Programme Structure

Sharda School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech. in Electrical and Electronics Engineering

Programme code: SET0404

Batch: 2023-2027

Sharda University

Sharda School of Engineering & Technology
Department of Electrical Electronics & Communication Engineering
B.Tech-EEE
Batch: 2023-2027
TERM: I

S. No.	Course Code	Course	Teaching Load			Credits	UC/PC/PE/OE/ AECC/SEC
			L	T	P		
THEORY SUBJECTS							
1.	CSE113	Programming for Problem Solving	3	0	0	3	UC
2.	MTH141	Maths –I Calculus, Analysis and linear Algebra	3	1	0	4	UC
3.	PHY125	Engineering Physics (Semiconductor Physics)	3	1	0	4	UC
4.	EEE112	Principle of Electrical and Electronics Engineering	3	0	0	3	UC
5.	CVL103	Environmental Studies*	2	0	0	0	UC
Practical/Viva-Voce/Jury							
6.	ECP110	Electrical CADD software	0	0	3	1.5	P
7.	CSP113	Programming for Problem Solving Lab	0	0	2	1	P
8.	EEP112	Principle of Electrical and Electronics lab	0	0	2	1	P
9.	PHY161	Engineering Physics (Semiconductor Physics) Lab	0	0	2	1	P
10.	ARP101	Communicative English-I	1	0	2	2	P
11.	EEP113	Tinkering Lab	0	0	2	1	P
TOTAL CREDITS						**21.5**	

*Audit course

Sharda University

Sharda School of Engineering & Technology
Department of Electrical Electronics & Communication Engineering
B.Tech-EEE Batch: 2023-2027
TERM: II

S. No.	Course Code	Course	Teaching Load			Credits	UC/PC/PE/OE/ AECC/SEC
			L	T	P		
Theory Subjects							
1	CSE114	Application based Programming	3	0	0	3	UC
2	MTH143	Diff Eqs Special T& Comp Variables	3	1	0	4	UC
3	ECE140	Digital Electronics	3	0	0	3	PC
4	HMM111	Values and Ethics	2	0	0	2	UC
Practical/Viva-Voce							
5	EEP120	Fault Detection and Correction in Electrical Circuits	0	0	3	1.5	P
6	ARP102	Communicate English-II	1	0	2	2	P
7	CSP114	Application based Programming Lab	0	0	2	1	P
8	ECP240	Digital system design Lab	0	0	2	1	P
9	EEE121	Domestic Wiring	1	0	2	2	P
TOTAL CREDITS						**19.5**	
Note: Industrial Internship after completion of 2nd semester and will be evaluated in 3rd Semester							

Sharda University

Sharda School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-EEE Batch: 2023-2027 TERM: III

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	UC/PC/PE/OE/ AECC/SEC
			L	T	P			
Theory Subjects								
1.	IED001	Introduction to Entrepreneurship	2	0	0	2	-	SEC
2.	MTH145	Probability & Statistics (with MATLAB & Sci Lab)	3	1	0	4	Maths	AECC
3.	ECE237	Analog Circuits –I	3	0	0	3	Electronics	PC
4.	EEE221	Electrical Machines -I	3	0	0	3	Electrical	PC
5.	EEE220	Network Analysis and Synthesis	3	0	0	3	Electrical	PC
Practical/Viva-Voce								
6.	ARP207	Logical Skill building and Soft Skill	0	0	4	2	-	SEC
7.	ECP237	Analog Circuit-I lab	0	0	2	1	Basics Circuits	P
8.	EEP221	Electrical Machines –I Lab	0	0	2	1	Electrical	P
9.	EEP252	Project Based Learning (PBL) -1	0	0	4	2	-	P
10.	EEP220	Network Analysis and Synthesis Lab	0	0	2	1	Electrical	P
11.	EEP295	Summer Internship	-	-	-	2	-	P
TOTAL CREDITS						**24**		

Sharda University

Sharda School of Engineering & Technology

Department of Electrical Electronics & Communication Engineering

B.Tech-EEE Batch: 2023-2027

TERM: IV

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	UC/PC/PE/OE/ AECC/SEC
			L	T	P			
Theory Subjects								
1.	EEE224	Electrical Machines-II	3	0	0	3	Engineering Math	PC
2.	EEE244	Introduction to Electric Vehicles	4	0	0	4	Electrical	PC
3.	EEE228	Industrial Instrumentation	3	0	0	3	-	PC
4.	PE1	Programme Elective 1	3	0	0	3	-	PE
5.	BTY223	Introduction to Biology for Engineers	2	0	0	2	Basic Sciences	AECC
6.	OE 1	Open Elective 1	2	0	0	2	-	SEC
Practical/Viva-Voce								
7.	EEP224	Electrical Machines-II Lab	0	0	2	1	-	P
8.	EEP228	Industrial Instrumentation Lab	0	0	2	1	-	P
9.	EEP253	Project Based Learning (PBL) - 2	0	0	4	2	-	P
10.	ARP 208	Quantitative and Qualitative Aptitude Skill Building	0	0	4	2	-	SEC
TOTAL CREDITS						**23**		
Note: Industry connect after completion of 4th semester and will be evaluated in 5th Semester								

Sharda University

Sharda School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-EEE Batch-2023-2027 TERM: V

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	UC/PC/PE/OE/ AECC/SEC
			L	T	P			
Theory Subjects								
1.	EEE330	Control systems	3	0	0	3	-	PC
2.	EEE333	Power System I	3	0	0	3	-	PC
3.	PE2	Programme Elective 2	2	0	0	2	-	PE
4.	MRM001	Research Methodology	2	0	0	2	-	AECC
5.	OE2	Open Elective –2	2	0	0	2	-	SEC
Practical/Viva-Voce								
6.	EEP331	Control systems Lab	0	0	2	1	-	P
7.	EEP338	Power System I Lab	0	0	2	1	-	P
8	PE-2 lab	Programme Elective 2 Lab	0	0	2	1	-	P
9.	EEP337	Technical Skill Enhancement Course-1	0	0	2	1	-	SEC
10.	EEP343	Project Based Learning (PBL) -3	0	0	4	2	-	P
11.	ARP 305	Personality Development and Decision making Skills	0	0	4	2	-	SEC
12.	EEP395	Industry Connect	-	-	-	2	-	P
13.	ECC301	Community Connect	-	-	-	2	-	P
TOTAL CREDITS						**24**		

Sharda University

Sharda School of Engineering & Technology

Department of Electrical Electronics & Communication Engineering

B.Tech-EEE Batch: 2023-2027 TERM: VI

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	UC/PC/PE/OE/ AECC/SEC
			L	T	P			
Theory Subjects								
1.	EEE334	Switch Gear Protection	3	0	0	3	Power System	PC
2.	PE 3	Programme Elective 3	3	0	0	3	-	PE
3.	PE4	Programme Elective 4	3	0	0	3	-	PE
4.	PE5	Programme Elective 5	2	0	0	2	-	PE
5.	PE6	Programme Elective 6	3	0	0	3	-	PE
6.	OE 3	Open Elective-3	3	0	0	3	-	SEC
Practical/Viva-Voce								
7.	ARP 306	Campus to Corporate	0	0	4	2		SEC
8.	EEP334	Switchgear & Protection Lab	0	0	2	1	Power System	P
9	PE-5 Lab	PE lab	0	0	2	1		P
10	EEP344	Project Based Learning (PBL) -4	0	0	4	2	-	P
11	EEP339	Technical Skill Enhancement Course-2	0	0	2	1	-	SEC
					TOTAL CREDITS	**24**		
Note: Industrial Internship after completion of 6th semester and will be evaluated in 7th Semester.								

Sharda University

Sharda School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-EEE Batch: 2023-2027 TERM: VII

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	UC/PC/PE/OE/ AECC/SEC
			L	T	P			
Theory Subjects								
1.	PE 7	Programme Elective 7	2	0	0	2	-	PE
2.	HMM305	Management for Engineers	3	0	0	3	-	UC
3.	PE 8	Programme Elective 8	3	0	0	3	-	PE
4.	OE 4	Open Elective-4	3	0	0	3	-	SEC
Practical/Viva-Voce								
6.	EEE430	Major Project- 1	-	-	-	2	-	P
7	PE-7 lab	PE lab	0	0	2	1		P
8.	EEP431	Industrial Internship	-	-	-	2	-	P
TOTAL CREDITS						**16**	-	

Sharda University

Sharda School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-EEE

Batch: 2023-2027

TERM: VIII

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	UC/PC/PE/OE/ AECC/SEC
				L	T	P			
Practical/Viva-Voce/Jury									
1.		EEP432	Major Project – 2	-	-	16	8	-	P
TOTAL CREDITS							**8**	-	

List of Programme Electives

S. No	PE	Course Name	L	T	P	C	Category
1	PE1	Electromagnetic Field Theory	3	0	0	3	Engineering
	PE2	Microprocessor and Microcontroller with Interfacing					
2	PE2	Wind and Solar Energy	3	0	0	3	Engineering
3	PE3	Electrical and Electronics Measurements	3	0	0	3	Engineering
4	PE3	Power System II					
5	PE4	Power Electronics	3	0	0	3	Engineering
6	PE5	Robotics and Industrial Robots	3	0	0	3	Engineering
7	PE5	Intelligent Actuators and Mechatronics	3	0	0	3	Engineering
8	PE5	Virtual Instrumentation	3	0	0	3	Engineering
9	PE5	Advanced Electric Vehicles	3	0	0	3	Engineering
10	PE6	PLC and SCADA	3	0	0	3	Engineering
11	PE6	Computer Architecture	3	0	0	3	Engineering
12	PE7	Biomedical Instrumentation	3	0	0	3	Engineering
13	PE7	Wireless Senor Network: Architecture and Protocol	2	0	0	2	Engineering
14	PE8	Distributed Generation Technology	4	0	0	4	Engineering
15	PE8	Operation and Control of smart grid	3	0	0	3	Engineering
16	PE8	Smart Power Grid and Micro-Grid	3	0	0	3	Engineering
17	PE8	HVDC and FACTS	3	0	0	3	Engineering

Additional credits for Minor in Programme
Electric Vehicles

S.No	Course Code	Course Name	L	T	P	C	Category	Prerequisite	Offered in Term
1	EEE144	Energy Resources and Technology	2	0	0	2	Engineering	Introduction	II
2	EEE242	Energy storage for Renewables	3	0	2	4	Engineering	Basic Course	III
3	EEE243	Solar Energy Technologies and System Design	3	0	0	3	Engineering	Basic Course	IV
4	EEE244	Introduction to Electric Vehicles	4	0	0	4	Engineering	Advance Course	V
5	EEE344	Advanced Electric Vehicles	4	0	0	4	Engineering	Advance Course	VI
6	EEE443	Sensor Integration Lab	0	1	4	3	Engineering	Industrial Applications	VII
		Total credits to be taken				20			

Course Modules

TERM 1

School: SSET
Batch:2023-27
Programme: B.Tech
Current Academic Year: 2023-24
Branch: EEE
Semester:1

1	Course Code	**CSE113**	Course Name: Programming for problem solving
2	Course Title	Programming for problem solving	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Core	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	After completion of Course Students will be able to: CO1: demonstrate the algorithm, Pseudo-code and flow chart forthe given problem. CO2: develop better understanding of basic concepts of C programming. CO3: create and implement logic using array and function. CO4: construct and implement the logic based on the concept ofstrings and pointers. CO5: apply user-defined data types and I/O operations in file. CO6: design and develop solutions to real world problems using	
7	Course Description	Programming for problem solving gives the Understanding of C programming andimplement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Logic Building**	
	A	Flowchart: Elements, Identifying and understanding input/ output, Branching and iteration in flowchart	CO1,
	B	Algorithm design: Problem solving approach (top down/bottom-up approach)	CO1
	C	Pseudo Code: Representation of different construct, writing pseudo-code from algorithm and flowchart	CO1
	Unit 2	**Introduction to C Programming**	
	A	Introduction to C programming language, Data types, Variables, Constants, Identifiers and keywords, Storag classes	CO2
	B	Operators and expressions, Types of Statements: Assignment, Control, jumping.	CO2
	C	Control statements: Decisions, Loops, break, continue	CO2
	Unit 3	**Arrays and Functions**	
	A	Arrays: One dimensional and multi-dimensional arrays: Declaration, Initialization, and array manipulation (sorting, searching).	CO3
	B	Functions: Definition, Declaration/Prototyping and Calling, Types of functions, Parameter passing: Call by value, Call by reference.	CO3
	C	Passing and Returning Arrays from Functions, Recursive Functions.	CO3

Unit 4	**Pre-processors and Pointers**	
A	Pre-processors: Types, Directives, Pre-processor Operators (#,##,\) , Macros: Types, Use, predefined Macros	CO4, CO6
B	Pointer: Introduction, declaration of pointer variables,Operations on pointers: Pointer arithmetic, Arrays and pointers, Dynamic memory allocation.	CO4 , CO6
C	String: Introduction, predefined string functions, Manipulation of text data, Command Line Arguments.	CO4, CO6
Unit 5	**User Defined Data Types and File Handling**	
A	Structure and Unions: Introduction, Declaration, Difference, Application, Nested structure, self-referential structure, Array of structures, Passing structure in function.	CO5, CO6
B	Files: Introduction, concept of record, I/O Streaming and Buffering, Types of Files: Indexed file, sequential file and random file,	CO5, CO6
C	Creating a data file, Opening and closing a data file, Various I/O operations on data files: Storing data or records in file, adding records, Retrieving, and updating Sequential file/random file.	CO5, CO6
Mode of examination	**Theory**	

Weightage Distribution	CA	MTE	ETE
	25%	25%	50%
Textbook/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*		
Other References	1. B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 3rdEdition .ISBN 9780070145900 2. E. Balagurusamy - Programming in ANSI C – 8thEdition - Tata McGraw Hill- 2019		

School: SSET		**Batch:2023-2027**	
Programme: B.Tech		**Current Academic Year: 2023-24**	
Branch: EEE		**Semester: I**	
1	Course Code	PHY125	
2	Course Title	Engineering Physics (Semiconductor Physics)	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Compulsory	
5	Course Objective	To make students proverbial with the fundamental concepts of Semiconductors materials and their real-life applications for configuring various electronicsdevices.	
6	Course Outcomes	After completion of Course, Students will be able to CO1: Learn the various fundamental theory of materials and concept of solid classification. CO2: Learn the fundamental concepts of mobility, conductivity, electrons and holes in an intrinsic semiconductor, Donor and Acceptor impurities (n-type and p-type semiconductor), Fermi levels etc. CO3: Kowledge about the formation of depletion region, barrier potential, Zener diode, Characteristics of Zener diode etc. CO4: Understanding of Coherent sources, interaction of radiation with matter (spontaneous and stimulated emission), Einstein's relation, population inversion and pumping, etc. CO5: Learn the concept of optical sources: Light emitting diode (construction, basic working principle), semiconductor laser (construction, basic working principle), and optical detectors. CO6: Knowledge on essential concepts of Semiconductors materials technology and their applications in industries.	
7	Course Description	This course provides the basic foundation for understanding electronic semiconductor devices and their applications and limitations. It has introductory elements of various concept of material science. This course is essential for students who desire to specialize their engineering in Computer Sciences, Electronics, and Electronics and Electrical engineering.	
8	Outline Syllabus		CO Mapping
	Unit 1	**Physics of Semiconductor**	
	A	Introduction, classical free electron theory (Lorentz-Drude theoryand limitations), Quantum theory of free electron	CO1, CO6
	B	(Fermi energy, effect of temperature on Fermi-Dirac distribution)(qualitative analysis)	CO1
	C	Energy bands, Classification of Solids on the basis of energy band.	CO1
	Unit 2	**Transport phenomena in semiconductors**	
	A	Mobility, conductivity, electrons and holes in an intrinsic semiconductors, Donor and Acceptor impurities (n-type and p-type semiconductor)	CO2, CO6
	B	Fermi levels, carrier densities in semiconductor	CO2

