engineering**		Programme: **B.Tech. (Common to all Branch)**						
Semester: **First/Second**		Course Category Code: **ESC**				Semester Exam Type: **LB**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CSUC102	**Computer Programming Laboratory**	**0**	**0**	**2**	**1**	**40**	**60**	**100**
Prerequisite:	-							
Course Outcome	**CO1**	Interpret C programming environment to write simple C programs using branching and looping statements						
	CO2	Apply arrays and pointer for problem solving						
	CO3	Demonstrate the working of structure and union concept in C programming						
	CO4	Implement programs using user-defined and in-built function						

1. Study of C Program Development Environment 2. Understanding of compiling and executing of C program 3. Basic C Programs a. Arithmetic Operations b. Area and Circumference of a circle c. Swapping with and without Temporary Variables	**CO1**
4. Programs using Branching statements 1. To check the number as Odd or Even 2. Greatest of Three Numbers 3. Grading based on Student's Mark 4. Arithmetic operations using switch-case 5. Programs using Looping Statement a. Computing Factorial of a number b. Fibonacci Series generation c. Prime Number Checking d. Computing Sum of Digit	**CO1**
6. Programs using Arrays a. Sum of 'n' numbers b. Sorting an Array c. Matrix Addition, Subtraction, Multiplication and Transpose 7. Program using Pointer 5. Counting Vowels in the string a. Call by reference	**CO1, CO2**
8. Program Using Structure a. Student Information System b. Employee Pay Slip Generation c. Electricity Bill Generation d. Nested Structure a. Demo on Union	**CO1, CO3**
9. Programs using Functions b. Call by Value c. Computing nCr d. Factorial using Recursion e. Palindrome checking using string in-built functions f. Sorting 'n' names using string in-built functions	**CO1, CO4**

Lecture Periods: 00	**Tutorial Periods: 00**	**Practical Periods: 30**	**Total Periods: 30**

Reference Books:

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Eighth Edition, 2019.
2. Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publications, 19th Edition, 2022
3. Byron Gottfried & Jitender Chhabra, "Programming with C", Schaum's Outlines Series, 2017.
4. Brian W. Kernighan & Dennis Ritchie. "The C Programming Language", Pearson Education India; Second Edition, 2015.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO 12	PS O1	PS O2	PS O3
CO 1	3	3	2	2	-	-	-	-	-	-	2	-	-	-	-
CO 2	3	3	2	2	-	-	-	-	-	-	2	-	-	-	-
CO 3	3	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	3	2	-	-	-	-	-	-	-	2	-	-	-	-

Score: 3 – High; 2 – Medium; 1 – Low

Department: **Computer Science and Engineering**		Programme: **B.Tech. Computer Science and Engineering**						
Semester: **First**		Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CSUC103	**Fundamentals of Computer Organization**	**3**	**1**	**0**	**4**	**40**	**60**	**100**
Prerequisite:	-							
Course Outcome	**CO1**	Explain Boolean functions and to develop combinational logic functions and design combinational circuit.						
	CO2	Explain the basics of functional units of a digital computer and types of computers.						
	CO3	Analyze the execution of instructions in conventional and pipelined processors.						
	CO4	Apply of computing algorithms for the design and implementation of ALU.						
	CO5	Compare the performances of different types of memory, interconnecting devices and their impact on computer design.						
UNIT-I	**Boolean Algebra and Basic Structures of Computer**				**Periods: 12**			
Boolean algebra, Logic Gates, Basic operations, Basic Theorems, Boolean Functions, Canonical forms, Simplification of Boolean functions, Karnaugh Maps, Adders, encoders, decoders, multiplexers, de-multiplexers, Introduction to sequential circuits, D flip-flop. Functional Units of computer, Basic Operational Concepts**,** Types of Computer Architecture, Performance, Instructions and Instruction Sequencing, Addressing modes.								**CO1 CO2**
UNIT-II	**Basic Processing Unit and Pipelining**				**Periods: 12**			
Fundamental Concepts, Instruction Execution, Hardware Components, Instruction Fetch and Execution Steps, Control Signals, Hardwired Control, Micro-programmed control. Pipelining: Basic Concept, Pipeline Organization, Pipeline Hazards.								**CO1 CO3**
UNIT-III	**Computer Arithmetic**				**Periods: 12**			
Number systems, Number Representation, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Unsigned Numbers, Multiplication of Signed Numbers, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.								**CO4**
UNIT-IV	**Memory System**				**Periods: 12**			
Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Memory Hierarchy, Cache Memories, Associative memory, Performance Considerations, Memory Management requirements, Secondary Storage – Magnetic disk and CDROM								**CO5**
UNIT-V	**Input /Output Organization**				**Periods: 12**			
Accessing I/O Devices: I/O Device Interface, Program-Controlled Data Transfer, Interrupts Driven Data Transfer, DMA, Synchronous and Asynchronous Bus, Input-output interface circuits, Interconnection Standards: USB, SCSI.								**CO5**
Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: 00**			**Total Periods: 60**			

Reference Books:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded
2. Systems, Sixth Edition, McGraw Hill, 2022.
3. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2017.
4. William Stallings, Computer Organization and Architecture, Designing for Performance, Tenth Edition, Pearson Education, 2016.
5. M. Morris R. Mano, Michael D. Ciletti, Digital Design: With an introduction to Verilog HDL, VHDL and System Verilog, Sixth Edition Pearson Education, 2021.

CO – PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	2	2	-	-	-	-		-	-	-	-	2	-	-	2
CO 2	2	2	-	-	-	-	-	-	-	-	-	2	2	-	2
CO 3	3	3	-	-	-	-		-	-	-	-	2	-	-	2
CO 4	3	3	2	-	-	-	-	-	-	-	-	2	-	-	-
CO 5	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-

Score:3 – High; 2 – Medium; 1 – Low

Department: **Computer Science and Engineering**			Programme: **B.Tech. Computer Science and Engineering**						
Semester: **Second**			Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
CSUC104	**Software Engineering**		**3**	**1**	**0**	**4**	**40**	**60**	**100**
Prerequisite:	-								
Course Outcome	**CO1**	Illustrate the software process models suitable for variety of real-life software development problems.							
	CO2	Develop software plan, requirement specification document and design models using function-oriented approach.							
	CO3	Design test cases and test plan for a specific testing activity.							
	CO4	Explain the software maintenance process and international quality standards for software systems.							
UNIT-I	**Introduction to Software Engineering**					**Periods: 12**			
Importance of Software Engineering Discipline – Types of Software Companies– Software Life Cycle Models – Classic Waterfall Model – Iterative Life Cycle Model – V Model - Prototyping Model – Incremental Development model - Evolutionary Model – RAD Model – Agile Development Models – Spiral Model – Comparison of Software Life Cycle.									**CO1**
UNIT-II	**Software Project Management and Requirements Analysis**					**Periods: 12**			
Responsibilities of a Software Project Manager – Project Planning – LOC and FP metric for Project Size Estimation — COCOMO – Halstead's Software Science – Scheduling – Requirements for the Wheels Case Study System- Requirements Engineering – Requirements Elicitation – List of requirements for the Wheels System Development of Software Requirements Specification for a Case Study-.									**CO2**
UNIT-III	**Software Design**					**Periods: 12**			
Characteristics of a Good Software Design – Cohesion and Coupling—Data Flow Diagrams –- RUP – UML - Use Cases – Basic concepts of Objects and classes – class and object diagrams – state diagram- activity diagram – Sequence – collaboration – package-components-deployment diagrams for a case study.									**CO2**
UNIT-IV	**Coding and Software Testing**					**Periods: 12**			
Coding Standards and Guidelines – Code Review – Software Documentation – Testing – Unit Testing – Black Box Testing – White Box Testing – Debugging – Program Analysis Tools – Integration Testing – System Testing – Issues with Testing.									**CO3**
UNIT-V	**Software Maintenance and Quality Management**					**Periods: 12**			
Characteristics of Software Maintenance – Reverse Engineering – Software Maintenance Process Models – Estimation of Maintenance Cost – Software Quality – Quality Management System – ISO 9000 – SEI CMM.									**CO1, CO4**
Lecture Periods: 45	**Tutorial Periods: 15**		**Practical Periods: 00**				**Total Periods: 60**		

Reference Books:

1. Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, PHI Learning Pvt. Ltd., 2018.
2. Roger S. Pressman, Software Engineering: A Practitioner's Approach, Seventh Edition, McGraw-Hill, 2014.
3. Ian Sommerville, Software Engineering, Tenth Edition, Pearson Publishers, 2016.
4. Carol Britton and Jill Doake, A Student Guide to Object-Oriented Development, First Edition, Elesvier,2020.

CO – PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO 12	PS O1	PS O2	PS O3
CO 1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

Score:**3** – High; **2** – Medium; **1** – Low

Department : **EEE**				Programme: **B.Tech.**				
Semester :**First**				Course Category Code: **PCC**		Semester Exam Type: **TY**		
EEUC101	**Elements of Electrical Engineering**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
		3	1	-	4	40	60	100
Prerequisite:	NIL							
Course Outcome: At the end of the course students will be able to	**CO1**	To understand the basic concepts of DC circuits and theorems.						
	CO2	To explain the concepts of AC circuits						
	CO3	To understand the basic concepts of Three Phase circuits						
	CO4	To understand electrical wiring and calculation of electrical energy.						
	CO5	To gain knowledge of electrical safety and protection Devices.						
UNIT-I	**DC Circuits**				**Periods: 12**			
Review of Ohm's and Kirchoff's Laws, Series and parallel circuits - Star Delta conversion - Mesh and Node Analysis of DC circuits- Network Theorems: Thevenin, Norton and Superposition.								CO1
UNIT-II	**AC Circuits**				**Periods: 12**			
Sinusoidal voltages and currents - average and R.M.S. values- peak factor and form factor for sinusoidal and non-sinusoidal waveform- phase difference- lagging- leading and in phase quantities and phasor representation -real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).								CO2
UNIT-III	**Three Phase Circuits**				**Periods: 12**			
Concept of three-phase supply and phase sequence- voltages, currents and power relations in three phase balanced star-connected and delta-connected loads along with phasor diagrams– Power measurement by two Wattmeter method.								CO3
UNIT-IV	**Domestic Wiring**				**Periods: 12**			
Requirements: Connectors and switches, Types of wiring: casing and craping-Layout of an domestic wiring- Simple control circuit in domestic installation. Power rating of house holds appliances- calculation of electrical energy for domestic consumers.								CO4
UNIT-V	**Electrical Safety and Protective Devices**				**Periods:12**			
Electrical Safety: Safety precautions, electric shock, first aid for electric shock and other hazards, Use of multi-meters - Grounding: Definition, Importance of grounding, Types of grounding - Protective Devices: fuses, MCB, MCCB, ELCB and electromagnetic relays.								CO5
Lecture Periods: 45	**Tutorial Periods: 15**			**Practical Periods:NIL**			**Total Periods: 60**	

Reference Books:

1. Basic Electrical and Electronics Engineering by R.Muthusubramanian and S.Salivahanan. McGraw Hill Education India Pvt Ltd, New Delhi, 2009.
2. Electric Circuit Theory by Dr.M.Arumugam and N.Premkumar, Khanna Publisher, New Delhi, 2006.
3. B. L. Theraja, “Electrical Technology”, Vol.1, S. Chand Publication, New Delhi, 2014.
4. D C Kulshreshtha, “Basic Electrical Engineering”, Tata McGraw Hill, 2nd Edition, New Delhi, 2019.