	C	Concentration of electrons in conduction band and holes in valence band, Drift and diffusion current, Hall effect.			CO2
	Unit 3	P-N Junction			
	A	P-N junction, types of p-n junction (step-graded and Linearly- graded junction)			CO3
	B	Formation of depletion region, barrier potential, Zener diode, Characteristics of Zener diode			CO3
	C	Avalanche and Zener breakdown, comparison of Zener diode and PN junction diode, concept of tunneling, I-V characteristics of tunnel diode.			CO3, CO6
	Unit 4	Laser Physics			
	A	Coherent sources, interaction of radiation with matter (spontaneous and stimulated emission), Einstein's relation			CO4
	B	Population inversion and pumping, active components of laser, optical amplification or gain			CO4
	C	Threshold condition for laser action, three and four level lasers, Ruby and He-Ne lasers.			CO4
	Unit 5	Optoelectronic Devices			
	A	Optical sources: Light emitting diode (construction, basic working principle), semiconductor laser (construction, basic working principle)			CO5
	B	Optical detectors: photodiode (working principle), p-i-n photodiode			CO5, CO6
		(working principle),			
	C	Photovoltaic effect, p-n junction solar cell (basic working idea).			CO5, CO6
	Mode of Examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text books	Integrated Electronics- Millman - Halkias, Tata McGraw Hill			
	Other References	1. Semiconductor Devices Physics and Technology- S M Sze, John Wiley & Sons -ISBN: 978-0-470-53794-7 Semiconductor Device Fundamentals- Robert F. Pierret Addison Wesley Longman –ISBN:0201543931			

School: SSET **Batch:2023-27** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: EEE** **Semester:1**			
1	Course Code	EEE112	
2	Course Title	Principles of Electrical and Electronics Engineering	
3	Credits	3	
4	Contact Hours (L-T-P)	2-1-0	
	Course Status	Compulsory	
5	Course Objective	To provide the students with an introductory concept in the field of electrical and electronics engineering to facilitate better understanding of the devices, techniques and equipment's used in engineering applications.	
6	Course Outcomes	After completion of Course Students will be able to: CO1: To analyze and solve basic electrical circuits CO2: To understand the working principle of transformer and identify its applications. CO3: To understand the working principle of dc and ac motors and identify the starting methods of single-phase induction motor CO4: To apply the basics of diode to describe the working of rectifiercircuits such as half and full wave rectifiers CO5: To apply the concepts of basic electronic devices to design variouscircuits CO6:Apply the basic concepts in Electrical and Electronics Engineeringfor multi-disciplinary tasks	
7	Course Description	This initial course introduces the concepts and fundamentals of electrical and electronic circuits and devices. Topics include basic circuit analysis, diode and transistor fundamentals and applications. This course also introduces working principle and applications of dc/ac motors and transformers.	
8	Outline syllabus		CO Mapping
	Unit 1	**DC & AC Circuits**	
	A	Electrical circuit elements (R, L and C), series and parallel circuits, concept of equivalent resistance, Kirchhoff current and voltage laws, star-delta conversion	CO1
	B	Analysis of simple circuits with dc excitation and Superposition Theorem, Representation of sinusoidal waveforms, peak and rms values, real power, reactive power, apparent power, power factor	CO1
	C	Introduction to three phase system, relationship between phase voltages and line voltages,	CO1
	Unit 2	**Transformer**	
	A	Working principle and construction of transformer, EMF Equation	CO2

	B	Efficiency of transformer, Power and distribution transformer and difference between them			CO2
	C	Transformer applications in transmission and distribution of electrical power			CO2
	Unit 4	**Electrical Motors**			
	A	Construction, working principle, torque-speed characteristic and applications of dc motor.			CO3, CO6
	B	Construction, working principle and applications of a three-phase induction motor, significance of torque-slip Characteristic			CO3, CO6
	C	Working principle starting methods and applications of single phase induction motor			CO3, CO6
	Unit 4	**Semiconductor Diode and Rectifier**			
	A	PN junction and its biasing			CO4, CO6
	B	Semiconductor diode, ideal versus practical diode , VI characteristics of diode			CO4, CO6
	C	Half wave and full wave rectifiers with and without filters.			CO4, CO6
	Unit 5	**Transistors**			
	A	Bipolar Junction Transistor (BJT) –Construction, working principle and input-output characteristics			CO5, CO6
	B	BJT as CE amplifier and as a switch			CO5, CO6
	C	Introduction to JFET			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010- ISBN: 1259081532, 9781259081538 2. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Publication,2011 ISBN-8131754561, 9788131754566 3. Robert L Boylestad, "Electronic Devices and Circuit Theory" Pearson Education, 201311th edition ISBN-9780136064633			
	Other References	1. V. D. Toro, "Electrical Engineering Fundamentals" Prentice Hall India, 2003 ISBN 9789332551763			

School: SSET		**Batch : 2023- 2027**	
Programme: B.Tech.		**Current Academic Year: 2023-24**	
Branch: EEE		**Semester: I**	
1	Course Code	MTH 141	
2	Course Title	CALCULUS, ANALYSIS AND LINEAR ALGEBRA	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Compulsory	
5	Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.	
6	Course Outcomes	After completion of Course Students will be able to: CO1: Explain the concept of differential calculus, illustrate the curvature and Maxima, minima and saddle point by using Method of Lagrange. CO2: Explain the concept of integral calculus, describe Beta and Gamma function, calculate multiple integration and evaluate area and volume. CO3:Describe the concept of sequence and series; discuss the test of convergence to evaluate convergence of series. CO4: Discuss the basic of vector calculus; illustrate gradient, curl and divergence. CO5: Describe and use the concepts line and surface integral for scalarand vector, explain the Green theorem. CO6: Explain the basic concepts matrices and determinate, evaluate system of linear equation by using rank and inverse method, calculate Eigen values and Eigen vectors; Diagonalization of matrices; Cayley -Hamilton Theorem.	
7	Course Description	This course is an introduction to the fundamental of Mathematics. Theprimary objective of the course is to develop the basic understanding of differential and integral calculus, sequence and series, vector calculus and linear algebra.	
8	**Outline Syllabus Calculus, Analysis And Linear Algebra**		**CO Mapping**
	Unit 1	**Differential Calculus**	
	A	Differentiation, Taylor‟s and Maclaurin‟s theorems with remainders; indeterminate forms and L' Hospital's rule;	CO1
	B	Limits and continuity for multivariable and Partial derivatives, Euler‟s theorem total derivative; Tangentplane and normal line (basic concepts);	CO1
	C	Expansion of functions of several variables, Maxima,	CO1
		minima and saddle points; Method of Lagrange multipliers.	
	Unit 2	**Integral Calculus**	

	A	Beta and Gamma functions and their properties; Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals,	CO2
	B	Change of variables (Cartesian to polar), Applications:areas and volumes, Center of mass	CO2
	C	Triple integrals (Cartesian), Simple applications of triple integration.	CO2
	Unit 3	Sequences and series	
	A	Convergence of sequence and series,	CO3
	B	tests for convergence: comparison test, D‟ Alembert‟s ratio test,	CO3
	C	Raabe‟s test, Cauchy root test; Power series.	CO3
	Unit 4	Vector Calculus	
	A	Gradient, curl and divergence, Scalar line integrals,	CO4, CO5
	B	vector line integrals, scalar surface integrals,	CO4, CO5
	C	vector surface integrals, Theorems of Green‟s theorem.	CO4, CO5
	Unit 5	Matrices	
	A	Inverse and rank of a matrix, System of linear equations,	CO6
	B	Symmetric, skew-symmetric and orthogonal matrices; Determinants	CO6
	C	Eigen values and Eigen vectors; Diagonalization of matrices; Cayley - Hamilton Theorem.	CO6
	Mode of examination	Theory	

	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Kreyszig, E., “Advanced Engineering Mathematics”, John Wiley & Sons Inc. - ISBN 978-0-470-45836-5 2. Jain, M.K., and Iyengar, S.R.K., “Advanced Engineering Mathematics”, Narosa Publications 2007			
	Other References	1. Simmons, G.F., “Differential Equations with applications with applications”, Tata McGraw-Hill.- second edition 2003 ISBN 10: 0070573751ISBN 13: 9780070573758			

School: SSET
Batch: 2023-27
Programme:
B.Tech.
Current Academic Year: 2023-24
Branch: EEE
Semester: I

1	Course Code	CSP113	
2	Course Title	Programming for problem solving lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming	
6	Course Outcomes	After Completion of Course, Students will be able to: CO1: demonstrate the algorithm, Pseudo-code and flow chart for the given problem. CO2: develop better understanding of basic concepts of C programming. CO3: create and implement logic using array and function. CO4: construct and implement the logic based on the concept of strings and pointers. CO5: apply user-defined data types and I/O operations in file. CO6: design and develop solutions to real world problems using C.	
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
8	Outline syllabus		CO Mapping
	Unit 1	**Logic Building**	
	A	Draw flowchart for finding leap year	CO1
	B	Write a c Program to Add Two Integers	CO1
	C	Write a program to create a calculator	CO1
	Unit 2	**Introduction to C Programming**	
	A	Write a c program to convert length meter to cm	CO2
	B	Write a c program to convert temp	CO2
	C	Write a c program to swap two numbers	CO2
	Unit 3	**Arrays and Functions**	
	A	Write a c program to calculate the average using arrays	CO3
	B	Write a c program to find the largest element of the array	CO3
	Unit 4	**Pre-processors and Pointers**	
	A	Write a c program to swap two values using pointers	CO4, CO6
	B	Write a c program to find largest number from array using pointers	CO4, CO6
	Unit 5	**User Defined Data Types and File Handling**	

	A	Write a c program to store information of a student using structure			CO5, CO6
	B	Write a c program to store information of a student using union			CO5, CO6
	Mode of examination	Practical/VIVA			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Kernighan, Brian, and Dennis Ritchie. *The C Programming Language*			
	Other References	1. E. Balagurusamy - Programming in ANSI C – 8thEdition -Tata McGraw Hill- 2019 ISBN-0070681821			

School: SSET
Batch : 2023-2027
Programme: B.Tech
Current Academic Year:2023-24
Branch:EEE
Semester: I

1	Course Code	ECP110	
2	Course Title	Computer Aided Design & Drafting Lab	
3	Credits	1.5	
4	Contact Hours (L-T-P)	0-0-3	
	Course Status	Compulsory	
5	Course Objective	The objective of this introductory course is to make students familiar with computer-aided drafting/ design, introduce them about the basic commands, tools and dimension techniques for creation and presentation of various engineering drawing by using AutoCAD software which helps in visualization and problem solving in engineering disciplines.	
6	Course Outcomes	After successful completion of this course, the student will be able to: CO1: Understand the fundamental features of AutoCAD workspace and user interface. CO2: Apply the fundamental tools such as draw, edit, and view for creating two dimensional engineering drawings in AutoCAD. CO3: Choose advance features to present an engineering drawing in AutoCAD CO4: Apply text and dimension features in the engineering drawing CO5: Create different orthographic projections from a pictorial view. CO6: Analyze an engineering drawing and use the software packages for drafting and modeling.	
7	Course Description	This introductory course is offered to students to make them proficient in design, layout, product development, and other careers that require technical drawing. Using the current version of the AutoCAD software, students will learn a variety of drawing techniques and be able to replicate specific drawings in multiple perspectives. The pinnacle of the class is to empower and enable students to create using the software provided. Career opportunities and 3-D modelling, manufacturing, and engineering will also be explored. No drafting or computer experience is necessary.	
8	Outline syllabus		CO Mapping
Unit 1	**A**	Introduction to AutoCAD and its interface with assignment 1	CO1
	B	Working with coordinates, Drawing ofline, circle, arc, polygon and creating sketches by using them assignment 2	CO2
Unit 2	**A**	Editing of drawing by using editing Tools and Power tools with assignment 3	CO2
	B	Creating of advanced feature like fillet, chamfer, hatch and using of reusable items with assignment 4	CO3, CO6
Unit 3	**A**	Representing text and dimensioning in AutoCADwith assignment 5	CO4

	B	Creating the drawing of the given assignment 6 by using AutoCAD features.			CO2, CO3
Unit 4	**A**	Creating the drawing of the given assignment 7 in AutoCAD.			CO2,CO6
	B	Creating the drawing of the given diagram and giving dimensions in AutoCAD.			CO2, CO4
Unit 5	**A**	Creating the drawing of TajMahal in Autocad 2D			CO3, CO6
	B	Creating of orthographic projections from a 3D figure			CO5, CO6
	Mode of examination	Practical/VIVA			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	1. Ibrahim Zaid,"CAD/CAM- Theory and Practice", McGrawHill, International Edition. ISBN 0–07–072857–7			
	Software	AutoCAD			

School: SSET **Batch: 2023-27**			
Programme: B.Tech.		**Current Academic Year: 2023-24**	
Branch: Physics		**Semester: I**	
1	Course Code	PHY 161	
2	Course Title	Physics Lab 1	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.	
6	Course Outcomes	On successful completion of the course the students will be able to: CO1: Knowledge and study of basic physics experiments based on simple harmonic motion CO2: Use the concept of stress, strain to calculate modulus of rigidity, Young's modulus. CO3: Understand how to determine moment of inertia of different bodies. CO4: Understand how to draw characteristic curves of different electronic components CO5: Understand how to calculate frequency using Melde's Experiment CO6: Apply the mathematical concepts/equations to obtain quantitative resultsand ability to conduct, analyze and interpret experiments	
7	Outline Syllabus		CO Mapping
	Unit 1		
	A	To verify the relation of time period using simplependulum. To determine the acceleration due to gravity and radiusof Gyration of compound pendulum and compare with theoretical value.	CO1
	B		
	C		
	Unit 2		
	A	To measure the moment of inertia of a flywheel. To determine the Young"s modulus of a beam using cantilever beam experiment apparatus. To determine vertical distance between two points usingsextant.	CO2
	B		
	C		
	Unit3		
	A	To determine the modulus of rigidity of a material of a given wire with an inertia table (torsion pendulum) by dynamical method. To calculate Moment of inertia of different irregularshapes.	CO3 CO4
	B		
	C		
	Unit 4		
	A	To determine the frequency of an electrically maintainedtuning fork using Melde"s Apparatus. (i) Transverse mode of vibration (ii) Longitudinal mode of vibration. To determine the coefficient of viscosity of water by Poiseuille"s method.	CO4,CO6
	B		
	C		
	Unit 5		
	A	To draw the characteristic curve of a PN junction diode. To trace the circuit of a Half Wave Rectifier circuit and determine efficiencies and ripple factors with capacitor	CO5,CO6
	B		
	C		

		and inductor filters. To trace the circuit of a Full Wave Rectifier circuit and determine efficiencies and ripple factors with capacitor and inductor filters.		CO5,CO6
	Mode of Examination	Practical/Viva		
	Weightage Distribution	CA	CE	ETE
		25%	25%	50 %
	Text books	1. B.Sc. Practical Physics- Harnam Singh, S. Chand Publishing. 2. B.Sc. Practical Physics- C L Arora, S. Chand Publishing.		
	Other References	1. GeetaSanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co. 2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New		

School: SSET
Batch:2023-2027
Programme: B.Tech
Current Academic Year: 2023-2024
Branch: EEE
Semester: I

1	Course Code	EEP112	
2	Course Title	Principles of Electrical and Electronics Engineering Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	To provide the students with an introductory concept in the field of electrical andelectronics engineering to facilitate better understanding of the devices, techniques and equipment's used in engineering applications.	
6	Course Outcomes	After successful completion of this course, the student will be able to: CO1: Configure and analyze any given circuit. CO2: Inspect the working of transformer and calculate its efficiency CO3: Understand the working of dc and ac motors and measure its various operatingparameters. CO4: Design rectifier circuits such as half and full wave rectifiers and observe itsoutput waveforms. CO5: Design the characteristics of BJT. CO6:Apply the basic concepts in Electrical and Electronics Engineering for multi-disciplinary tasks.	
7	Course Description	This initial course introduces the concepts and fundamentals of electrical and electronic circuits and devices. Topics include basic circuit analysis, diode and transistor fundamentals and applications. This course also introduces working principle and applications of dc/ac motors and transformers.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on DC & AC Circuits**	CO1
	A	To configure a dc circuit on breadboard, and measure voltage/current across/through each element	CO1
	B	To verify Kirchhoff"s Laws	CO1
	C	To verify Superposition Theorem	CO1
		To find the real power, reactive power, apparent power and power factor of RL & RC load	CO1
	Unit 2	**Practical related to Transformers**	
	A	To find the efficiency of transformer by obtaining its losses.	CO2,CO6
	Unit 3	**Practical related to Electrical Motors**	
	A	To study cut-section of DC motor and induction motor.	CO3,CO6
	B	To start the DC motor and reverse its direction of rotation.	CO3,CO6
	C	To start an induction motor and reverse its direction of rotation.	CO3,CO6
	Unit 4	**Practical related to Diode and Rectifier**	
	A	To determine voltage-current characteristic of diode	CO4,CO6
	B	To assemble and test half wave and full wave rectifier circuits for theirinput and output waveform	CO4,CO6