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **EEE**				Programme: **B.Tech.**				
Semester : **Second**				Course Category Code: **PCC**			Semester Exam Type: **TY**	
EEUC102	**Electronic Devices and Circuits**			Periods / Week		Credit	Maximum Marks	
				L	T	P	C	CA	SE	TM
				3	1	-	4	40	60	100
Prerequisite:	NIL							
Course Outcome: At the end of the course students will be able to	**CO1**	Describe the characteristics and operation of PN junction diode, BJT and FET						
	CO2	Gain knowledge about various applications of PN junction diodes.						
	CO3	Calculate biasing currents and voltages for BJT and FET circuits.						
	CO4	Describe the properties and characteristics of few specialized diodes, optoelectronic devices and power devices						
	CO5	Acquire knowledge about rectifiers, filters and regulators.						
UNIT-I	**Semiconductor diodes**					**Periods: 12**		
PN junction diode - Construction – forward and reverse bias operation –volt-ampere characteristics mathematical model of a PN junction diode–Silicon versus Germanium diodes – Effects of temperature on diode operation– Static and dynamic resistances–Diode equivalent models– Specification sheets– Transition and diffusion capacitances–Diode switching characteristics -reverse recovery time, Diode applications: Clipping circuits – positive clipper, negative clipper and biased clipper. Clamping circuits – positive clamper, negative clamper and biased clamper.							**CO1, CO2**	
UNIT-II	**Bipolar Junction Transistors**					**Periods: 12**		
Construction and operation– NPN and PNP transistors– CB, CE and CC configurations – Specification sheet, Transistor currents, current gains and leakage currents. BJT characteristics: Input and output characteristics of CB, CE and CC configurations and regions of operation Biasing of BJTs – DC load line characteristics - operating point– stabilization of operating point– different biasing circuits: base bias, base bias with emitter feedback, base bias with collector feedback and voltage divider bias and Bias compensation techniques–thermal stability and thermal runaway.							**CO1, CO3**	
UNIT-III	**Field Effect Transistors**					**Periods: 12**		
Construction and operation of JFET – drain and transfer characteristics – JFET parameters - Shockley's equation– comparison between JFET and BJT. MOSFET – Construction and operation - depletion and enhancement types Biasing of FETs – Gate bias, source bias and potential divider bias.							**CO1, CO3**	
UNIT-IV	**Special Devices**					**Periods: 12**		
Principle of operation of Schottky diode, Varactor diode, Zener diode, Tunnel diode and PIN Diodes. OPTO ELECTRONIC DEVICES: Principle of operation and characteristics of Photo diodes, Phototransistors, Photo conductive cells, LEDs and LCDs, Opto-couplers, seven segment displays, Solar cells and thermistors.							**CO4**	
UNIT-V	**Power Devices and Rectifiers & Power Supplies**					**Periods:12**		
Introduction to power devices– SCR, SCS, GTO, Shockley diode-DIAC- TRIAC and UJT. Half-wave rectifier and full wave rectifiers: center tapped and bridge type – PIV and ripple factor calculations - ripple reduction using filter circuits: inductor filter, capacitor filter, LC filter and filter. Shunt and series voltage regulators.							**CO2, CO4, CO5**	
Lecture Periods: 45	**Tutorial Periods: 15**			**Practical Periods:NIL**			**Total Periods: 60**	

Reference Books:

1. Jacob Millman and Christopher C Halkias, Electronic Devices and Circuits, McGraw Hill Edition, 4th Edition, 2015.
2. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson, 11th Edition,

2021.
3. David A Bell, Electronic Devices and Circuits, oxford higher education, 5th Edition, 2018.
4. J. D. Ryder, Electronic Fundamentals and Applications, Pearson Education, Canada, 1976.
5. Allen Mottershed, Electronic Devices and Circuits: An Introduction, PHI Learning, 2011

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Electronics & Instrumentation Engineering**		Programme: **B.Tech.**						
Semester : 1		Course Category Code:				Semester Exam Type:		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
EIUC101	**Fundamentals of Instrumentation**	3	1	-	4	40	60	100
Prerequisite:								
Course Outcome	**CO1**	Demonstrate a comprehensive understanding of the principles and significance of instrumentation.						
	CO2	Analyze and classify measurement systems based on their characteristics and applications.						
	CO3	Evaluate and select appropriate sensors and transducers for specific measurement tasks.						
	CO4	Apply signal conditioning techniques to accurately process and interpret measurement data.						
UNIT-I	**Understanding Circuit Laws, Measurement Systems, and Calibration**				**Periods: 12**			
Basic Circuit Laws – Ohms Law, KCL, KVL. - Definition, importance, and scope of instrumentation - Measurement Systems - Types of measurements and measurement units - classification of measurement systems - Errors in measurements –types of errors- Statistical analysis of measurement data - mean, standard deviation – Importance of calibration in instrumentation - Calibration methods and standards								**CO1**
UNIT-II	**Basics of sensors**				**Periods: 12**			
Static & Dynamic Characteristics of Sensor - Principles of sensing and transduction - Types of sensors – based on principle of operation: resistive, capacitive, inductive, magnetic, optical – based on application – Selection Criteria								**CO2, CO4**
UNIT-III	**Basics of Electronics**				**Periods: 12**			
Basics of Electronic circuits - Review of Transistor Amplifiers (CB, CE, CC) – basics of opamp - amplification, filtering - Analog-to-digital conversion (ADC) and digital-to-analog conversion (DAC) – Basics of Power supplies								**CO1**
UNIT-IV	**Measuring Instruments**				**Periods: 12**			
Principle & Operation of Measuring Instruments: D'Arsonval galvanometer – moving coil, moving iron meters, Voltmeter, Ammeter, Ohmmeter, Wattmeter, CRO, Function Generator - Megger								**CO3**
UNIT-V	**Digital systems Basics:**				**Periods: 12**			
Digital Basics: Review of Numbers systems & Logic gates (AND, OR, NOT, NAND, NOR) – DVM, DMM, DFM, DPM								**CO1**
Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:0**			**Total Periods: 60**			

Text book:

1. "A Course in Electrical and Electronic Measurements and Instrumentation" by A.K. Sawhney, Dhanpat Rai & Co., 23rd Edition, 2020

References:

1. "Principles of Measurement Systems" by John P. Bentley, Pearson Publishing, 5th edition, 2021

2. "Instrumentation and Measurement in Electrical Engineering" by Roman Malaric, CRC Press, 2nd Edition, 2020