	Unit 5	**Practical related to Transistors**				
	A	To determine input and output characteristics of BJT			CO5, CO6	
	B	Validation of BJT as a switch			CO5, CO6	
	Mode of examination	Practical/VIVA				
	Weightage Distribution	CA	CE	ETE		
		25%	25%	50%		
	Text book/s*	1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", TataMcGraw Hill, 2010-ISBN:9780070146112 2. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering",Pearson Publication.ISBN: 9789332586505 3. Robert L Boylestad, "Electronic Devices and Circuit Theory" PearsonEducation, 2009 ISBN: 9780131189058				
	Other References	1. V. D. Toro, "Electrical Engineering Fundamentals", PrenticeHall India, 1989. SBN:9780132471312				

Schools: SSET		**Batch :** 2023-2027
		Academic Year: 2023-2024
		Semester: 1st
1	Course Code	**ARP101**
2	Course Title	Communicative English-1
3	Credits	2
4	Contact Hours (L-T-P)	1-0-2
5	Course Objective	To minimize the linguistic barriers that emerges in varied socio-linguistic environments through the use of English. Help students to understand different accents and standardise their existing English. Guide the students to hone the basic communication skills - listening, speaking, reading and writing while also uplifting their perception of themselves, giving them self-confidence and building positive attitude.
6	Course Outcomes	After completion of this course, students will be able to: CO1 Develop a better understanding of advanced grammar rules and write grammatically correct sentences CO2 Acquire wide vocabulary and punctuation rules and learn strategies for error-free communication. CO3 Interpret texts, pictures and improve both reading and writing skills which would help them in their academic as well as professional career CO4 Comprehend language and improve speaking skills in academic and social contexts CO5 Develop, share and maximise new ideas with the concept of brainstorming and the documentation of key critical thoughts articulated towards preparing for a career based on their potentials and availability of opportunities. CO6 Function effectively in multi-disciplinary teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality
7	Course Description	The course is designed to equip students, who are at a very basic level of language comprehension, to communicate and work with ease in varied workplace environment. The course begins with basic grammar structure and pronunciation patterns, leading up to apprehension of oneself through written and verbal expression as a first step towards greater employability.
8		Outline syllabus – ARP 101

	Unit 1	**Sentence Structure**	**CO Mapping**
	A	Subject Verb Agreement	CO1
	B	Parts of speech	
	C	Writing well-formed sentences	
	Unit 2	**Vocabulary Building & Punctuation**	
	A	Homonyms/ homophones, Synonyms/Antonyms	CO1, CO2
	B	Punctuation/ Spellings (Prefixes-suffixes/Unjumbled Words)	CO1, CO2
	C	Conjunctions/Compound Sentences	CO1, CO2
	Unit 3	**Writing Skills**	
	A	Picture Description – Student Group Activity	CO3

	B	Positive Thinking - Dead Poets Society-Full-length feature film - Paragraph Writing inculcating the positive attitude of a learner through the movie | SWOT Analysis – Know yourself	CO3, CO2, CO3
	C	Story Completion Exercise –Building positive attitude - The Man from Earth (Watching a Full length Feature Film) Digital Literacy | Effective Use of Social Media	CO2, CO3
	Unit 4	**Speaking Skill**	
	A	Self-introduction/Greeting/Meeting people – Self branding	CO4
	B	Describing people and situations - To Sir With Love (Watching a Full length Feature Film)	CO4
	C	Dialogues/conversations (Situation based Role Plays)	CO4
	Unit 5	**Professional Skills | Career Skills**	
	A	Exploring Career Opportunities, Brainstorming Techniques & Models,	CO4, CO5
	B	Social and Cultural Etiquettes, Internal Communication	CO4, CO5
	C	Managerial Skills, Entrepreneurial Skills	CO6
9	Evaluations	**Class Assignments/Free Speech Exercises / JAM Group Presentations/Problem Solving Scenarios/GD/Simulations (25% CA and 75% ETE**	*N/A*
10	Texts & References | Library Links	• Blum, M. Rosen. *How to Build Better Vocabulary*. London: Bloomsbury Publication • Comfort, Jeremy (et.al). *Speaking Effectively*. Cambridge University Press	

School:SSET		**Batch: 2023-27**	
Programme: B.Tech		**Current Academic Year:2023-24**	
Branch:EEE		**Semester:1**	
1	Course Code	EEP113	
2	Course Title	Tinkering Lab Electrical	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory/Elective	
5	Course Objective	1. To know basic wiring one point 2. To know basic wiring more than one point 3. To know trouble shooting of domestic electrical equipment 4. To do case study of internal architecture of electrical equipment	
6	Course Outcomes	After completion of Course, Students will be able to: CO1: Applying of single phase electrical concepts on very basics CO2: Applying of solar and DC electrical concepts CO3: Knowing internal connections of domestic electrical equipment CO4: Able to do troubleshooting of domestic electrical equipment CO5: Knowing working of complex electrical equipment CO6: Knowledge of fundamental concepts in Electrical Engineering	
7	Course Description	Basic electrical concepts are very important for all branch engineers. After completing of engineering or while doing engineering, a student should able to do basic electrical work or basic electrical trouble shooting. To fulfil the above requirement, this subject will be more helpful.	
8	Outline syllabus		CO Mapping
	Unit 1	**House Wiring Basics**	
	A	Wiring of a bulbs (series & parallel), socket and a switch	CO1,CO6
	B	Estimation of current, power and selection of wire, wiring components for house wiring	CO1,CO6
		Understanding of wiring diagrams of house wiring	CO1,CO6
	Unit 2	**Electrical Wiring Basics 1**	
	A	Stair case wiring	CO2,CO6
	B	Testing of motor windings	CO2,CO6
	C	Ceiling Fan winding connection and wiring	CO2,CO6
	Unit 3	**Electrical Wring Basics 2**	
	A	Solar panel testing	CO3,CO6
	B	Wiring of solar panel with DC loads	CO3,CO6
	C	Motor assembling	CO3,CO6
	Unit 4	**Trouble Shooting**	
	A	Testing of windings and alignment of carbon brushes	CO4,CO6
	B	Mixer Grinder trouble shooting	CO4,CO6
	C	Brightness control of bulb using auto transformer	CO4,CO6

	Unit 5	**Grounding and Case Studies**			
	A	Need of grounding in electrical wiring and simple			CO5,CO6
	B	Case study of single phase inverter			CO5,CO6
	C	Case study of semi automatic washing machine			
	Mode of examination	Practical & Viva			
	Weightage Distribution	CA	CE(VIVA)	ETE	
		25%	25%	50%	
	Text book/s*	Refer lab manuals			

School: SSET	**Batch : 2023-2027**		
Programme: B. Tech		**Current Academic Year: 2023-2024**	
Branch: EEE		**Semester: I**	
1	Course Code	CVL103	
2	Course Title	Environmental Studies	
3	Credits	0	
4	Contact Hours (L-T-P)	2-0-0	
	Course Status	Compulsory	
5	Course Objective	After completion of Course, Students will be able to: 1. Enable students to learn the importance of environmental studies, population growth and sustainable development 2. Provide students an insight to different aspects related to water i.e. water resources, pollution and its control 3. Provide knowledge about air resources i.e. atmosphere, atmospheric pollution, control of air pollution and climate change 4. Provide detailed knowledge about land resources, pollution and management of solid wastes 5. Provide and enrich the students about other natural resources i.e. energy, mineral and food resources and biodiversity and its conservation	
6	Course Outcomes	After completion of Course, Students will be able to: CO1. Understand the scope of environmental study and knowledge about population growth and its effects on environment and health and sustainable development CO2. Comprehend different aspects related to water i.e. water resources, pollution and its control CO3. Understand different aspects related to air resources i.e. atmosphere, atmospheric pollution, control of air pollution and climate change CO4. Appreciate and comprehend land resources, pollution and management of solid wastes CO5. Understand about other natural resources i.e. energy, mineral and food resources and biodiversity and its conservation CO6. Understand overall environmental issues and their ways of their effective management	
7	Course Description	as: 1. Population and Environment; Sustainable Development 2. Water: Resources, Pollution and Control 3. Air: Atmosphere, Pollution, Control and Climate Change 4. Land: Resources, Pollution and Management Environmental Studies emphasises on various aspects related to environment, its degradation and control measures such 5. Energy, Mineral and Food Resources and Biodiversity and its Conservation	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to the course, Population and Environment and Sustainable Development**	

	A	Environmental Studies: Background; Definition; Objectives; Scope; Major environmental issues of concern; Multidisciplinary nature of Environmental Studies			CO1, C06
	B	Human Population and Environment: Population growth/ explosion and its effects on human health and environment			CO1, C06
	C	Sustainable Development: Definition; Aim; Sustainability Development Goals (SDGs); Sustainability issues at various levels; Examples/ sustainability initiatives; Pillars of sustainable development; Desired outcomes			CO1, C06
	Unit 2	**Water: Resources, Pollution and Control**			
	A	Water Resources: Water cycle; Total water on earth; Residence time of water in different compartments; Classification of waters as per salt content; Stresses on water resources/ water crises; Water conservation; Water conflicts			CO2, C06
	B	Water Pollution: Impurities in water; Water quality parameters; Standards; Major categories of water pollutants and their sources and effects; Surface water versus groundwater quality; Point and non-point sources; Pollution of (i) fresh water streams (DO sag curve/ self-purification), (ii) lakes, (iii) groundwater/ aquifers, and (iv) oceans			CO2, C06
	C	Water Pollution Control: Water treatment (domestic and municipal); Wastewater treatment (on-site and municipal)			CO2, C06
	Unit 3	**Air: Atmosphere, Pollution, Control and Climate Change**			
	A	Atmosphere: Composition and structure; Classification of pollutants; Air pollution: sources and effects on humans, plants and materials; AQI and how it is calculated, Plume shapes			CO3, C06
	B	Air Pollution Control: Laws; Modifications in fuels and engines; Ambient air quality control; Control equipment's (in vehicles and industry); Stack height			CO3, C06
	C	Climate Change: Global warming and greenhouse effect; Ozone layer depletion and its consequences; Climate Change and its impact on ecosystem; International agreements			CO3, C06
	Unit 4	**Land: Resources, Pollution and Management**			
	A	Land Resources: Importance; Soil and its formation; Soil profile; Land degradation: causes and effects; Soil conservation through sustainable agriculture			CO4, C06
	B	Soil/ Land Pollution: Major categories of soil pollutants: sources and effects			CO4, C06
	C	Solid Waste Management: Classification of solid wastes; Engineering systems for management; Methods of treatment; Bio-medical wastes; Non-degradable wastes; Hazardous wastes; Electronic wastes; Plastic wastes etc.			CO4, C06
	Unit 5	**Energy, Mineral and Food Resources and Biodiversity and its Conservation**			
	A	Energy Resources: Conventional and non-conventional; Non-renewable and renewable; Fossil fuels: coal, petroleum and natural gas; Solar and wind energy			CO5, C06
	B	Mineral, Forest and Food Resources: (i) Minerals -Definition; Importance; Minerals in our diet, Metallic and non-metallic minerals, (ii) Forest - Direct and indirect benefits; Depletion of forest resources: causes and effects; and, (iii) Food - Three main calorie providers; Green revolution			CO5, C06
	C	Biodiversity and its Conservation: Definition; Threats to biodiversity; Extinct, endangered and endemic species; Conservation of biodiversity			CO5, C06
	Mode of examination	Theory through OMR sheet having 100 MCQs			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	

	Text book(s)	1. Erach Bharucha, Environmental Studies for Undergraduate Students, 3rd Ed., Universities Press, Hyderabad, 2021	
	Other Reference (s)	1. Joseph, Benny, Environmental Studies, Tata McGraw-Hill, New Delhi, 2022 2. Howard S. Peavy, Donald R. Rowe, and George Tchobanoglous, Environmental Engineering, McGraw-Hill, New York, 1985	

TERM-II

School: SSET Batch : 2023-2027
Programme: B.Tech
Current Academic Year: 2023-24
Branch: EEE
Semester: II

1	Course Code	CSE114	
2	Course Title	Application Based Programming in Python	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	Emphasis is placed on procedural programming, algorithm design, and languageconstructs common to most high-level languages through Python Programming.	
6	Course Outcomes	Upon successful completion of this course, the student will be able to: CO1. Apply decision and repetition structures in program design. CO2. Demonstrate the use of Python lists, tuples and dictionaries CO3. Implement methods and functions to improve readability of programs. CO4. Describe and apply object-oriented programming methodology. CO5. Apply top-down concepts in algorithm design. CO6. Write Python programs to illustrate concise and efficient algorithms	
7	Course Description	Python is a language with a simple syntax, and a powerful set of libraries. It is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	History, Python Environment, Variables, Data Types, Operators.	CO1
	B	**Conditional Statements:** If, If- else, Nested if-else. **Looping:** For, While, Nested loops.	CO1
	C	**Control Statements:** Break, Continue, And Pass. Comments	CO1, CO6
	Unit 2	**List, Tuple and Dictionaries**	
	A	**Lists and Nested List:** Introduction, Accessing list, Operations, Working with lists, Library Function and Methods with Lists.	CO2
	B	**Tuple:** Introduction, Accessing tuples, Operations, Working, Library Functions and Methods with Tuples.	CO2
	C	**Dictionaries :**Introduction, Accessing values in dictionaries, Working with dictionaries, Library Functions	CO2
	Unit 3	**Functions and Exception Handling**	
	A	Functions: Defining a function, Calling a function, Typesof functions, Function Arguments	CO3,CO6
	B	Anonymous functions, Global and local variables	CO3,CO6

	C	Exception Handling: Definition Exception, Exception handling Except clause, Try? finally clause			CO3,CO6
	Unit 4	**OOP and File Handling**			
	A	OOPs concept : Class and object, Attributes, Abstraction, Encapsulation, Polymorphism and Inheritance			CO4
	B	Static and Final Keyword, Access Modifiers and specifiers, scope of a class			CO4
	C	User Defined Exceptions			CO4
	Unit 5	**Module and Applications**			
	A	Modules: Importing module, Math module, Random module			CO5,
	B	Matplotlib, Packages			CO5,
	C	Applications: Searching Linear Search, Binary Search. Sorting: Bubble Sort			CO5, CO6
	Mode of examination	**Theory**			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	The Complete Reference Python, Martin C. Brown, McGrwHill ISBN:9780072127188			
	Other References	1. Introduction to computing in problem solving using Python, E Balahurusamy, McGrwHill-ISBN:9789352604173 2. Introduction to programming using Python, Y. Daniel Liang, Pearson-ISBN:9780132747189			

School: SSET		**Batch: 2023-2027**	
Programme: B.Tech		**Current Academic Year: 2018**	
Branch:EEE		**Semester: II**	
1	Course Code	CSP114	
2	Course Title	Application Based Programming in Python Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	Emphasis is placed on procedural programming, algorithm design, and languageconstructs common to most high level languages through Python Programming.	
6	Course Outcomes	Upon successful completion of this course, the student will be able to: CO1. Apply decision and repetition structures in program design. CO2. Demonstrate the use of Python lists, tuples and dictionaries CO3. Implement methods and functions to improve readability of programs. CO4. Describe and apply object-oriented programming methodology. CO5. Apply top-down concepts in algorithm design. CO6. Write Python programs to illustrate concise and efficient algorithms	
7	Course Description	Python is a language with a simple syntax, and a powerful set of libraries. It iswidely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on conditional statements and control structures**	
	A	1. Program to implement all conditional statements 2. Program to implement different control structures	CO1
	B		
	Unit 2	**Practical related to List, Tuples and dictionaries**	
	A	1. Program to implement operations on lists 2. Program to implement operations on Dictionary 3. Program to implement operations on Tuple	CO2
	B		
	Unit 3	**Practical related to Functions and Exception Handling**	
	A	1. Program to implement Exception Handling	CO3

	B	2. Program to use different functions	
	Unit 4	**Practical related to Object Oriented Programming**	
	A	1. Program to use object oriented concepts like inheritance, overloading polymorphism etc. 2. Program for file handling	CO4,CO6
	B		
	Unit 5	**Practical related to Modules and Applications**	
	A	1. Program to use modules and package 2. Program to implement searching and sorting	CO5,CO6
	B		
	Mode of examination	Practical/Viva	
	Weightage Distribution	CA | CE | ETE 25% | 25% | 50%	
	Text book/s*	The Complete Reference Python, Martin C. Brown, McGraw Hill,2010-ISBN:9780072127188	
	Other References	1. Introduction to computing in problem solving using Python, E Balagurusamy, McGraw Hill ISBN-9789353160920 2. Introduction to programming using Python, Y. Daniel Liang, Pearson ISBN-9780132747189	