CO PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **Electronics & Instrumentation Engineering**			Programme: **B.Tech.**						
Semester : 2			Course Category Code:				Semester Exam Type:		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	SE	TM
EIUC102	**Basics of Industrial Automation & Control**		3	1	-	4	40	60	100
Prerequisite:									
Course Outcome	**CO1**	Describe the fundamental concepts and types of control systems, including their components and functions.							
	CO2	Design and analyze feedback control systems using PID controllers and stability analysis techniques.							
	CO3	Program and troubleshoot PLCs for industrial automation applications.							
	CO4	Apply process instrumentation principles to monitor and control various industrial processes effectively.							
UNIT-I	**Basic concepts of control systems**					**Periods: 12**			
open-loop vs. closed-loop systems - Types of control systems Automatic, Manual - Role of instrumentation in control systems - Feedback control loop: sensors, controllers, actuators – P&I Diagram									**CO1**
UNIT-II	**Basics Measurement & controllers**					**Periods: 12**			
Basics Measurement & control - Level, Temperature, Flow, Pressure - Types of Controllers – ON/OFF controller, P, I, D & PID controller: principles & applications– Mathematical model of First order systems – Selection Criteria									**CO2, CO4**
UNIT-III	**Overview of industrial automation**					**Periods: 12**			
Overview of industrial automation and its components - PLC (Programmable Logic Controller) architecture, basic programming and applications – Basics of Distributed Control Systems - SCADA (Supervisory Control and Data Acquisition) systems									**CO3, CO4**
UNIT-IV	**Introduction to Virtual instruments**					**Periods: 12**			
Evolutions of VI, advantages, block diagram and architecture of a virtual Instrument-Graphical programming, and comparison with conventional programming - Controls and indicators- Data flow Programming-Editing – Debugging and Running a Virtual Instrument – Loops & Structures									**CO4**
UNIT-V	**Introduction to smart sensors,**					**Periods: 12**			
MEMS sensors and IoT (Internet of Things) - Measurement and monitoring of physiological parameters - Role of instrumentation in renewable energy systems - Recent advancements in instrumentation technology and their applications									**CO4**
Lecture Periods: 45	**Tutorial Periods: 15**		**Practical Periods:0**				**Total Periods: 60**		

Text Book

1. "Control Systems Engineering" by I.J. Nagrath and M. Gopal, New Age International Publishers, 6th Edition, 2021

Reference Books:

1. "Programmable Logic Controllers" by Frank D. Petruzella, McGraw-Hill Education, 6th Edition, 2020
2. "Modern Control Engineering" by Katsuhiko Ogata, Pearson, 6th Edition, 2021

CO PO Mapping

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

Department :**CHEMICAL ENGINEERING**			Programme: **B.Tech**					
Semester : **First**			Course Category Code: **PCC**			Semester Exam Type: **TY**		
Course Code	Course Name		Periods / Week			Credit	Maximum Marks	
			L	T	P	C	CA	SE	TM
CHUC101	**Basics of Chemical Engineering**		3	1	-	4	40	60	100
Prerequisite									
Course Outcome	**CO1**	Understand the role of Chemical Engineer in Process Industry							
	CO2	Able to use appropriate units for Material Balances Calculations							
	CO3	Gain the basic Knowledge of Fluid Flow and Heat Transfer							
	CO4	Obtain the basic knowledge of Mass Transfer and Reaction Rates and Reactors							
	CO5	Gather the basic Knowledge of Controls and Economics							

UNIT-I	**Introduction to Chemical Engineering**	**Periods: 12**
The impact of Chemical Engineering, The Chemical Engineering Discipline, The role of Chemical Processing: What is a Chemical Process, Representing Chemical Process Using Process Diagrams; Solving Chemical Engineering Problems: Strategies for solving problems, Ethical Considerations in Solving Problems.		**CO1**
UNIT-II	**Material Balances**	**Periods: 12**
Describing Physical Quantities: Units, Some important Process variables; Material Balances: Conservation of Total Mass, Material Balances for Multiple Species, Material Balances: Summary. Spreadsheets: The Calculation Scheme, Setting Up a Spreadsheet, Graphing		**CO2**
UNIT-III	**Fluid Flow and Energy Balances**	**Periods: 12**
Fluid Flow: The Concept of Pressure, Non-flowing Fluids, Principle of fluid flow, Pumps and Turbines; Heat Transfer: Energy Balance for Steady State Open Systems, Application of the Steady State Energy Balance, Heat Exchanger Devices.		**CO3**
UNIT-IV	**Mass Transfer with and without Chemical Reactions**	**Periods: 12**
Mass Transfer : Molecular Diffusion, Mass Convection, Mass convection with Transfer across phase Boundaries, Multi-step Mass Transfer; Reaction Engineering: Describing Reaction Rates, Designing the Reactor;		**CO4**
UNIT-V	**Process Control and Process Economics**	**Periods: 12**
Controlling The Process: The need for the Process Control; Feedback Control, Feed forward Control and Comparison of strategies; Economics: Costs, Profitability, Economics for the Acid-Neutralization Problem, Reporting the Results; Case Studies: Using Engineering Teams for These Case studies; Case Study-I: Manufacture of Aspirin, Case Study-II: Manufacture of Xylenes		**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:**	**Total Periods: 60**

Text/Reference Books:

1. Kenneth A. Solen, John N. Harb, Introduction to Chemical Engineering: Tools for Today and Tomorrow, A First Year Integrated Course, 5th Edition, Wiley Student Edition, 2015.
2. Max Peters, "Elementary Chemical Engineering", 2nd Edition, TATA Mc Graw Hill Publication, 2009.
3. S.Pushpavanam, "Introduction to Chemical Engineering", PHI Learning Pvt. Limited, 2012.
4. Morton M. Denn, "Chemical Engineerng - An Introduction", Cambridge University Press, 2012.
5. Walter L. Badger, Julius T. Danchero, "Introduction to Chemical Engineering", TATA McGraw Hill, 1997.
6. Salil K. Ghosal, Shyamal K. Sanyal, Siddhartha Datta, "Introduction to Chemical Engineering", First Edition, Tata Mc Graw Hill , 2004 .

CO-PO Mapping

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

Score: 3 – High; 2 – Medium; 1 – Low

Department: **Chemical Engineering**		Programme: **B.Tech (CH)**						
Semester: **Second**		Course Category Code: **PCC**				Semester Exam Type: **TY**		
Course Code	Course Name	Periods/Week			Credit	MaximumMarks		
		L	T	P	C	CA	SE	TM
CHUC102	**Process Calculations**	**3**	**1**	**-**	**4**	**40**	**60**	**100**

Prerequisite		
	On successful completion of the course, students should be able to:	
Course Outcome	**CO1**	Understand the fundamental concepts of dimensional consistency, stoichiometry and estimation of composition of mixtures and solutions, conversion, yield, selectivity, ideal and real behavior of gases, vapors and liquids.
	CO2	Analyze the problem statement and balance the material flowing through a chemical process/equipment without and with reactions
	CO3	Understand the general energy balance, simplify and apply to open and closed systems with and without reactions
	CO4	Able to draw flow diagrams and solve problems involving recycle, Purge and bypass in a process or unit.
	CO5	Able to judge the process units from various angles such as: society, environment, sustainability, etc.