School: SSET
Batch : 2023-27
Programme: B.Tech
Current Academic Year: 2023-24
Branch: EEE
Semester: II

1	Course Code	ECP240	
2	**Course Title**	**Digital System Design Lab**	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. To acquire the basic knowledge of digital logic levels and application ofknowledge to understand digital electronics circuits. 2. To prepare students to perform the analysis and design of various digitalelectronic circuits. 3.To be able to model and simulate digital circuits in verilog and VHDL	
	Course Outcomes	After successful completion of this course the student will be able to: CO1:Understand and examine the structure of various number systems and its application in digital design. CO2:Understand, analyze and design various combinational,sequential circuits and logic families CO3: Model circuits and systems in System Verilog or VHDL CO4: Describe sequential digital systems in a hardware description language. CO5: Utilize HDL for the functional verification of FSM. CO6: Analyze a given combinational circuit	
7	Course Description	This course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, multiplexer, demultiplexer, programmable logic circuits and other related topics. Upon completion, students should be able to construct, analyze, verify, and troubleshoot digital circuits using appropriate techniques and test equipment as well as can model and simulate using verilog and vhdl.	
8	Outline syllabus		CO Mapping
	Unit 1		
	A	To verify and design AND, OR, NOT and XOR gates using NAND gates.	CO1
	B	To verify and design AND, OR, NOT and XOR gates using NOR gates.	CO1
	C	To convert a Boolean expression into logic gate circuit and assemble it using logic gate IC‟s.	CO1
	Unit 2		
	A	Design a Half and Full Adder.	CO2
	B	Design a Half and Full Subtractor.	CO2
	C	Design a seven segment display driver.	CO2
	Unit 3		
	A	To build a Flip- Flop Circuits using elementary gates. (RS, Clocked RS, D-type).	CO3
	B	Design a counter using D/T/JK Flip-Flop.	CO3

	C	Design a 4 X 1 Multiplexer using gates.			CO3
	Unit 4				
	A	To study basic Logic Families.			CO4
	B	Half adder, Full Adder using basic and derived gates.			CO4
	C	Half subtractor and Full Subtractor using basic and derived gates			CO4
	Unit 5				
	A	Write code to realize basic and derived logic gates.			CO5,CO6
	B	Clocked D FF, T FF and JK FF (with Reset inputs). Multiplexer (4x1, 8x1) and Demultiplexer using logic gates.			CO5,CO6
	C	Code converters (Binary to Gray and vice versa). 2 bit Magnitude comparator. 3 bit Ripple counter.			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Refer Lab Manual			
	Other References	NA			

School: SSET		**Batch:2023-2027**	
Programme: B.Tech		**Current Academic Year: 2023-24**	
Branch:EEE		**Semester: II**	
1	Course Code	EEE121	
2	Course Title	Domestic Wiring	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
	Course Status	Compulsory	
5	Course Objective	To develop electrical wiring skills in students throughsystematic training that would enable the students toconstruct and test various electrical circuits using appropriateelectrician tools, wires, protective devices and wiring accessories as per IS standards	
6	Course Outcomes	After completion of Course, Students will be able to: CO 1: learn about basic concept of Safety CO 2: Rig up wiring diagrams using conduit system ofwiring CO 3: Use appropriate electrician tools, wires, protective devices and wiring accessories. CO 4: Apply IS standards for electrical wiring. CO 5: To have Basic knowledge of Electrical Instruments. CO6: To study Electrical Accessories and wiring techniques.	
7	Course Description	This course teaches residential wiring methods and, includesinstallation plan, single line diagram, protection appliances, panel board installation, grounding techniques, andassociated safety procedures..	
8	Outline syllabus		CO Mapping
	Unit 1	**Safety precautions and first aid**	
	A	Draw standard electrical symbols related to electrical wiring.	CO1,CO6
	B	Understand the components of simple electrical circuit consisting of source , load ,protective devices and measuring instruments	CO1,CO6
	C	Identify open, close and short circuit	CO1,CO6
	Unit 2	**Electrical installation**	
	A	installation plan,	CO2,CO6
	B	single line diagram	CO2,CO6
	C	selection and rating of necessary equipment's	CO2,CO6
	Unit 3	**Wiring systems**	
	A	Identify different types of wiring systems and their applications	CO3,CO6
	B	Surface conduit , concealed conduit, PVC casing capping	CO3,CO6
	C	Types of wires, cables used for different current and voltage ratings	CO3,CO6
	Unit 4	**Wiring accessories and hardware items**	

	A	Switches: SP, DP, ICDP, ICTP, change over switch, SPST, DPST,DPDT, TPST,TPDT, rotary switches , micro switches, modular switches	CO4,CO 6
	B	Sockets: 2 pin socket ,3 pin socket, 2 pin plug top , 3 pin plug top	CO4,CO6
	C	Boxes and Panels: switch boards, switch plates, modular switch enclosures, blank insert gang box , junction box, fan box.	CO4,CO6
	Unit 5	**Safety devices**	
	A	Fuses: Materials for fuse wire, Glass cartridge fuse, types of HRC fuse, Kit-kat fuse.	CO5,CO 6
	B	Types of MCB, MCCB, RCCB, ELCB	CO5,CO6
	C	Types of Earthing- Pipe earthing , Plate earthing and Chemical earthing	CO5,CO6
	Mode of examination	**Practical/Viva**	

	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Refer Lab Manual			
	Other References	NA			

School: SSET		**Batch:2023-2027**	
Programme: B.Tech		**Current Academic Year: 2023-24**	
Branch:EEE		**Semester: II**	
1	Course Code	ECE140	
2	Course Title	Digital Electronics	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. 2. To prepare students to perform the analysis and design of various digital electronic circuits.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Understand Boolean algebra, various codes and minimization of Boolean expression. CO2: Design and implement Combinational logic circuits. CO3: Design and implement Sequential logic circuits. CO4: Understand the working of logic families. CO5: Utilise PLDs to implement the given logical problem. CO6: Design digital circuits by using combinational, sequential, PLDs and logic families.	
7	Course Description	This course covers basic of Boolean algebra, codes, combinational and sequential logic circuits, flip flops, counters, logic families and their characteristics, different semiconductor memory devices, programmable logic devices. Upon completion, students would able to understand , design , analyse and implement the various digital circuits using appropriate techniques and devices.	
8	Outline syllabus		CO Mapping
	Unit 1	**Logic Simplification**	
	A	Review of Boolean Algebra and De-Morgan's Theorem, SOP & POS forms.	CO1, CO6
	B	Canonical forms, Karnaugh maps up to 5 variables	CO1, CO6
	C	Binary codes, Code Conversion.	CO1, CO6
	Unit 2	**Combinational Logic Design**	
	A	Half and Full Adders, Subtractors, Serial and Parallel Adders	CO2, CO6
	B	Parity Generator-Even and Odd, ALU	CO2, CO6
	C	MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display	CO2, CO6
	Unit 3	**Sequential Logic Design**	
	A	Building blocks like S-R, D,JK,T and Master-Slave JK FF, Edge triggered FF	CO3, CO6
	B	Ripple Counter, Synchronous counters, Shift registers	CO3, CO6
	C	Finite state machines, Design of synchronous FSM, Designing synchronous	CO3,

		circuits like Pulse train generator, Pseudo Random Binary Sequence gene Clock generation			
	Unit 4	**Logic Families**			
	A	Logic Families: Introduction to digital logic family such as RTL, DTL, TTL, ECL, CMOS, IIR, HTL etc.			CO4, CO6
	B	TTL logic gate characteristics, Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. 4 TTL subfamilies Specifications.			CO4, CO6
	C	MOS & CMOS logic families, Interfacing logic families to one another.			CO4, CO6
	Unit 5	**Memory devices**			
	A	Semiconductor Memories read only memory (ROM), read and write memory (RAM) and Programmable Logic Devices, PLD, PLA, ROM, logic implementation			CO5, CO6
	B	Memory organization and operation, expanding memory size, content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips.			CO5, CO6
	C	Complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).			CO5, CO6
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.			
	Other References	1. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002. 2. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006. 3. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989 4. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.			

School: SSET		**Batch:2023-2027**	
Programme: B.Tech		**Current Academic Year: 2023-24**	
Branch: EEE		**Semester: II**	
1	Course Code	HMM111 | Course Name	
2	Course Title	Human Values and Ethics	
3	Credits	2	
4	Contact Hours (L-T-P)	2-0-0	
	Course Status	Compulsory	
5	Course Objective	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence	
6	Course Outcomes	After completion of Course, Students will be able to: CO1. Understand that the technical education without study of human values can generate more problems than solutions. CO2. Define the principles and ideals, which help in making the judgement of what is more important. CO3. See that 'I' and 'Body' are two realities, and most of their desires are related to 'I' and not body, while their efforts are mostly centered on the fulfilment of the needs of the body assuming that it will meet the needs of 'I' too. CO4. Appreciate the importance of harmony in the self, family and the society for mutual fulfilment. CO5. Understand the importance of harmony among human beings, other living beings and entire nature for universal equilibrium and mutual co-existence. CO6. Know and practice the ethical approach in profession for continuous happiness and sustained prosperity.	
7	Course Description	Human values and embedded in all human beings it is important to sensitize them towards these values that they can use in their life to attain mutual happiness and mutual prosperity. Professional ethics will enlighten them about the value addition that can be done within the framework of ethical behaviour.	
8	Outline syllabus		CO Mapping
	Unit 1	The Need and Process for Value Education	
	A	The need, basic guidelines, content, and process for Value Education	CO1
	B	Concept of 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration; Continuous Happiness and Prosperity- A look at basic Human Aspirations	CO1,CO2
	C	Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment aspirations of every human being with their correct priority	CO1,CO2
	Unit 2	Understanding Harmony in the Human Being - Harmony in Myself	
	A	Human being as a co-existence of the sentient 'I' and the material 'Body'	CO3

	B	The needs of Self ('I') and 'Body' ; Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)			CO3
	C	The characteristics and activities of 'I' and harmony in 'I' ; Understanding the harmony of I with the Body: Correct appraisal of Physical needs, meaning of Prosperity in detail			CO3
	Unit 3	Harmony in the Family and Society			
	A	Values in human-human relationship; Trust and Respect as the foundational values of relationship			CO4
	B	Understanding the meaning of Trust; Difference between intention and competence; The meaning of Respect; Difference between respect and differentiation; the other salient values in relationship			CO4
	C	Harmony in the society (society being an extension of family; Visualizing a universal harmonious order in society - from family to world family			CO4
	Unit 4	Harmony in the Nature and Existence			
	A	The harmony in the Nature			CO5
	B	Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature			CO5
	C	Understanding Existence as Co-existence of mutually interacting units in all-pervasive space			CO5
	Unit 5	Competence in professional ethics			
	A	Ability to utilize the professional competence for augmenting universal human order			CO6
	B	Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,			CO6
	C	Ability to identify and develop appropriate technologies and management patterns for above production systems.			CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. R.R Gaur, R Sangal, G P Bagaria, "A foundation course in Human Values and professional Ethics", Excel books, New Delhi			
	Other References	1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. 2. A.N. Tripathy, 2003, Human Values, New Age International Publishers. 3. PL Dhar, RR Gaur, Science and Humanism, Commonwealth Publishers. Starting out with Python, Tony Gaddis, Pearson			

Schools: SSET		Batch : 2023-2027 Current Academic Year: 2023-2024 Semester: 2nd (Second)	
1	Course Code	**ARP102**	
2	Course Title	Communicative English -2	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
5	Course Objective	To Develop LSRW skills through audio-visual language acquirement, creative writing, advanced speech et al and MTI Reduction with the aid of certain tools like texts, movies, long and short essays.	
6	Course Outcomes	After completion of this course, students will be able to: CO1 Acquire Vision, Goals and Strategies through Audio-visual Language Texts CO2 Synthesize complex concepts and present them in creative writing CO3 Develop MTI Reduction/Neutral Accent through Classroom Sessions & Practice CO4 Determine their role in achieving team success through defining strategies for effective communication with different people CO5 Realize their potentials as human beings and conduct themselves properly in the ways of world. CO6 Acquire satisfactory competency in use of Quantitative aptitude and Logical Reasoning	
7	ourse Description	The course takes the learnings from the previous semester to an advanced level of language learning and self-comprehension through the introduction of audio-visual aids as language enablers. It also leads learners to an advanced level of writing, reading, listening and speaking abilities, while also reducing the usage of L1 to minimal in order to increase the employability chances.	
8	Outline syllabus – ARP 102		
	Unit 1	**Acquiring Vision, Goals and Strategies through Audio-visual Language Texts**	**CO Mapping**
	A	Pursuit of Happiness / Goal Setting & Value Proposition in life	CO1
	B	12 Angry Men / Ethics & Principles	
	C	The King's Speech / Mission statement in life | strategies & Action Plans in Life	
	Unit 2	**Creative Writing**	
	A	Story Reconstruction - Positive Thinking	CO2
	B	Theme based Story Writing - Positive attitude, Learning Diary Learning Log – Self-introspection	
	C	Precis, Paraphrasing, Essays (Simple essays)	
	Unit 3	**MTI Reduction/Neutral Accent through Classroom Sessions & Practice**	
	A	Vowel, Consonant, sound correction, speech sounds, Monothongs, Dipthongs and Tripthongs	CO3

	B	Vowel Sound drills , Consonant Sound drills, Affricates and Fricative Sounds, Speech Sounds | Speech Music| Tone | Volume| Diction |Syntax |Intonation | Syllable Stress |	
	C	Jam sessions, Extempore, Situation-based Role Play	
	Unit 4	**Leadership and Management Skills**	
	A	Innovative Leadership	CO4
	B	Design Thinking	CO4
	C	Ethics and Integrity	CO4
	Unit 5	**Universal Human Values**	
	A	Love & Compassion, Non-Violence & Truth	CO5
	B	Righteousness, Peace, Service, Renunciation (Sacrifice)	CO5
	C	Analytical Reasoning & Puzzle Solving, Number Systems and its Application in Solving Problems	CO5
9	Evaluations	*Class Assignments/Free Speech Exercises / JAM Group Presentations/Problem Solving Scenarios/GD/Simulations (25% CA and 75% ETE*	*N/A*
10	Texts & References | Library Links	• Wren, P.C.&Martin H. *High English Grammar and Composition*, S.Chand& Company Ltd, New Delhi. • Blum, M. Rosen. *How to Build Better Vocabulary*. London: Bloomsbury Publication • Comfort, Jeremy(et.al). *Speaking Effectively*. Cambridge University Press. The Luncheon by W.Somerset Maugham - http://mistera.co.nf/files/sm_luncheon.pdf	

School:SSET	**Batch : 2023- 2027**
Programme: B.Tech.	**Current Academic Year: 2023-2024**
Branch: EEE	**Semester: II**
Course Code	**MTH 143**
Course Title	**Diff Eqs Special T& Comp Variables**
Credits	4
Contact Hours (L-T-P)	3-1-0
Course Status	Compulsory
Course Objective	To make students familiar with the solutions of first & second degree ODE along with solution of PDE by method of separation of variable. The concepts & application of Laplace & Fourier transform is also introduced with the Fourier series. And at last differentiation of complex variable, Counter integration, Taylor's & Laurent's series expansion will be included.
Course Outcomes	After completion of Course, Students will be able to: CO1: Explain the concept of differential equations, illustrate the second order differential equations with constant coefficients and use power series solutions CO2: Explain the concept of partial differential equation, describe the method of separation of variables and evaluate wave equation, heat equation and Laplace equation using method of separation of variables. CO3: Describe Laplace transform and Z transform. Discuss inverse laplace transform and evaluate convolution theorem. CO4: Discuss Fourier series and Fourier transform and evaluate half range sine and cosine Fourier series and Fourier transform of the functions. CO5: Describe basic concept of complex variable and illustrate differentiation and contour integration of complex functions CO6: Explain Cauchy Integral theorem, and Cauchy integral formula and evaluate integration of complex functions using Cauchy residue theorem Cauchy Integral theorem, and Cauchy integral formula.
Course Description	The primary objective of the course is to develop the basic understanding of differential equations, special transforms and complex analysis.