UNIT-I	**Process Principles**	**Periods: 12**
Introduction to Chemical engineering calculations, units and dimensions, mole and molecular weight, properties of gases, vapors, liquids, solutions and solids, gas laws, partial pressures, vapor pressures, saturation and equilibria, Raoults law, partial saturation and humidity. Introduction to Material and Energy Balances- Derivation of Steady state and Unsteady state Balance equations for any system		**CO1, CO2**

UNIT-II	**Material Balances on Non-reactive System**	**Periods: 12**
Material balances without chemical reactions, stoichiometry and unit operations - distillation, absorption, stripping, extraction, leaching, crystallization, drying and psychrometry. Recycle, purge and By-pass calculations.		**CO2, CO3**

UNIT-III	**Material Balances on Reactive system**	**Periods: 12**
Material balances involving chemical reactions, simple oxidation reaction, calculations involving combustion of gaseous, liquid and solid fuels. Recycle, purge and bypass calculations. Introduction to unsteady balances, Balances on mixing vessel, Level Systems		**CO2, CO3, CO4**

UNIT-IV	**Energy Balances on Non-reactive System**	**Periods: 12**
Energy balance-heat capacity and calculation of enthalpy changes, Enthalpy changes for phase transitions, evaporation, Clausius- Clapeyron equation.		**CO2, CO3, CO4**

UNIT-V	**Energy Balances on Reactive Systems**	**Periods: 12**
Energy balances with chemical reaction – heat of reaction and adiabatic flame temperature calculations		**CO2, CO5**

Lecture Periods: 45	**Tutorial periods: 15**	**Practical Periods: -**	**Total Periods: 60**

ReferenceBooks:

1. Bhatt and S.M. Vora, Stoichiometry, Tata Mc Graw Hill, 5th Edition, 2013.
2. David.M. Himmelblau and Riggs , Basic Principles and Calculations in Chemical Engineering, Prentice Hall of India Ltd., 7thEdition,2004
3. A.Hougen, K.M.Watson and K.A.Ragatz, Chemical Process Principles, Vol.1, CBSE Publishers, 1980.
4. Richard M.Felder,RonaldW.Rousseau, Elementary Principles of Chemical Processes, Wiley Publications,3rd Ed., 2007.
5. V.Venkataramani, N. Anantharaman and K.M. Meera Sheriffa Begum, Process Calculations, PHI Learning Private Limited, 2nd Edition, 2012.
6. D.C. Sikdar, Chemical Process Calculations, PHI Learning Private Limited, 2nd Edition, 2013.

CO-PO MAPPING

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

Score: 3 – High; 2 – Medium; 1 – Low

Department : **IT**		Programme : **B.Tech**						
Semester : First		Course Category Code:			Semester Exam Type:			
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
ITUC101	**Information Technology Essentials**	3	1	-	4	40	60	100
Prerequisite:	-							
Course Outcome At the end of the course students will be able to	**CO1**	Discuss the basic concepts of Information Technology.						
	CO2	Describe the working principle of Computer and its hardware components.						
	CO3	Examine various programming concepts and decide the best one to be applied for real time applications						
	CO4	Design websites with basic multimedia features that meet specified needs and interests using basic elements to control layout and style.						
	CO5	Develop dynamic website/web based applications using HTML and MYSQL database.						
UNIT-I	**Introduction to Information Technology**				**Periods: 12**			
Core Functions of Information Technology- Components of the Computer System- Data and Information - Data Storage -Data Organization- Introduction to Content Management Systems (CMS)- CMS Tools and Examples- Societal Impacts of Information Technology.								**CO1**
UNIT-II	H**ardware Essentials**				**Periods: 12**			
Motherboard – Networking Cards – Graphics Card – Processors – Hard Drive – USB Port –Monitor Ports – Servers – Types of Servers – Web Server – Database Server – Data Centre and Cloud Servers – Server Management								**CO2**
UNIT-III	Computer Programming and Languages				**Periods: 12**			
Introduction, Algorithm, Programming Paradigms, characteristics of a Good Program, Programming Languages, Generations of Programming Languages, Features of a Good Programming Language. Operating System- Introduction, Operating System Definition, Evolution of Operating System, Types of Operating Systems. Database Fundamentals- Introduction, Database Definition								**CO3,CO 4**
UNIT-IV	**Multimedia Essentials**				**Periods: 12**			
Components of Multimedia -Multimedia and Hypermedia-Overview ofMu1timedia Software Tools-Graphics and Image Editing-Video Editing-Animation- Mu1timedia Authoring and tools-Adobe Premiere-Macromedia Director-Macromedia Flash-Dreamweaver								**CO4,CO 5**
UNIT-V	**WEB and Scripting Essentials**				**Periods:12**			

Internet Basics – Browser Fundamentals – Authoring Tools – Introduction to HTML5 – HTML5 Tags – HTML5 Forms – Cascading Style Sheets (CSS3) Fundamentals – Need for Scripting Languages – Introduction to JavaScript/ Angular JS.	**CO4,CO 5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:**	**Total Periods: 60**

Reference Books:

1. Shambhavi Roy, Clinton Daniel, Manish Agrawal, "Fundamentals of Information Technology" USF Publications, 2023.
2. Rajaraman .V "Introduction to Information Technology" PHI Learning; 3rd edition,2018
3. Irv Englander "The Architecture of Computer Hardware, Systems Software and Networking:", Wiley, Fifth Edition, 2016.
4. Deane Barker "Web content management: Systems, features, and best practices. Boston: O'Reilly, First Edition,2016.
5. Niederst Robbins, Jennifer, "Learning Web Design: A Beginner's Guide to HTML,
6. Ze-Nian Li and Mark S. Drew," Fundamentals of Multimedia", Springer International Publishing Switzerland , Second Edition 2014
7. Robert W. Sebesta, "Concepts of Programming Languages , Pearson Publisher Tenth Edition, 2012

CO-PO MAPPING

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PSO2
CO1	2	2	2	3	2							1	3	2
CO2	2	2	3	3	2							1	3	1
CO3	2	3	3	3	2							2	2	3
CO4	2	2	3	3	2							2	2	2
CO5	2	2	3	3	2							2	2	2

Department : **IT**				Programme : **B.Tech**				
Semester : Second				Course Category Code: **PCC**		Semester Exam Type: **TY**		
Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
ITUC102	**Digital Logic Design**	3	1	-	4	40	60	100
Prerequisite:	-							