Outline syllabus : Diff Eqs Special T& Comp Variables		**CO Mapping**
Unit 1	**Ordinary differential equations**	
A	Exact differential equations, Second order linear differential equations with constant coefficients	CO1
B	Method of variation of parameters, Cauchy-Euler equation, Power series solution	CO1
C	Introduction of Legendre and Bessel functions	CO1
Unit 2	**Partial differential equations**	
A	Definition, classification of partial differential equation, method of separation of variables	CO2
B	Solution of wave equation,	CO2
C	Heat equation and Laplace equation using method of separation of variables.	CO2
Unit 3	**Laplace Transform and Z Transform**	

A	Laplace transform of some standard functions and its properties			CO3
B	Inverse Laplace transform and Convolution theorem			CO3
C	Introduction to Z transforms.			CO3
Unit 4	**Fourier series and Fourier Transform**			
A	Fourier series, Fourier series in change of interval, Half range sine and cosine series			CO4
B	Parseval's theorem. Fourier Transforms			CO4
C	Fourier Cosine and sine Transform properties of Fourier Transform.			CO4
Unit 5	**Complex Variable – Differentiation**			
A	Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions,			CO5
B	Contour integrals, Cauchy-Integral theorem, Cauchy Integral formula (without proof),			CO5, CO6
C	Taylor's series and Laurent's series (without proof), zerosof analytic functions, singularities, Residues, Cauchy Residue theorem (without proof).			CO6
Mode of examination	Theory			
Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Text book/s*	1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006. 2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th reprint, 2010.			
Other References	1. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009. 2. S. L. Ross, Differential Equations, 3rd Ed., WileyIndia, 1984. 3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.			

TERM-III

School: SSET			
Programme: B. Tech.			
Branch: EEE		**Semester: III**	
1	Course Code	EEE220	
2	Course Title	Network Analysis and Synthesis	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems.	
6	Course Outcomes	After successful completion of the course, student will be able to CO1 Obtain circuit matrices of linear graphs and analyze networksusing graph theory CO2 Select appropriate and relevant technique for solving the Electricalnetwork in different conditions CO3 Learn conditions for stability and realizability of networkfunctions CO4 Solve two port network functions CO5 Synthesize driving point functions of RL, RC and RLC networks CO6 Apply mathematics in analyzing and synthesizing the networks intime and frequency domain.	
7	Course Description	This course deals with the fundamentals of electric circuits, their components and the mathematical tools used to represent and analyze electrical circuits. It also deals with analysis of stability of network usingtransfer function and also to design circuit from transfer function.	
8	Outline syllabus		CO Mapping
	Unit 1	**GRAPH THEORY**	
	A	Graph of a network, definitions, tree, co tree , link, basicloop and basic cut set	CO1,CO6
	B	Incidence matrix, cut set matrix, tie set matrix	CO1,CO6
	C	Duality, loop and node methods of analysis	CO1,CO6
	Unit 2	**NETWORK THEOREMS (FOR AC NETWORKS)**	
	A	Super-position theorem, Thevenin's theorem, Norton,'stheorem, Maximum power transfer theorem	CO2,CO 6
	B	Reciprocity theorem, Millman's theorem	CO2,CO6
	C	Compensation theorem, Tellegen's theorem	CO2,CO6
	Unit 3	**NETWORK FUNCTIONS**	

	A	Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks,	CO3,CO 6
	B	Concept of poles and zeros, properties of driving point and transfer functions	CO3,CO6
	C	Time response and stability from pole zero plot	CO3,CO6
	Unit 4	**TWO PORT NETWORKS**	
	A	Characterization of LTI two port networks Z, Y, ABCD and h parameters	CO4,CO 6
	B	Reciprocity and symmetry, Inter-relationships between the parameters	CO4,C O6
	C	Inter-connections of two port networks, Ladder and Lattice networks, T & Π Representation	CO4,CO6
	Unit 5	**NETWORK SYNTHESIS**	
	A	Positive real function: definition and properties, properties of LC, RC and RL driving point functions	CO5,CO6
	B	Synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms	CO5,CO 6
	C	**FILTERS:** Passive and Active filter fundamentals, low pass, high pass, band pass, band elimination filters.	CO5,CO 6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	Franklin F. Kuo,"Network Analysis and Synthesis", JohnWiley & Sons ISBN:9788126510016, 8126510013	
	Other References	1. M.E. Van Valkenburg," Network Analysis", Prentice Hall of India ISBN:9788131701584, 8131701581 2. Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company. ISBN:9780070561274, 0070561273. 3. W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGraw Hill. ISBN:9789814646345, 9814646342	

School: SSET		Branch:EEE Batch:2023-2027			
1	Course Code:EEP220	**Semester:** III			
2	CourseTitle	Network Analysis and Synthesis Lab			
3	Credits	1			
4	Contact Hours(L-T-P)	0-0-2			
	Course Status	Compulsory			
5	Course Objective	To make the students capable of analyzing and synthesizing any given electrical network.			
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Identify various signals and apply them to the systems. CO2: Analyze various theorems applied in network theory CO3: Demonstrate various parameters of two port network CO4: Construct networks for analysis CO5: Design the network on the basis of analysis CO6:Design and analysis of various networks			
7	Course Description	Students will learn and understand Network Systems through practical approach			
8	Outline syllabus				CO Mapping
	Unit 1	**Basics of Network Theory**			
	A	To configure a dc circuit in bread board and obtain voltage and current			CO1,CO6
	B	To verify KCL of the given network			CO1,CO6
	C	To verify KVL of the given network			CO1,CO6
	Unit 2	**Network Theorems (DC Independent and Dependent Sources)**			
	A	Principle of various Electromagnetic relays and their constructions.			CO2,CO6
	B	To verify superposition theorem of the given network			CO2,CO6
	C	To verify Thevinin's and Norton's theorem of the given network			CO2,CO6
	Unit 3	**Two Port network**			
	A	To find impedance parameters			CO3,CO6
	B	To find admittance parameters			CO3,CO6
	C	To find hybrid parameters			CO3,CO6
	Unit 4	**Circuit Analysis in S-domain**			
	A	To calculate driving function and transfer function of the ladder network			CO4,CO6
	B	To calculate driving function and transfer function of the T-network			CO4,CO6
	Unit 5	**Network Synthesis**			
	A	To design a network for a given transfer function			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE(Viva)	ETE	
		25%	25%	50%	

Text book/s*	Franklin F. Kuo,"Network Analysis and Synthesis", John Wiley & Sons ISBN:9788126510016, 8126510013	
Other References	. M.E. Van Valkenburg," Network Analysis", Prentice Hall of India ISBN:9788131701584, 8131701581 2. Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company. ISBN:9780070561274, 0070561273. 3. W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGraw Hill. ISBN:9789814646345, 9814646342	

School: SSET		**Batch:2023-2027**	
Programme: B.Tech			
Branch: EEE		**Semester: 3**	
1	Course Code	EEP221	
2	Course Title	Electrical Machines-I Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. The capability to analyze the operation of electric machines under different loading conditions 2. The ability to conduct testing and experimental procedures on different types of electrical machines.	
6	Course Outcomes	After completion of this course students will be able to: CO1: Experimentally obtain the load characteristics of various dc motors and generators. CO2: Determination of various performance curves of DC Motor CO3: Experimentally perform speed control of DC motor CO4: Understand the concept of efficiency and the short circuit impedance of a single-phase transformer from no-load test, windingresistance, short circuit test, and load test CO5: Understand the concept of parallel operation of transformer. CO6: Combine an understanding of the established principles, theories, concepts and terminology relevant to electrical machines with practical application.	
7	Course Description	The course covers practical experiment on transformers and DC machines. It includes load test on various dc machines andtransformer and also speed control of DC motor.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on Load Test of DC Generator**	
	A	Load test on DC shunt generator and determination of characteristics.	CO1,CO6
	B	Load test on DC series generator and determination of characteristics.	CO1,CO6
	C	Load test on DC compound generator and determination of characteristics.	CO1,CO6
	Unit 2	**Practical related to Characteristic of DC Generator**	
	A	Magnetization characteristics of DC shunt generator and determination of critical field resistance and critical speed.	CO2,CO6
	Unit 3	**Practical related to DC Motor**	
	A	Swinburne's test of DC Machine	CO3,CO6
	B	Brake test on DC compound motor and determination of performance curves.	CO3,CO6
	C	Hopkinson test on two identical DC machine.	CO3,CO6
		Brake test on DC shunt motor and determination of performance curves.	CO3,CO6
		speed control of DC shunt motor and predetermination of efficiency.	CO3,CO 6

	Unit 4	**Practical related to Testing of Transformer**			
	A	OC and SC tests on single phase transformer			CO4,CO6
	B	Sumpner's test on a pair of single phase transformers.			CO4,CO6
	C	To perform load test on 1-phase transformer.			CO4,CO6
	Unit 5	**Practical related to Transformer**			
	A	Parallel operation of single phase transformers.			CO5,CO6
	B	Polarity test on 1-phase transformer.			CO5,CO6
	C	Study of Scott Connection			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE(VIVA)	ETE	
		25%	25%	50%	
	Text book/s*	Electric Machines by I.J. Nagrath& D.P. Kothari, Tata Mc Graw – Hill Publishers ISBN 1259081532 2010			
	Other References	1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education,2014. ISBN:9780071326469, 0071326464 2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBSPublishers, 2004. ISBN:9780852268131, 0852268130			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch:EEE		**Semester: 3**	
1	Course Code	EEE221	
2	Course Title	Electrical Machines-I	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	To provide students with: 1. knowledge of basic principles of electromechanical energy conversion 2. the understanding of operation principles of electrical machines 3. ability to analyse different electrical machines	
6	Course Outcomes	After completion of this course students will be able to: CO 1. Understand the concepts of magnetic circuits. CO 2. describe the basic energy conversion principles and different magnetic field systems CO 3. Understand the operation of dc machines CO 4. Analyse the differences in operation of different dc machine configurations. CO 5. Analyse single phase and three phase transformers circuits. CO6: Combine an understanding of the established principles, theories, concepts and terminology relevant to electrical machines with practical application.	
7	Course Description	The course covers the basics of electromechanical energy conversion and electrical machines. The operating principles of DC machines and transformers are thoroughly described as well as their testing and speed control methods.	
8	Outline syllabus		CO Mapping
	Unit 1	**Magnetic fields, Electromagnetic force and torque**	
	A	Review of magnetic circuits - MMF, flux, reluctance, inductance; Visualization of magnetic fields produced by a bar magnet and a current carrying coil - through air and through a combination of iron and air	CO1,CO6
	B	Influence of highly permeable materials on the magnetic flux lines. B-H curve of magnetic materials, energy stored in the magnetic circuit	CO1,CO6
	C	force as a partial derivative of stored energy with respect to position of a moving element; torque as a partial derivative of stored energy with respect to angular position of a rotating element.	CO2,CO6
	Unit 2	**DC machines**	
	A	Basic construction of a DC machine, visualization of magnetic field produced by the field winding excitation with armature winding open, air gap flux density distribution, flux per pole ; Armature winding and commutation - Elementary armature coil and commutator, lap and wave windings, construction of commutator	CO3,CO6
	B	DC generator: principle of operation, induced EMF in an armature coil, commutation, methods of improving commutation, parallel operation of DC generator	CO3,CO6

	C	DC Motor: principle of operation, Derivation of back EMF equation, derivation of torque equation	CO3, CO4
	Unit 3	**DC machine – Speed Control and Testing**	
	A	Armature reaction, Cross magnetizing and de-magnetizing AT/pole, Types of field excitations - separately excited, shunt and series. Characteristics of separately excited and self-excited generators, build-up of EMF, critical field resistance and critical speed	CO3, CO4,CO6
	B	Characteristics and torque-speed characteristics of separately excited, shunt and series motors. Speed control of DC Motors: armature voltage and field flux control methods. Ward-Leonard system	CO3, CO4,CO6
	C	Losses of DC machines: constant and variable losses, calculation of efficiency, condition for maximum efficiency. DC machine Testing: direct, indirect and regenerative testing: brake test, Swinburne's test, Hopkinson's test, field's test,	CO4,CO6
	Unit 4	**Transformers**	
	A	Principle, construction and operation of single-phase transformers, EMF equation, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency, condition for maximum efficiency, All day efficiency, regulation and condition for maximum voltage regulation	CO5,CO6
	B	Three-phase transformer - construction, types of connection and their comparative features, Parallel operation of single-phase and three-phase transformers,	CO5,CO6
	C	Autotransformers - construction, principle, applications and comparison with two winding transformer	CO5,CO6
	Unit 5	**Transformers Testing**	
	A	Testing - open circuit and short circuit tests, polarity test, back-to-back test, separation of hysteresis and eddy current losses	CO5,CO6
	B	Poly phase connections, third harmonics and their effect	CO5,CO6
	C	three winding transformers, tertiary winding, Scott connection	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd edition, 2004.	
	Other References	1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013. 2. 2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.	

School: SSET		**Batch : 2023 – 2027**	
Programme: B.Tech			
Branch: EEE		**Semester: 3rd**	
1	Course Code	**EEP252**	Course Name: Project Based Learning -1
2	Course Title	Project Based Learning -1	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory	
5	Course Objective	1. To align student's skill and interests with a realisticproblem or project 2. To understand the significance of problem and its scope 3. Students will make decisions within a framework	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Acquire practical knowledge within the chosen area oftechnology for project development CO2: Identify, analyze, formulate and handle programmingprojects with a comprehensive and systematic approach CO3: Discuss and accumulate the background information CO4: Develop effective communication skills forpresentation of project related activities CO5: Contribute as an individual or in a team indevelopment of technical projects CO6: Demonstrate effectively the module designed	
7	Course Description	In PBL-1, the students will learn how to define the problemfor developing projects, identifying the skills required to develop the project based on given a set of specifications and all subjects of that Semester.	
8	Outline syllabus		CO Mapping
	Unit 1	Problem Definition, Team/Group formation and Project Assignment. Finalizing the problem statement, resource requirement, if any.	CO1, CO2
	Unit 2	Develop a work flow or block diagram for the proposed system / software.	CO1, CO2
	Unit 3	Design Flow Chart for the proposed problem.	CO1, CO2, CO3
	Unit 4	Implementation of work under the guidance of a faculty member and obtain the appropriate results.	CO3, CO4
	Unit 5	Demonstrate and execute Project with the team. Test the project modules.	CO4, CO5, CO6

		References if any. The presentation, report, work done during the term supported by the documentation, forms the basis of assessment.			
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	NA			
	Other References	NA			

School: SSET		**Batch : 2023- 2027**	
Programme: B.Tech.			
Branch: EEE		**Semester: III**	
1	Course Code	**MTH 145**	
2	Course Title	**Probability and Statistics**	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Compulsory	
5	Course Objective	The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.	
6	Course Outcomes	After completion of this course students will be able to: CO1: Explain the concept of probability and Random Variable. CO2: Explain the concept of distribution functions, densities and probability distributions, Illustrate discrete and continuous probability distributions. CO3: Describe the concept of moments, skewness and Kurtosis; evaluate correlation and regression – Rank correlation; discuss bivariate distributions and their properties CO4: Discuss the basic of Curve fitting by the method of least squares; evaluate straight lines, second degree parabolas and more general curves. CO5: Describe and use the concepts test of significance: Large sample test for single proportion, difference of proportions; calculate single mean, difference of means, and difference of standard deviations. CO6: Explain the basic concepts of tests of small samples- Student's T test, Chi-square test for goodness of fit, and evaluate the result.	
7	Course Description	This course is an introduction to the fundamental of Mathematics. The primary objective of the course is to develop the basic understanding of statistics including measures of central tendency, correlation and regression, statistical methods of data sampling, probability and random variables and various discrete and continuous probability distributions and their properties.	
8	**Outline syllabus :Probability and Statistics**		**CO Mapping**
	Unit 1	**Basic Probability**	
	A	Probability spaces, conditional probability, Bayes' rule.	CO1
	B	Discrete random variables, Independent random variables	CO1

	C	Expectation of Discrete Random Variables, Chebyshev's Inequality			CO1
	Unit 2	**Discrete and Continuous Probability Distributions**			
	A	Discrete Probability distributions: Binomial, Poisson.			CO2
	B	Continuous random variables and their properties, distribution functions and densities.			CO2
	C	Normal, exponential and gamma distribution.			CO2
	Unit 3	**Statistics**			
	A	Moments, skewness and Kurtosis.			CO3
	B	Correlation and regression – Rank correlation.			CO3
	C	Bivariate distributions and their properties.			CO3
	Unit 4	**Applied Statistics**			
	A	Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.			CO4, CO5
	B	Test of significance: Large sample test for single proportion,			CO4, CO5
	C	Difference of proportions, single mean, difference of means, and difference of standard deviations.			CO4, CO5
	Unit 5	**Testing Hypothesis**			
	A	Test for single mean, difference of means			CO6
	B	test for ratio of variances			CO6
	C	Chi-square test for goodness of fit and independence of Attributes			CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2011- ISBN: 9780470458365. 2. S. Ross, A First Course in Probability, 10th Ed., Pearson Education India, 2018- ISBN: 9780134753119.			
	Other References	1. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 6th Ed., Wiley, 2003- ISBN: 9788126518050. 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000. Veerarajan T.,Engineering Mathematics (for semester 3 Tata McGraw-Hill, New Delhi,- ISBN:9788174091956 2013.			