Course Outcome		
At the end of the course the students will be able to	**CO1**	Describe the combinational circuits, sequential circuits, memory / programmable logics.
	CO2	Solve complex Boolean functions through algebraic manipulation and Karnaugh maps
	CO3	Describe the characteristics of various Flip-Flops
	CO4	Design PLDs from their specifications or truth/function table
	CO5	Design digital systems with combinational and sequential circuits logic

UNIT-I	**BOOLEAN ALGEBRA AND GATES**	**Periods: 12**
Number Systems: Binary, Octal, Hexadecimal – Representation of Negative Numbers – 1's and 2's Complements – Arithmetic Operations – Binary Codes – Boolean Algebra – Theorems and Postulates – Functions – Truth Table – Canonical and Standard Forms – Minterms and Maxterms - Logic Gates – Universal gates		**CO1,**

UNIT-II	**SIMPLIFICATION OF BOOLEAN FUNCTIONS**	**Periods: 12**
Sum of Products and Product of Sums- Simplification of Boolean Functions –Karnaugh Map – 2, 3, 4 variables – NAND/NOR Implementations - Two level and multi-level implementation – Don't care conditions.		**CO2,**

UNIT-III	**COMBINATIONAL LOGIC**	**Periods: 12**
Design Procedure – Adders- Subtractors - Binary Parallel Adder – Carry Look-ahead Adder – BCD Adder – Binary Multiplier – Magnitude Comparator – Code Converters – Decoder – Encoder – Priority Encoder – Mux/Demux – Applications.		**CO1, CO5**

UNIT-IV	**SEQUENTIAL CIRCUITS**	**Periods: 12**
Sequential Circuits –latches (S-R Latch, D-Latch)– flip flops (S-R Flip Flop, D-Flip Flop, J-K Flip Flop, T-Flip Flop) - Master Slave Configuration of J-K Flip Flop – analysis of clocked sequential circuits – Registers and Counters: Registers – shift registers –Ripple counters –synchronous counters		**CO1, CO5**

UNIT-V	**MEMORY AND PROGRAMMABLE LOGIC**	**Periods:12**
Introduction - Random Access Memory - Memory Decoding - Read Only Memory - Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Sequential Programmable Devices		**CO1,**

			CO4
Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods:**	**Total Periods: 60**

Reference Books:

1. Shipra Gupta, "Digital System Design" Kararia, 2021
2. M. Morris Mano and Michael D. Ciletti, Digital Systems: With an Introduction to the Verilog HDL, Sixth Edition, Pearson, 2018.
3. Samir Palnitkar, VERILOG HDL – A Guide to Digital Design and Synthesis, Pearson Education Inc., Second Edition, 2012.
4. J. Bhasker, VHDL Primer, Prentice Hall of India Pvt. Ltd, Third Edition, 2006.
5. Thomas L. Floyd and R.P. Jain, Digital Fundamentals, Pearson Education, Tenth edition, 2008.
6. Leach Malvino, Digital Principles and Applications, Tata McGraw Hill, Fifth edition, 2005.
7. Charles H. Roth, Fundamentals of Logic Design, Thomson Brooks/Cole, Fifth edition, 2003.
8. Thomas C Bartee, Computer Architecture and Logic Design, McGraw Hill, Singapore, 2002.

CO-PO Mapping Table

CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	1	1	-	-	-	-	-	-	-	-	2	1
CO2	2	1	-	2	-	-	-	-	-	-	-	-	2	1
CO3	3	2	1	2	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	2	-	-	-	-	-	-	-	-	2	1
CO5	3	3	2	2	-	-	-	-	-	-	-	-	2	1
Avg	2.6	2.2	1.5	1.8									2	2

Department: **Mechatronics**				Programme : **B.Tech.(MT)**					
Semester : **First**				Course Category Code: **PCC /** Semester Exam Type: **TY**					
Course Code	Course	Periods / Week			Credit	Maximum Marks			
		L	T	P	C	CA	SE	TM	
MTUC101	**Basics of Mechatronics**	3	0	0	3	40	60	100	
Prerequisite	Nil								
Course Outcome After successful completion of course, the student will be able to:	**CO1**	Differentiate the concurrent mechatronics and traditional approach.							
	CO2	Describe transducers and micro mechatronic system and their applications							
	CO3	Defines the actuators and their application							
	CO4	Explain controllers and algorithms and their applications							
	CO5	Describe the interfacing concepts to appreciate the interdisciplinary							

UNIT – I	**Introduction**	**Periods: 9**	
Definition, basic concepts and elements of mechatronic systems and comparison with traditional approach of design, needs and benefits of mechatronics in manufacturing - Applications in robotics, CNC, Automotive Systems etc.			**CO1**
UNIT-II	**Transducers and Micro Mechatronic System**	**Periods: 9**	
Introduction to transducers- Primary, Secondary- Working, Mechanical device as primary detector, electrical transducers, active & passive, analog & digital. Introduction to micro mechatronics system- System principle - Component design – System design- Scaling laws- Micro actuation- Micro robot- Micro pump - Applications of micro mechatronic components.			**CO2**
UNIT-III	**Drives and Actuators**	**Periods: 9**	
Solenoids, relays, diodes, DC motor, AC Motor, stepper motors, Hydraulic & Pneumatic devices, Power supplies, valves.			**CO3**
UNIT-IV	**Controllers and Algorithms**	**Periods: 9**	
Introduction to Microprocessor -Microcontrollers, Programmable Logic Controllers (PLC), Artificial Neural Networks (ANN), Fuzzy controls.			**CO4**
UNIT-V	**Interfacing**	**Periods: 9**	
Introduction to Input / Output addressing, interface requirements, peripheral interface adapters, serial communications – examples.			**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:**	**Total Periods: 45**

Reference Books:

1. W Bolton, Mechatronics, Pearson Education, Sixth Edition, 2015.
2. D. A. Bradley, Mechatronics and the Design of Intelligent Machines and Systems, CRC Press, 2000.
3. Dan Nesculescu, Mechatronics, Pearson Education Pvt. Ltd, Fourth Impression 2009.
4. David G. Alciatore & Michael B Histand., Introduction to Mechatronics and Measurement systems, Tata McGraw Hill, Third Edition, 2007.
5. D. Shetty & R. Kolk, Mechatronics System Design, Second Edition, SI, Global Engineering, 2011.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2											2	1
CO 2	3	3	2	1									2	1
CO 3	3	2	1										2	1
CO 4	3	2	1	1	2								2	2
CO 5	3	3	2	2								1	2	1