School: SSET
Batch 2023-27
Programme: B.Tech.
Branch: EEE
Semester: III

1	**Course Code**	**ECE237**	
2	**Course Title**	**Analog Circuits-I**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	1. To develop a knowledge of special diodes. 2. To develop a knowledge of BJT and MOSFET devices. 3. Which can be used in the design and analysis of various usefulcircuits. 4. To study differential, multi-stage and operational amplifiers.	
6	Course Outcomes	After completion of this course students will be able to: CO1: To study the various diodes as high speed switch for RF applications. CO2: Understand the functioning of BJT and design differentcircuits. CO3: Understand the functioning of J-FET and design differentcircuits. CO4: Understand the functioning of MOS-FET and operating indifferent modes. CO5: To acquire knowledge of amplifiers using BJT and FET. Toanalyze efficiency of variousAmplifiers. CO6: Design and analysis of differential, multi-stage andoperational amplifier circuits usingBJT and MOSFET	
7	Course Description	After completing this course students will be able to design the different types of circuits with the help of E-CAD tools andcompare the measured and simulated results.	
8	Outline syllabus		CO Mapping
	Unit 1	**Types of Diodes (Special Diodes)**	
	A	Zener diode: Equivalent circuit of Zener diode and V-I characteristics. Principle of operation of Zener diode as voltage regulator.	CO1
	B	Light Emitting Diodes (LEDs): p-n Junction and general structure of LED. Emission of light, characteristics and its applications.	CO1
	C	Varactor (Vari-cap) diodes:characteristics, and its applications. Schottky diodes:Structure of metal- semiconductor junction, characteristics.	CO1

	Unit 2	**Bipolar Junction Transistor (BJT)**			
	A	Basics introduction of BJT, Modes of operation,Structure of actual transistor, Ebers-Moll (EM) Model.			CO2
	B	Circuit symbol and conventions for n-p-n and p-n-ptransistor. The Early Effect, input and output characteristics of BJT in CB, CE, and CC.			CO2
	C	BJT as an amplifier and switch, BJT circuit at DC, Different types of biasing in BJT amplifier circuit.Small-signal operation and Hybrid-π model.			CO2,CO5
	Unit 3	**Junction Field Effect Transistors (J-FET)**			
	A	Junction Field Effect Transistor:Basic ideas – Field effect, Reverse bias of gate voltage, Gate voltagecontrols drain current, Schematic symbol			CO3
	B	Construction and characteristic of JFETs (n-channel and p-channel), Voltage controlled resister, Transfer characteristics			CO3
	C	J-FET Biasing Configuration:Fixed bias, Self bias, and Voltage-divider biasing.			CO3,CO5
	Unit 4	**Metal Oxide Semiconductor Field Effect Transistors (MOS-FET)**			
	A	Metal Oxide Semiconductor (MOS) Structure, TheMOS system under external bias, Operation of MOS transistor, Formation of channel, Enhancement and Depletion MOSFET.			CO4
	B	MOSFET current-voltage (I_D-V_{DS}) characteristics forn-MOS and p-MOS. Drain current (I_D) equation in linear and saturation mode.			CO4
	C	Application of MOSFET as an amplifier and switch.			CO4,CO5
	Unit 5	**Differential, multi-stage and operationalamplifiers**			
	A	Differential amplifier, power amplifier, direct coupled multi-stage amplifier.			CO6
	B	Internal structure of an operational amplifier, ideal op-amp.			CO6
	C	Non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)			CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	

	Text book/s*	1. Robert L. Boylestad, "Electronic Devices and Circuit Theory", PHI - ISBN: 9780131189058 2. S. Sedra and K. C. Smith, "Microelectronic Circuits", Oxford University Press- ISBN:9780190853464 3. Sung-Mo Kang, "CMOS Digital Integrated Circuits", TMH- ISBN: 9780071326346	
	Other References	1. J. Millman, C. C. Halkias, "Electronics Devices and Circuits", McGraw-Hill- ISBN:9780071337069 2. S. Salivahanan, N. Suresh Kumar, "Electronics Devices and Circuits",2003- ISBN: 9780070534766	

School: SSET
Batch: 2023-27
Programme:
B.Tech.
Branch: EEE
Semester: III

1	Course Code	ECP237	
2	Course Title	**Analog Circuit-I Lab**	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. To develop a knowledge of special diodes. 2. To develop a knowledge of BJT and MOSFET devices. 3. It can be used in the design and analysis of various useful circuits. 4. To study differential, multi-stage and operational amplifiers.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: To study the various diodes as high speed switch for RF applications. CO2: Understand the functioning of BJT and design different circuits. CO3: Understand the functioning of J-FET and design different circuits. CO4: Understand the functioning of MOS-FET and operating in different modes. CO5: To acquire knowledge of amplifiers using BJT and FET. To analyse efficiency of variousAmplifiers. CO6: Design and analysis of differential, multi-stage and operational amplifier circuits usingBJT and MOSFET.	
7	Course Description	To design the different type of circuits with the help of E-CAD tools and compare the experimental and simulation results.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on Diodes**	
	A	Plot the V-I characteristics of junction diode under forward and reverse biased condition, and find its Knee voltage.	CO1
	B	Plot the V-I characteristics of Zener diode and compare with p-n junction diode.	CO1
	C	To design Zener diode as a voltage regulator.	CO1
		To design Zener diode as a wave shaping.	CO1
	Unit 2	**Practical related to BJT**	
	A	To study the characteristics of BJT in CB configuration.	CO2
	B	To study the characteristics of BJT in CE configuration	CO3, CO6
	Unit 3	**Practical related to FET**	
	A	To plot the output characteristics of FET and measure pinch-	CO3

		off voltage.			
	B	Examine the relationship between the drain current (I_D) and terminal voltages (V_{DS}& V_{GS}) of n-channel MOS transistor.			CO4
	C	With the help circuits, define drain current (I_D) of the n-channel MOS transistor as a function of the gate-to-source voltage (V_{GS}), with $V_{DS}>V_{DSAT}$ (transistor in saturation)			CO4
	Unit 5	**Practical related to Differential and operational amplifiers**			
	A	Design and analysis of differential amplifiers.			CO5,CO6
	B	Design and characterization of operational amplifiers.			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	1. Robert L. Boylestad, "Electronic Devices and Circuit Theory", PHI - ISBN: 9780131189058 2. S. Sedra and K. C. Smith, "Microelectronic Circuits", Oxford University Press-ISBN:9780190853464 3. Sung-Mo Kang, "CMOS Digital Integrated Circuits", TMH-ISBN: 9780071326346			
	Other References	1. J. Millman, C. C. Halkias, "Electronics Devices and Circuits", McGraw-Hill- ISBN:9780071337069 2. S. Salivahanan, N. Suresh Kumar, "Electronics Devices and Circuits",2003- ISBN: 9780070534766 3. Manuals			

		Batch : 2023-2027	
Programme: B.Tech			
Branch: EEE		**Semester:** III	
1	Course Code	**ARP207**	Course Name: **Logical Skills Building and Soft Skills**
2	Course Title	**Logical Skills Building and Soft Skills**	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Active	
5	Course Objective	To enhance holistic development of students and improve their employability skills. To provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To step up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a student will have entered the threshold of his/her 1st phase of employability enhancement and skill building activity exercise.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Ascertain a competency level through Building Essential Language and Life Skills CO2: Build positive emotional competence in self and learn GOAL Setting and SMART Goals techniques CO3: Apply positive thinking, goal setting and success-focused attitudes which would help them in their academic as well as professional career CO4: Acquire satisfactory competency in use of aptitude, logical and analytical reasoning CO5: Develop strategic thinking and diverse mathematical concepts through building number puzzles CO6: Demonstrate an ability to apply various quantitative aptitude tools for making business decisions	
7	Course Description	This Level 1 blended training approach equips the students for Industry employment readiness and combines elements of soft skills and numerical abilities to achieve this purpose.	
8	Outline syllabus – ARP 207		
	Unit 1	**BELLS (Building Essential Language and Life Skills)**	**CO Mapping**
	A	*Know Yourself*: Core Competence. A very unique and interactive approach through an engaging questionnaire to ascertain a student's current skill level to design, architect and expose a student to the right syllabus as also to identify the correct TNI/TNA levels of the student.	CO1
	B	Techniques of Self Awareness | Self Esteem & Effectiveness| Building Positive Attitude | Building Emotional Competence	CO1, CO2

	C	Positive Thinking & Attitude Building | Goal Setting and SMART Goals – Milestone Mapping | Enhancing L S R W G and P (Listening Speaking Reading Writing Grammar and Pronunciation) | Verbal Abilities - 1			CO1, CO2,CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**			
	A	Syllogism | Letter Series | Coding, Decoding , Ranking & Their Comparison Level-1			CO4
	B	Number Puzzles			CO5
	C	Selection Based On Given Conditions			CO5
	Unit 3	**Quantitative Aptitude**			
	A	Number Systems Level 1 | Vedic Maths Level-1			CO6
	B	Percentage ,Ratio & Proportion | Mensuration - Area & Volume |Algebra			CO6
	Weightage Distribution	CA	CE	ETE	
		25	*25*	*50*	
	Text book/s*	**Wiley's Quantitative Aptitude-P Anand | Quantum CAT – Arihant Publications | Quicker Maths- M. Tyra | Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson**			

TERM- IV

School: SSET	**Batch:2023-2027**	
Programme: B.Tech		
Branch: EEE	**Semester: 4**	
Course Code	EEE224	
Course Title	Electrical Machines-II	
Credits	3	
Contact Hours (L-T-P)	3-0-0	
Course Status	Compulsory	
Course Objective	To provide students with: 1. fundamentals of AC machine construction 2. the understanding of operation principles of AC electrical machines 3. ability to analyse performance characteristics of ac machines	
Course Outcomes	After completion of this course students will be able to: CO 1. Understand the concepts of rotating magnetic field. CO 2. demonstrate the operation of Synchronous generator and motor CO 3. define, analyse and solve problem based on Three-phase Inductionmachine CO 4. identify the problem in three-phase Induction motor starting and analyse different type of starters CO 5. analyse the principle of operation of special electrical machines CO6 Combine an understanding of the established principles, theories, concepts and terminology relevant to electrical machines with practicalapplication.	
Course Description	This course provides a basic understanding of AC machinery fundamentals, constructional features, operational analysis throughphasor diagrams, equivalent circuits ,determination of performanceparameters, testing and applications	
8	Outline Syllabus	CO Mapping
Unit 1	**Fundamentals of AC machine windings**	
A	Physical arrangement of windings in stator and cylindrical rotor; slots for windings; single turn coil - active portion and overhang;	CO1,CO6
B	full-pitch coils, concentrated winding, distributed winding, winding axis, 3D visualization of the above winding types	CO1,CO6
C	Air-gap MMF distribution with fixed current through winding-concentrated and distributed, Sinusoidally distributed winding, winding distribution factor	CO1,CO6
Unit 2	**Synchronous machines**	
A	Principle of rotating magnetic field, Constructional features, cylindrical rotor synchronous machine, Salient pole, generated EMF, equivalent circuit and phasor diagram, armature reaction, voltage regulation: EMF, MMF, ZPF and ASA methods.	CO2,CO6
B	Synchronous motor: Principle of operation, Starting methods. Operating characteristics of synchronous machines, V- curves. Salient pole machine–two reaction theory,	CO2,CO6
C	Analysis of phasor diagram, power angle characteristics. Parallel operation of alternators-synchronization and load division	CO2,CO6

	Unit 3	**3- Phase Induction Machines**	
	A	Principle of operation, constructional details , types of rotors, equivalent circuit, slip-torque characteristics.	CO3,CO6
	B	Condition for maximum torque and maximum power, losses and efficiency, load test, no load and blocked rotor tests, cogging and crawling, Circle diagram: separation of no load losses.	CO3,CO6
	C	Double cage rotor, induction generator.	CO3,CO6
	Unit 4	**Starting and Speed Control of 3-Phase Induction Motor**	
	A	Requirements for starters, types of starters: stator resistance and reactance, rotor resistance, autotransformer and star-delta starters.	CO4,CO6
	B	Speed control: change of voltage, torque, number of poles and slip.	CO4,CO6
	C	V/f control method, cascaded connection, slip power recovery scheme.	CO4,CO6
	Unit 5	**Special Electrical Machines**	
	A	Single phase induction motor, double revolving field theory and operation and its type	CO5,CO6
	B	Principle of operation and constructional features of universal and stepper motors	CO5,CO6
	C	Principle of operation and constructional features of brushless DC motor and servomotor	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw– Hill Publishers ISBN 1259081532 2010	
	Other References	1. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education,2014. ISBN:9780071326469, 0071326464 2. A. E. Clayton and N. N. Hancock, "Performanceand design of DC machines", CBS Publishers, 2004. ISBN:9780852268131, 0852268130	

School: SSET			
Programme: B.Tech			
Branch: EEE		**Semester: 4**	
1	Course Code	EEP224	
2	Course Title	Electrical Machines-II Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. The capability to analyze the operation of electric machines under different loading conditions 2. The ability to conduct testing and experimental procedures on different types of electrical machines.	
6	Course Outcomes	After completion of this course students will be able to: CO1: Experimentally obtain the load characteristics of induction motor. CO2: Determination of various performance characteristic of induction motor CO3: Experimentally perform speed control of induction motor CO4: Understand the effect of variation of field current on armature current and power factor of a synchronous motor. CO5: Understand the concept of parallel operation of alternator. CO6 : Understand the concept of parallel operation of alternator.	
7	Course Description	The course covers practical experiment on three phase induction motor, single phase induction motor and synchronous machines.	
8	Outline syllabus		
	Unit 1	**Practical based on three phase induction motor**	
	A	To perform no-load and blocked rotor tests on three-phase induction motor	CO1
	B	To perform load test on three-phase induction motor.	CO1
	C	To obtain the characteristic of three-phase induction generator.	CO1
	Unit 2	**Practical related to single phase induction motor**	
	A	To start single-phase induction motor using auxiliary winding and capacitor and to reverse its direction of rotation	CO2
	B	To perform no-load and blocked rotor tests on single-phase induction motor.	CO2
	C	To perform load test on single-phase induction motor.	CO2
	Unit 3	**Practical related to speed control of induction motor**	
	A	To perform speed control of single-phase induction motor using v/f method.	CO3
	B	To perform speed control of three-phase slip-ring induction motor by varying rotor resistance	CO3

	Unit 4	**Practical related to Synchronous machine**			
	A	To obtain the effect of variation of field current on armature current and power factor of a synchronous motor.			CO4
	B	To perform open-circuit and short-circuit tests on synchronous generator			CO4
	Unit 5	**Practical related to parallel operation of synchronous generator**			
	A	To carry-out parallel operation of three-phase synchronous generators. .			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Electric Machines by I.J. Nagrath& D.P. Kothari, Tata Mc Graw – Hill Publishers ISBN 1259081532 2010			
	Other References	1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education,2014. ISBN:9780071326469, 0071326464 2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBSPublishers, 2004. ISBN:9780852268131, 0852268130			

School: SSET		**Batch: 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	EEE228	
2	Course Title	Industrial Instrumentation	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Department	
5	Course Objective	1. To discuss about basic instrument and measurement system 2. To identify basic structure of electrical meters 3. To study techniques of RLC measurement 4. To explain different principle of special instruments 5. To get knowledge and discuss on basic industry sensors and transducers	
6	Course Outcomes	After completion of this course students will be able to: CO1: Getting knowledge of basic electrical instrument and measurement systems CO2: Getting knowledge of basic electronics instrument and measurement systems CO3: Getting knowledge of special electrical and electronics measurement systems Analyzing concepts of RLC measurements CO4: Understanding concepts of sensors & transducers; Getting knowledge temperature instrumentation system CO5: Getting knowledge of temperature instrumentation system CO6: Studying applications of instruments in industry	
7	Course Description	Instrumentation field is very important in industry field. Internal details of different types of EEE instruments will be discussed here. How to find the suitable instrument for a particular application can be done by the student after going through this subject. Some of special instruments of industry and work bench instrument details will be discussed. Basics of sensors and their applications are explained	
8	Outline syllabus		CO Mapping
	Unit 1	**Electrical Instrumentation**	
	A	Instrumentation system, classification of instruments, characteristics of instruments	CO1,CO6
	B	PMMC meter, Moving Iron, Extension of voltmeter and ammeter	CO1,CO6

	C	Wattmeter and Energy meter; single phase and three phase	CO1,CO6
	Unit 2	**Electronics Instrumentation**	
	A	Measurements RLC – Bridges	CO2,CO6
	B	Digital voltmeter , DMM, Digital tachometer	CO2,CO6
	C	CRO, DSO	CO2,CO6
	Unit 3	**Special Instrumentation**	
	A	Industrial Mimic Panels, Mimic Board	CO3,CO6
	B	Harmonic analyzer; wave analyzer; distortion analyzer	CO3,CO6
	C	Megger, Instrument transformers	CO3,CO6
	Unit 4	**Sensors, Transducers and Temperature**	
	A	Definition: Sensors and transducers; classification of Sensors and transducers;	CO4,CO6
	B	Temperature: RTD, Thermocouple, Thermistor, IC temperature sensors	CO4,CO6
	C	optical pyrometers, Industrial temperature measurement system	CO4,CO6
	Unit 5	**Pressure and Flow Instrumentation**	
	A	Mechanical pressure sensors and transducers; electrical pressure sensors and transducers	CO5,CO6
	B	Mechanical flow sensors and transducers; electrical flow sensors and transducers;	CO5,CO6
	C	Industrial temperature and flow measurement systems	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25%	MTE: 25%	ETE: 50%
	Text book/s*	E.W. Golding & F.C. Widdis, “Electrical Measurement & Measuring Instrument”, A.W. Wheeler& Co. Pvt. Ltd. India Patranab is D, "Sensors and Transducers", Prentice Hall India Learning Private Limited; 2nd edition	
	Other References	W.D.Cooper,” Electronic Instrument & Measurement Technique “ Prentice Hall International A.K. Sawhney,“Electrical & Electronic Measurement & Instrument”, Dhanpat Rai & Sons , India	

School:SSET		Batch:2023-2027
Programme:B.Tech		
Branch:EEE		**Semester:4**
1	Course Code	EEP228
2	Course Title	Industrial Instrumentation Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	1. To discuss about basic instrument and measurement system 2. To identify basic structure of electrical meters 3. To study techniques of RLC measurement 4. To explain different principle of special instruments 5. To get knowledge and discuss on basic industry sensors and transducers
6	Course Outcomes	After completion of this course students will be able to: CO1: Calibrate electrical instruments like voltmeter, ammeter, wattmeter, energy meter CO2: Utilize various bridges for R,L,C measurement CO3:Identify various controls and functions of CRO and DSO and demonstrate their use for various measurements. CO4: Develop instrumentation system for temperature measurement. CO5: Develop instrumentation system for force measurement CO6: Present the case studies related to digital meters.
7	Course Description	This course gives idea about how to use different types of meters in measurements. Some experiments give practice of RLC measurement using AC & DC bridges. One section gives practice of measurement using CRO. The last two sections about sensors and case studies

8 Outline syllabus

	Unit 1	Calibration	CO Mapping
	A	Calibration of voltmeter and ammeter	CO1
	B	Measurement of RMS, average and form factor using rectifier and meters, Calibration of Wattmeter	CO1
	C	Calibration of Energy meter	CO1
	Unit 2	**RLC Bridges**	
	A	DC Bridge for R measurement	CO2
	B	AC Bridge for L measurement	CO2
	C	AC Bridge for C measurement	CO2
	Unit 3	**CRO and DSO**	
	A	Identifying of controls and functions switches on CRO &DSO	CO3
	B	Measurements using CRO	CO3
	C	Measurements using DSO	CO3
	Unit 4	**Sensors Characteristics**	

	A	Characteristics of temperature sensor		CO4
	B	Characteristics of force sensor		CO4
	C	Characteristics of flow sensor		CO4
	Unit 5	**Case study of Instruments**		
	A	Digital Energy Meter		CO5,CO6
	B	Digital Temperature Meter		CO5,CO6
		Digital Multimeter		CO5,CO6
	Mode of examination	Practical & Viva		
	Weightage Distribution	CA	CE	ETE
		25%	25%	50%
	Text book/s*	Refer lab manuals		
	Other References	NA		

School: SSET		**Batch : 2023-2027**	
Programme: B.Tech			
Branch: EEE		**Semester: 4th**	
1	Course Code	**EEP253** Course Name: Project Based Learning -2	
2	Course Title	Project Based Learning -2	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory	
5	Course Objective	1. To align student's skill and interests with a realistic problem or project 2. To understand the significance of problem and its scope 3. Students will make decisions within a framework	
6	Course Outcomes	After completion of this course students will be able to: CO1: Acquire practical knowledge within the chosen area of technology for project development CO2: Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach CO3: Discuss and accumulate the background information CO4: Develop effective communication skills for presentation of project related activities CO5: Contribute as an individual or in a team indevelopment of technical projects CO6: Demonstrate effectively the module designed	
7	Course Description	In PBL-2, the students will learn how to define the problemfor developing projects, identifying the skills required developing the project based on given a set of specifications and all subjects of that Semester.	
8	Outline syllabus		CO Mapping
	Unit 1	Problem Definition, Team/Group formation and Project Assignment. Finalizing the problem statement, resource requirement, if any.	CO1
	Unit 2	Develop a work flow or block diagram for the proposed system / software.	CO2
	Unit 3	Design Flow Chart for the proposed problem.	CO3
	Unit 4	Implementation of work under the guidance of a faculty member and obtain the appropriate results.	CO4
	Unit 5	Demonstrate and execute Project with the team. Test the project modules.	CO5, CO6
		Report should include Abstract, Hardware / Software Requirement, Problem Statement, Design/Algorithm, Implementation Detail & Test Reports.	

		References if any. The presentation, report, work done during the term supported by the documentation, forms the basis of assessment.			
	Mode of examination	Practical/VIVA			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	NA			
	Other References	NA			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch:EEE		**Semester:4**	
1	Course Code	EEE244	
2	Course Title	Introduction to Electric vehicles	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status	Compulsory	
5	Course Objective	1.To introduce the concepts of electric vehicles and their operation. 2.To Understand the basic components of EV and their Design. 3.Understand energy storage and diagnostics of Electrical vehicles 4.Understand energy management strategies of Electrical vehicles	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Understand the operation of Electric vehicles CO2: Learning in detailed the dynamics of Electrical Vehicles CO3: Analyse power converters and applications CO4: Analyse energy storage for Electrical Vehicles and its diagnostics. CO5: Analyse energy management strategies of HEVs CO6: Design components of the electric vehicles and its maintenance.	
7	Course Description	EV are vital to overall automotive industries. It is applicable to regular vehicles and other vehicles like locomotives. Electrical Vehicles are having lot of applications in different fields. This subject gives knowledge about understanding and applying of concepts on Electrical Vehicles. It is also giving knowledge on power electronics circuits. Finally, students can get knowledge on energy storage and troubleshooting Electrical Vehicles.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Brief history, Electric Vehicles and the Environment, Types of electric vehicles, Economic and environment impact of electrical vehicle	CO1,CO6
	B	Components of EV: Introduction, Drive Technology Trends: Electrical Machines, Power Converters, Embedded Batter Sensors, Microcontrollers, Driving Patterns, Drive Design Methodology.	CO1,CO6
	C	Basics of Electric Vehicle; Hybrid Electric Vehicle; Plug in HEV; Fuel Cell Vehicle;	CO1,CO6
	Unit 2	**Dynamics of Electric Vehicle**	
	A	Motion and dynamic equation for vehicles, Vehicle Power Plant and Transmission Characteristics,	CO2,CO6
	B	Basic Architecture of Hybrid Drive Trains and Analysis of Series Drive Train,	CO2,CO6
	C	Power Flow in HEVs, Torque Coupling and Analysis of Parallel Drive Train, Basic Architecture of Electric Drive Trains.	CO2,CO6

	Unit 3	**Power Converters**			
	A	- DC-DC converters for EV and HEV applications, DC-AC converters in EV & HEV.			CO3,CO6
	B	AC Electrical Machines for hybrid and Electric Vehicles- Induction motors, Permanent Magnet Motors. SRM motors, their control and applications in EV/HEV.			CO3,CO6
	C	Design of Electrical EV/HEV – Principles, Drive cycles and its detail analysis, sizing of electrical machines			CO3,CO6
	Unit 4	**Energy Storage**			
	A	Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis			CO4,CO6
	B	Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis			CO4,CO6
	C	Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.			CO4,CO6
	Unit 5	**Energy Management Strategies**			
	A	Introduction to energy management strategies used in hybrid and electric vehicles			CO5,CO6
	B	Classification of different energy management strategies, comparison of different energy management strategies			CO5,CO6
	C	Implementation issues of energy management strategies.			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press, 2nd Edition, 2003			
	Other References	1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press, 2nd Edition, 2003. 2. James Larminie, John Lowry, “Electric Vehicle Technology”, Wiley publications, 1st Edition, 2003 3. B D McNicol, D A J Rand, “Power Sources for Electric Vehicles”, Elsevier publications, 1st Edition, 1998 4. SethLeitman, “Build Your Own Electric Vehicle” MC Graw Hill, 1st Edition, 2013.			

School: SSET		**Batch :** 2023-2027	
Programme:		**B.Tech**	
Branch: EEE		**Semester:** IV	
1	Course Code	**ARP208**	Course Name : **Quantitative and Qualitative Aptitude Skill Building**
2	Course Title	**Quantitative and Qualitative Aptitude Skill Building**	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
	Course Status	Active	
5	Course Objective	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 2nd phase of employability enhancement and skill building activity exercise.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Develop and deliver the effective presentations to interpret the deeper meaning of life. CO2: Improve listening skills so as to understand complex business communication in a variety of global English accents through proper pronunciation CO3: Demonstrate a good understanding of effective business writing and telephone handling Skills CO4: Acquire higher level competency in use of aptitude, logical and analytical reasoning CO5: Develop higher level strategic thinking and diverse mathematical concepts through building number puzzles CO6: Demonstrate higher level quantitative aptitude tools for making business decisions	
7	Course Description	This course bundle allows students to build vision, mission and strategy statements while exposing them to various models of communication along with MTI reduction and the 2nd level of quant, aptitude and reasoning abilities	
8	Outline syllabus – ARP208		CO MAPPING

	Unit 1	**Communicate to Conquer**			
	A	VMOSA (Vision, Mission, Values and Ethics)| Business Communication -Verbal Communication Skills | Barriers in communication | Basics of effective communication – PRIDE & STAR Model			CO1
	B	Different styles of communication & style flexing (Based on the 4 social styles-Analytical, Driving, Expressive, Amiable) | Importance of Listening & practice of Active Listening | The Art of Giving Feedbacks| Feedback Skills | Asking fact finding questions- Probing Skills			CO2
	C	Email Etiquette | Business Writing Skills| Telephone Etiquette Skills (Telephone Handling Skills) | Non Verbal Communication-Kinesthetics, Proxemics, Paralanguage | MTI Reduction Program | Verbal Abilities - 2			CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**			
	A	Coding Decoding , Ranking & Their Comparison Level-2			CO4
	B	Series, Blood Relations & Number Puzzle			CO5
	Unit 3	**Quantitative Aptitude**			
	A	Number System Level 2			CO5
	B	Vedic Maths Level-2 | Probability | Permutation & Combination			CO6
	C	Percentage, Profit & Loss ,Partnership, Simple Interest & Compound Interest			CO6
	Weightage Distribution	**CA**	**CE**	**ESE**	
		25	*25*	*50*	
	Text book/s*	**Wiley's Quantitative Aptitude-P Anand | Quantum CAT – Arihant Publications | Quicker Maths- M. Tyra | Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson**			

TERM -V

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE		**Semester:** V	
1	Course Code	EEE330	
2	Course Title	Control Systems	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	Control Systems is the study of the analysis and regulation of the output behaviors of dynamical systems subject to input signals. The concepts and toolsdiscussed in this course can be used in a wide spectrum of engineering disciplines. The emphasis of this course will be on analysis and feedback controller design methods for linear time-invariant systems.	
6	Course Outcomes	After completion of this course, students will be able to: CO1:Apply transfer function models, signal flow graphs and block diagram algebra to obtain the transfer function of a given system CO2: Obtain system response in time domain CO3: Design a closed-loop control system to satisfy dynamic performance specifications using frequency response CO4:Analyze closed-loop control systems for stability and steady-stateperformance CO5: Design simple feedback controllers and compensators tomeetdesired performance specifications CO6: Apply different types of analysis and explain the nature of stabilityof any given linear system	
7	Course Description	This course shall introduce the fundamentals of modeling and control of linear time invariant systems. The course will be useful for students from major streams of engineering to build foundations of time/frequency analysis of systems as well as the feedback control of such systems.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Control Problem**	
	A	Feedback Control: open-loop and closed-loop systems,benefits of feedback,block diagram algebra	CO1,CO6
	B	Mathematical models of physical systems, signal flowgraph	CO1,CO6
	C	Transfer function models of linear time-invariant systems	CO1,CO6
	Unit 2	**Time Response Analysis**	
	A	Standard test signals, time response of first order systemsfor standard test inputs	CO2,CO6
	B	Time response of second order systems for standard testinputs	CO2,CO6

	C	the time-response			CO2,CO6
	Unit 3	**Frequency Response Analysis**			
	A	Introduction and frequency domain specifications			CO3,CO6
	B	Correlation between frequency domain and time domain.			CO3,CO6
	C	Polar plot and Bode plot			CO3,CO6
	Unit 4	**Stability of Control Systems**			
	A	Concept of stability			CO4,CO6
	B	Characteristic equation, location of roots in s plane for stability, Routh Hurwitz criterion.			CO4,CO6
	C	Root-locus technique. Construction of root-loci			CO4,CO6
	Unit 5	**Modern Control System**			
	A	Lag, lead, lag-lead compensator and their performancecriteria			CO5,CO6
	B	Concepts of state variables and state space model.			CO5,CO6
	C	Solution of state equations, concept of controllability and observability.			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. K. Ogata, "Modern Control Engineering", Prentice Hall,1991. ISBN:9780135891285, 0135891280 2. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 1997. ISBN:9780070482890,0070482896			
	Other References	1. I. J. Nagrath and M. Gopal, "Control SystemsEngineering", New Age International, 2009 ISBN:9788122417753, 8122417752 2. B. C. Kuo, "Automatic Control System", Prentice Hall,1995. ISBN:9780471134763, 0471134767			

School: SSET		**Batch : 2023-27**
Programme:		B.Tech.
Branch: EEE		**Semester:** 05
1	CourseCode	EEE333
2	CourseTitle	Power System-I
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Compulsory
5	Course Objective	To provide students with the ability of: 1. understanding of the basic components of Power System and then analyze the system using the technique of per unit system. Also introducing the students to cables, insulators and the corono phenomena which occurs in transmission system 2. representing the transmission system with the help of theirequivalent circuits 3. calculating various design parameters of transmission lines
6	Course Outcomes	On successful completion of this course students will be able to CO1:Fundamental knowledge of different power system elements CO2: Apply concepts from basic electromagnetics to determine the inductance, capacitance, and resistance of three-phase transmission lines, including lines with conductor bundling. CO3: Derive the model for short, medium and long transmission lines CO4:Analyse the mechanical and electrical design aspects of transmission system CO5: Analyse different types of distribution systems and its design. CO6: Examine the various design features of overhead transmission lines
7	Course Description	This course will cover major topics of power engineering and intended to deliver basic knowledge of fundamentals of power systems including transmission, and distribution of electrical power. Course will guide students to design transmission line having perfect sag and insulator design and minimum corona loss.
8	Outline syllabus		CO Mapping
	Unit 1	**Fundamentals of Power System**	
	A	Single phase transmission, three phase transmission, basic components of a power system.	CO1,CO6
	B	Need of EHV Transmission	CO1,CO6
	C	Types of Distribution System	CO1,CO6