Department: **Mechatronics**				Programme : **B.Tech.(MT)**						
Semester :**Second**				Course Category Code: **PCC /** Semester Exam Type: **TY**						
Course Code	Course	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
MTUC102	**Basics of Sensors and Measurements**	3	0	0	3	40	60	100
Prerequisite	Nil							

Course Outcome After successful completion of course, the student will be able to:		
	CO1	Expertise in various calibration techniques and signal types for sensors.
	CO2	Apply the various sensors in the Automotive and Mechatronics applications
	CO3	Learn the various sensors used to measure various physical parameters.
	CO4	Study the basic principles of various smart sensors.
	CO5	Implement the DAQ systems with different sensors for real time applications

UNIT – I	**Introduction to Sensors**	**Periods: 9**
Basics of Measurement – Classification of errors – Error analysis – characteristics of transducers – Classification of sensors – Sensor Output Signal Types.		**CO1**

UNIT-II	**Motion, Proximity And Ranging Sensors**	**Periods: 9**
Motion Sensors – Potentiometers, Encoders – Optical, Magnetic, Inductive, Capacitive, LVDT– RVDT- Range Sensors – RF beacons, Ultrasonic Ranging, Applications.		**CO2**

UNIT-III	**Force, Magnetic And Heading Sensors**	**Periods: 9**
Strain Gage, Load Cell, Magnetic Sensors –types, principle, requirement and advantages: Magneto resistive – Hall Effect – Current sensor- Heading Sensors – Compass, Gyroscope, Inclinometers -Applications.		**CO3**

UNIT-IV	**Optical, Pressure And Temperature Sensors**	**Periods: 9**
Photo conductive cell, photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, Piezoelectric – Tactile sensors, Temperature – IC, Thermistor, Thermocouple. Acoustic Sensors – flow and level measurement, Radiation Sensors - MEMS & Nano Sensors, LASER sensors - Applications.		**CO4**

UNIT-V	**Signal Conditioning And DAQ Systems**	**Periods: 9**
Data Acquisition: Single channel and multi-channel data acquisition – Data logging – Benefits and applications - Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring.		**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:**	**Total Periods: 45**

Reference Books:

1. Ernest O Doebelin, “Measurement Systems – Applications and Design”, Tata McGraw-Hill, 2009.
2. Sawney A K and Puneet Sawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th edition, Dhanpat Rai & Co, New Delhi, 2013.
3. Patranabis D, “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.
4. John Turner and Martyn Hill, “Instrumentation for Engineers and Scientists”, Oxford Science Publications, 1999. Richard Zurawski, “Industrial Communication Technology Handbook” 2nd edition, CRC Press, 2015.
5. Czichos, Horst, Measurement, Testing and Sensor Technology, Springer International Publishing, 2018.

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

Department :		Programme : B.Tech.						
Semester : First/Second		Course Category Code: SEC				Semester Exam Type: LB		
Course Code	Course Name	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
GEUS101	Basic Engineering Skills Laboratory - I	1	-	4	3	40	60	100
Prerequisite	**NIL**							
Course Outcome At the end of the course students will be able to	**CO1**	Understanding the fundamentals of masonry technology						
	CO2	Gain skills in carpentry and sheet metal works						
	CO3	Understand basic properties chemicals and their handling and usage						
	CO4	To demonstrate understanding the principle of operation of various Electrical home appliances, Solar PV system and their wiring method						

UNIT – I (Civil Engineering)	Periods:15
1. Dimensions and Building Materials Basic Dimension and Units- Methods of measurements–Masonry tools and applications – Building materials and their uses –plans and Documents - Field study and Practical's . 2. Building Construction and working strategy Construction of walls-Types; Placing of reinforcement – for beams, column ,slabs and footings as per the detailed drawing- Plastering and techniques – Laying of Tiles , marbles and granite for cladding and floor - Field study and Practical's 3. Setting out of Buildings and Drainage system Marking diagonals, setting out cross walls & offsets. Marking excavation lines & fixing of plinth & floor levels. Setting out Drainage lines – finishing for plumbing and closet works – Field and Practical's	CO1

UNIT-II (Mechanical Engineering)	**Periods: 15**
1. Carpentry Study of different carpentry tools and their functions. Types of joints and their applications. Procedure for making different types of joints. Exercises: i) Lap joint ii) corner mortise joint and iii) Dovetail joint 2. Sheet Metal work Study of sheet metal work tools and their functions. Different types of sheet metal operations, Applications. Exercises: i) Dust pan ii) box tray and iii) Frustum of cone	**CO2**

UNIT-III (Chemical Engineering)	Periods:15
1. Studies on physical properties measurements (Boiling point, Density, Viscosity) 2. Studies on acid/base and estimation of Normality/Molarity and Molality Materials safety and data sheet 3. Studies on wet bulb/dry bulb (Humidity calculation, relative humidity calculation etc) 4. Studies on colligative properties (Boiling point ,freezing point elevation) 5. Studies on colours/flavours extraction/synthesis 6. Studies on centrifugal pump priming/cavity 7. Studies on peristaltic pump-calibration 8. Studies on basic (mass, heat and momentum transfer equation) equations and their verification 9. Studies on pipes, tube and fittings and valves and their standards and Hoop stress calculations 10. Studies on flow meters and their utilization and flow calculations 11. Studies on heat insulators and elements and their calculations 12. Soap preparation and analysis (fatty content and alkali content) 13. Handmade papers 14. Basic fuel analysis. 15. Bomb calorimeter (calorific value estimation) 16. Momentum transfer/ Heat transfer calculations/ Mass transfer calculations using Excel program 17. Steam distillation experiment 18. Testing the adulteration of coconut oil (Saponification number and Cloud & Pour point) 19. Testing of Viscosity of oils. (Viscometer) 20. Quality analysis of water. (pH, Density, Hardness, Alkalinity, TDS, DO)..	**CO3**
UNIT-IV (Electrical and Electronics Engineering)	**Periods: 15**
1.Wiring (i) Lamp controlled from two different places and from three different places. (ii) Bedroom wiring and Godown wiring. (iii)Doctor's room wiring 2.Electrical Maintenance (i) Demonstration and testing of mixer and iron box (ii) Demonstration and testing of grinder and induction stove (iii) Demonstration and testing of fan and tube light. 3.Solar setup (i) Study of solar cell characteristics (ii) Measurement of solar insolation using pyranometer (iii) Serial and parallel operation of solar panel	**CO4**

Lecture Periods: 15	Tutorial Periods: -	Practical Periods: 60	Total Periods :75

Reference Books:

1. GPS Sattelite Surveying—Alfred Leick—Wiley
2. Remote sensing and Geographical Information System, By A. M. Chandra and S. K. Ghosh, Narosa Publishing House.
3. Remote Sensing & GIS,2/E—Bhatta– Oxford University Press
4. Principles of Geographical Information System—Burrough– Oxford University Press
5. Surveying—M.D.Saikia—PHI Learning Pvt . Ltd.Delhi

6. Advanced Surveying -Total Station, GIS and Remote Sensing by SatheeshGopi, R.Sathikumar and N. Madhu, Pearson publication
7. Surveying Vol. 2 by S. K. Duggal, McGraw Hill Publication
8. Remote sensing & image interpretation, Lillesand& Kiefer, John Wiley Pub.
9. John K.C ., "*Mechanical Workshop Practice*", PHI Learning Pvt. Ltd., New Delhi,2010
10. Bawa H.S., "*Workshop Practice*", MC Graw Hill India, 2009
11. Lab Manual, Department of Chemical Engineering, Puducherry Technological University, 2024.
12. Electrical Wiring: An Introduction by Satheesh Kumar, Ane Books Pvt Ltd. 2022.
13. Electrical Wiring Handbook by Edward L. Safford. Jr, Tab Books Inc. 2021.
14. Study of Electrical Appliances and Devices by K.B . Bhatia – Khanna Publishers -1988.
15. Testing, Commissioning, operation and Maintenance of Electrical Equipments - Sunil S Rao, Khanna Publishers 1991.
16. Hand book on Solar PV Installer designed by Skill Council for Green Jobs (SCGJ), Skill India, National Skill Development Corporation, 2024.
17. Solar Photovoltaic Technology & Systems: A manual for Technicians, Trainers and Engineers, Chetan Singh Solanki, PHI, 2013.

CO-PO 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
CO 1	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO 2	1	-	1	1	-	1	1	-	2	1	-	1	-	1
CO 3						3	3	01					02	
CO 4	3	3	2			1								

Score: 3-High; 2-Medium; 1-Low

Department :		Programme : B.Tech.						
Semester : First/Second		Course Category Code: SEC				Semester Exam Type: LB		
Course Code	Course Name	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
GEUS102	Basic Engineering Skills Laboratory - II	1	-	4	3	40	60	100
Prerequisite	NIL							
Course Outcome At the end of the course students will be able to	CO1	students will demonstrate proficiency in understanding and applying principles of basic sensors and transducer, and will expertise proficiency in understanding and applying techniques in the field of instrument calibration						
	CO2	Test and troubleshoot Regulated Power Supply, Audio Amplifier and Function Generator using Breadboard and PCB.						
	CO3	Develop intuitive and responsive web pages Demonstrate Photoshop as a graphic designing tool and work with the text, graphics, and other effects that made designing easier.						
	CO4	Demonstrate Photoshop as a graphic designing tool and work with the text, graphics and other effects that made designing easier.						

UNIT – I (Electronics and Instrumentation Engineering)	Periods:15
1. a) Testing and troubleshooting in various types of sensors (thermocouples, RTDs, thermistor, pressure and level sensors) to understand their principles of operation and characteristics. 2. Testing of level, flow, pH value , moisture and humidity ……etc. 3. Drone Design 4. Calibration of ammeter, volt meter and wattmeter. etc. 5. Calibration and testing of control valves, pressure switch, P-I &I-P converter and temperature sensors 6. PCB Design .	CO1
UNIT-II (Electronics and Communication Engineering)	**Periods: 15**
1. Familiarization of Electronics components, devices and equipment using demo model 2. Construction of half wave and full wave rectifier with and without filter and measurement of ripple factor. 3. Construction of voltage regulator for varying line and load voltages. 4. Setting up of audio system using AF amplifier using tag board 5. Construct, test and troubleshoot Audio Amplifier 6. PCB Design	**CO2**
UNIT-III (Computer Science and Engineering)	**Periods:15**
1. A) Building a Wikipedia Clone website 1.1 Understanding the structure and layout of Wikipedia 1.2 Implementing navigation, content sections, and formatting B) Design and Implement student course registration HTML form 2. Building E-commerce site 2.1 Wireframing and prototyping 2.2 Responsive design 2.3 Adopting CSS frameworks	**CO3**

3. Graphics 3.1 Installation of image editing software (e.g., GIMP, photoshop) 3.2 Basic image editing techniques (cropping, resizing, color adjustments)	
UNIT-IV (Information Technology)	**Periods: 15**
1: Basics of photoshop Tools: Introduction to graphic design and Adobe Photoshop - Photoshop Pre-Settings - Photoshop User Interface - Cropping an object/color corrections/setting up canvas size/Import and Export file formats 2 Food/Tourism/ Event poster Design: Layout, Background Design and Image editing for Poster Design - -Role of Typography in Poster Design 3. Create customized Business cards with QR code: Work with fonts, including size and type, colors, pen tool and QR code. 4 Robotics Design – I 5 Robotics Design – II 6: Study of parts of the system unit.	**CO4**

Lecture Periods: 15	**Tutorial Periods: -**	**Practical Periods: 60**	**Total Periods :75**

Reference Books:

1. Paul Horowitz, Winfield Hill, *The Art of Electronics*, 3rd Edn., Cambridge university press, 2015.
2. C. Millman, Halkias and Satyabrata,"Electronic devices and Circuits", Third edition, Mc GrawHill, 2010.
3. Data sheets of various electronic components
4.Jason Beaird, Alex Walker, James George, The Principles of Beautiful Web Design, SitePoint, 4th Edition, September 2020.
5.Eugene Fedorenko, Designing in Figma, 1st Edition, January 2020.
6. Ernest Woodruff, "Adobe Photoshop for Beginners 2021: A Complete Step by Step Pictorial Guide for Beginners with Tips & Tricks to Learn and Master All New Features in Adobe Photoshop 2021", Kindle Edition, 2021.

CO-PO 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
CO 1														
CO 2	3	2	2	–	1	2	–	–	2	–	–	1	2	1
CO 3	2	-	3	-	-	-	-	-	-	-	-	-	-	-
CO 4	2	2	1									3	3	1

Score: 3-High; 2-Medium; 1-Low