	Unit 2	**Transmission Line Constants and Performance**	
	A	Inductance of solid, stranded and bundled conductors, symmetrical and unsymmetrical spacing and transposition, application of self and mutual GMD	CO2,CO6
	B	Capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition, application of self and mutual GMD	CO2,CO6
	C	Characteristics and performance of lines - short line, medium line and long line; equivalent circuits, ABCD constants, Ferranti effect.	CO2,CO6
	Unit 3	**Corona, Interference and Insulated Cables**	
	A	Critical disruptive voltage and visible disruptive voltage, corona loss, line design based on corona, advantages and disadvantages of corona.	CO3,CO6
	B	Skin and proximity Effects, Interference with neighbouring communication circuits and Radio Interference.	CO3,CO6
	C	Insulation, Shielding and Armouring of cables, types of cables, EHV cables, insulation resistance, capacitance and loss angle, capacitance grading, heating of cables, current rating	CO3,CO6
	Unit 4	**Mechanical Design of Transmission Lines**	
	A	Catenary curve, sag-tension calculations, supports at different levels	CO4,CO6
	B	Stringing chart, sag template, equivalent span, vibration and vibration dampers.	CO4,CO6
	C	Types, voltage distribution in insulator string and grading, methods of equalizing potentials.	CO4,CO6
	Unit 5	**HVDC Transmission**	
	A	Components of HVDC transmission system, Comparison of AC and DC transmission.	CO5,CO6
	B	Application of DC Transmission	CO5,CO6
	C	Types of HVDC links	CO5,CO6
	Mode of examination	Theory	
	Weight age Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book*	I.J.Nagrath and D.P.Kothari, “Power System Engineering”, Tata McGraw- Hill Publishers. ISBN:9789353165123, 9353165121	
	Other References	1. C.L.Wadhwa,“Electrical Power Systems”, New Age International Publishers. ISBN:9788122417739, 8122417736	

School: SSET		**Batch : 2023-27**	
Programme:		**B. Tech.**	
Branch: EEE		**Semester: 05**	
1	Course Code	EEP331	
2	Course Title	Power System-1 Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	To provide students with the ability of: 1. understanding of the basic components of Power System and thenanalyze the system using the technique of per unit system. Also introducing the students to cables, insulators and the corono phenomena which occurs in transmission system 2. representing the transmission system with the help of their equivalentcircuits 3. calculating various design parameters of transmission lines	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Design three-phase base power system model inPSCAD software CO2: Design of transmission lines of specified parameters CO3: Analyses Ferranti Effect in transmission line CO4: Derive the model for short, medium and long transmission lines CO5: Examine the various design features of overhead transmissionlines CO6: Fault analysis in transmission and distribution system.	
7	Course Description	This course will cover major topics of power engineering and intended to deliver basic knowledge of fundamentals of power systems including transmission, and distribution of electrical power. Course will guide students to design transmission line having perfect sag and insulatordesign and minimum corona loss.	
8	Outline syllabus		CO Mapping
	Unit 1	Practical based on fundamentals of Power System	
	A	To design single-phase power system model consisting of generator, transformer, transmission line and motors inPSCAD	CO1,CO6

	B	To design different types of distribution systems and to measure voltages and currents at different feeder point in PSCAD	CO1,CO6
	Unit 2	Practical based on transmission line constants and performance	
	A	To calculate inductance of transmission line using line data in MATLAB	CO2,CO6
	B	To calculate capacitance of transmission line using line data in MATLAB	CO2,CO6
	C	To determine ABCD parameters in transmission line kit	CO2,CO6
	Unit 3	Practical related to Corona, Interference and Insulated Cables	
	A	To plot a graph between critical disruptive voltage, temperature and conductor radius vs corona loss in MATLAB	CO3,CO6
	B	To examine Ferranti effect in transmission line kit.	CO3,CO6
	C	To determine the location of fault in a cable using cable fault locator.	CO3,CO6
	Unit 4	Practical related to Mechanical Design of Transmission Lines	
	A	To calculate sag taking required inputs from user in MATLAB	CO4,CO6
	B	To plot stringing chart and sag template in MATLAB	CO4,CO6
	C	To determine the string efficiency of insulating disc	CO4,CO6
	Unit 5	Practical related to HVDC Transmission	
	A	To design a rectifier model in PSCAD	CO5,CO6
	B	To design an inverter model in PSCAD	CO5,CO6
	C	To design a complete HVDC system in PSCAD	CO5,CO6
	Mode of examination	Practical	
	Weightage Distribution	CA: 25% / CE(VIVA): 25% / ETE: 50%	
	Text book/s*	I.J.Nagrath and D.P.Kothari, “Power System Engineering”, Tata McGraw- Hill Publishers.ISBN:9789353165123, 9353165121	
	Other References	1. C.L.Wadhwa, “Electrical Power Systems”, New Age International Publishers. ISBN:9788122417739,8122417736	

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE		**Semester:5th**	
1	Course Code	**EEP343**	Course Name: Project Based Learning -3
2	Course Title	Project Based Learning -3	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory	
5	Course Objective	1.To align student's skill and interests with a realistic problem or project. 2.To understand the significance of problem and its scope. 3.Students will make decisions within a framework.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Identify and formulate problem statement. CO2: Design relational circuit CO3: Develop the solution by Hardware or software. CO4:Classify and understand various test techniques for verification and validation of project. CO5: Analyze and make use of modern for solving real word problems. CO6: Develop teamwork and need to engage in life-long learning, along with the ability to communicate effectively with others.	
7	Course Description	In PBL-3, the students will learn how to define the problem for developing projects, and Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.	
8	Outline syllabus		CO Mapping
	Unit 1	Problem Definition and identification, Team/Group formation and Project Assignment. Finalizing the problem statement, resource requirement, if any.	CO1,CO4
	Unit 2	Requirement of hardware/software. Develop the flowchart for the proposed system	CO2,CO6
	Unit 3	Design; implement project work in hardware or software	CO3
	Unit 4	Use of various test tools and techniques for verification and validation of project	CO4,CO5

Unit 5	Demonstrate and execute Project with the team.		CO6
	Report should include Abstract, Hardware / Software Requirement, Problem Statement, Design/Algorithm, ER diagrams, Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams, Implementation Detail. Validation Reports. References, Test cases if any. The presentation, report, work done during the term supported by the documentation, forms the basis of assessment.		
Mode of examination	Practical /Viva		
Weight age Distribution			
	CA	CE(VIVA)	ETE
	25%	25%	50%

School: SSET		**Batch :** 2023-2027	
Programme:B.Tech			
Branch: EEE		**Semester: V**	
1	Course Code	**ARP 305**	Course Name : **Personality Development and Decision making Skills**
2	Course Title	**Personality Development and Decision making Skills**	
3	Credits	2	
4	Contact Hours (L-T-P)	1-0-2	
	Course Status	Active	
5	Course Objective	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 3rd phase of employability enhancement and skill building activity exercise.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Apply skills of personality development which will help a student groom to meet the needed social strata for establishing themselves in the society CO2: Build a positive behavioural attitude and attributes developing interpersonal skills for building positive and meaningful social and professional relationships CO3: Review and revise development plans to adapt to changing aspirations, circumstances and working environments CO4: Acquire higher level competency in use of numbers and digits, logical and analytical reasoning CO5: Develop higher level strategic thinking and diverse mathematical concepts through building cubes and cuboids. CO6: Demonstrate higher level quantitative aptitude such as analytical and statistical tools for making business decisions.	
7	Course Description	This bundles Training approach attempts to explore the personality, character, and the natural style of the student. This helps to develop character, personality, confidence and interpersonal abilities within the student along with level 3 readiness in quant, aptitude and reasoning skills	

8	Outline syllabus – ARP305	

	Unit 1	**Impress to Impact**	**CO MAPPING**
	A	What is Personality?| Creating a positive impression – The 3 V's of Impression | Individual Differences and Personalities	CO1
	B	Personality Development and Transformation | Building Self Confidence | Behavioural and Interpersonal Skills	CO2
	C	Avoiding Arguments | The Art of Assertiveness | Constructive Criticism | The Personal Effectiveness Grid | Assessing our Strengths & Limitations and Creating an Action Plan for Learning with the 4M Model | Verbal Abilities-3	CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Numbers & Digits , Mathematical Operations | Analytical Reasoning	CO4
	B	Cubes & Cuboids | Statement & Assumptions	CO5
	C	Strong & Weak Argument	CO5
	Unit 3	**Quantitative Aptitude**	
	A	Work & Time ,Pipes & Cistern	CO6
	B	Time ,Speed & Distance, Quadratic & Linear Equations, Logs & Inequalities	CO6
	C	Sequence & Series, Logarithms, Data Interpretation | Data sufficiency - Level 1	CO6
	Weightage Distribution	(CA)Class Assignment/Free Speech Exercises / JAM – 25% | (ETE) Group Presentations/Mock Interviews/GD/ Reasoning, Quant & Aptitude – 75%	
	Text book/s*	**Wiley's Quantitative Aptitude-P Anand | Quantum CAT – Arihant Publications | Quicker Maths- M. Tyra | Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson**	

School: SSET		**Batch : 2023- 2027**			
	Programme: B.Tech				
	Branch: EEE	**Semester: V**			
1	**Course Code**	**ECC301**			
2	**Course Title**	**Community Connect**			
3	**Credits**	**2**			
3.01	**(L-T-P)**	**(0-2-0)**			
4	**Learning Hours**		Contact Hours	30	
			Project/Field Work	20	
			Assessment	00	
			Guided Study	10	
			Total hours	30	
5	**Course Objectives**	1. The course is aimed at inculcating the spirit of community service amongst thestudents of the university. 2. The goal is make the students understand various social issues plaguing ourcommunity and its effects on diverse section of people. 3. The students would be able analyse the issues and come up with solutions toaddress the same. 4. It would also cultivate a sense of empathy for fellow citizens and also developmeans of effective issue resolution 5. A project of this nature will help our students to connect their class-roomlearning with practical situations in the society.			

6	**Course Outcomes**	After completion of this course, students will be able to: 1. The community connect programme is meant to enable the students to acquire knowledge regarding the various kinds of social issues and their optimum resolution. 2. It will help them understand the various ways in which social responsibility can be undertaken. 3. The programme will enable them to develop skills to break an issue into various modules and resolve them effectively. 4. The students will be able to conduct independent research and generate relevant reports.
7	**Theme**	**Major Sub-themes for research:** a. Extent of impact of state projects in a community b. Social and cultural issues c. Environmental issues d. Economic issues e. Caste-based problems f. Adaptation of new technology g. New trends in media h. Other issues.
8.1	**<u>Guidelines For Faculty</u>**	The Community Connect project is supposed to be based on data collected in the form of answers to questionnaire that will be designed by the students and approved
<u>Members</u>	by the faculty members. The topic of the research should be related to social, economical or environmentalissues concerning the common man. The students should prepare an abstract of the proposed research which should clearly state the objective and the nature of expected outcomes. This abstract and therelated questionnaire should be ratified by the faculty members of SHSS before the student groups proceeds to undertake the project. The students would be divided into groups of consisting of 3-4 students each under afaculty member to advise and guide their efforts. They will be directed to visit sites approved by the faculty members and collect data,and if possible videos. The faculty guide will guide the students and approve the project title and help thestudent in preparing the questionnaire and final report. The students will be marked on the basis of a final report which should contain 2,500to 3,000 words and relevant charts, tables and photographs. The student should **submit the report** to the school by 25 March 2019.	

8.2	**Layout of the Report**	Abstract(300 words) a. Introduction b. Objective of the research c. Research Methodology d. Questionnaire e. Expected Outcomes Note: Research report should base on primary data.
8.3	**Guideline for Report Writing**	**Title Page: The following elements must be included:** • Title of the article; • Name(s) and initial(s) of author(s), preferably with first names spelled out; • Affiliation(s) of author(s); • Name of the faculty guide **Abstract:** Each article is to be preceded by an abstract approved by the facultymembers. The abstract should highlight the objectives, methods, results, and conclusions of the project. **Text: Reports should be submitted in MS-Word.** • Use a normal, plain font (e.g., 12-point Times Roman) for text. • Use italics for emphasis. • *Use the automatic page numbering function to number the pages.* • *Save your file in docx format* (Word 2007 or higher) or doc format (olderWord versions)
8.4	**Format:**	**The report should be Spiral/ hardbound** Cover page Acknowledgem entContent

School: SSET

Batch: 2023-2027
Programme: B.Tech
Branch: EEE
Semester: V

1	Course Code	EEP330	
2	Course Title	Control System Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	1. An understanding of the methodology for modeling mechanical, electrical, and other types of dynamic systems using both time domainand frequency domain analysis. 2. An understanding of the fundamental analytical methods and tools used incontrol system design. 3. Ability to design feedback controllers and compensators to meet Desired performance specifications.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1:Understand the modeling of linear-time-invariant systems using transferfunction models, signal flow graphs and block diagram algebra CO2: Understand the concept of stability and its assessment for linear-time invariant systems. CO3: To obtain system response in both time domain and frequency domain CO4: Analyze dynamic systems for their stability and performance CO5: To obtain and analyze the state space representation of a system CO6: Apply the concept of time domain and frequency domain analysis for Industrial application.	
7	Course Description	This course shall introduce the fundamentals of modeling and control of lineartime invariant systems. The course will be useful for students from major streams of engineering to build foundations of time/frequency analysis of systems as well as the feedback control of such systems.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based Feedback Systems**	
		To determine the speed-torque characteristics of an ACServomotor	CO1, CO6
		To study synchro transmitter and receiver pair and obtainoutput versus input characteristics	CO1, CO6
		To control the speed of an AC motor using TRIAC	CO1, CO6

	Unit 2	**Practical related to time response analysis**			
		Time domain analysis and error analysis of first order control system using MATLAB			CO2
		Time domain analysis analysis of second order control system using MATLAB			CO2
		Error analysis of second order control system using MATLAB			CO2
	Unit 3	**Practical related to frequency response analysis**			
		Frequency domain analysis and error analysis of first order control system using MATLAB			CO3
		Frequency domain analysis analysis of second order control system using MATLAB			CO3
		Error analysis of second order control system using MATLAB			CO3
	Unit 4	**Practical related to Stability**			
		Stability analysis using Bode Plot of Linear Time Invariant system using MATLAB			CO4, CO6
		Stability analysis using Root Locus Technique of Linear Time Invariant system using MATLAB			CO4, CO6
	Unit 5	**Practical related to State Space Analysis**			
		To obtain state space representation of a given system using MATLAB.			CO5, CO6
		To transform a given state space model to transfer function and vice versa using MATLAB			CO5, CO6
	Mode of examination	Practical			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	1. K. Ogata, "Modern Control Engineering", Prentice Hall, 2010- ISBN: 9780136156734. 2. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 2002- ISBN:9780070482890.			
	Other References	3. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009- ISBN: 9781848290037 4. B. C. Kuo, "Automatic Control System", Prentice Hall, 1995.IEEE Industry Applications Society, IEEE Inst of Electrical & Electronics			

School:SSET		Batch : 2023-2027
Programme:B.Tech		
Branch: EEE		**Semester: V**
1	Course Code	MRM001
2	Course Title	Research Methodology
3	Credits	2
4	Contact Hours (L-T-P)	2-0-0
	Course Status	Compulsory
5	Course Objective	• To develop understanding of the basic framework of research process. • To develop an understanding of various research designs and techniques. • To identify various sources of information for literature review and data collection. • To develop an understanding of the ethical dimensions of conducting applied research. • Appreciate the components of scholarly writing and evaluate its quality.
6	Course Outcomes	CO1: Infer the mind-set of a researcher CO2: Design a research plan CO3: Apply different methods for data collection CO4: Analyze the collected data CO5: Compile relevant data and prepare a report CO6: Infer the process of research right from inception of idea to execution and documentation.
7	Course Description	The course aims to develop a research orientation among the scholars and to acquaint them with fundamentals of research methods. Specifically, the course aims at introducing them to the basic concepts used in research and to scientific social research methods and their approach. It includes discussions on sampling techniques, research designs and techniques of analysis.

8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Introduction to research – The role of research, research process overview	CO1
	B	Philosophies and the language of research theory building – Science and its functions, What is theory?, and The meaning of methodology	CO1,CO2
	C	Thinking like a researcher – Understanding Concepts, Constructs, Variables, and Definitions	CO1,CO2
	Unit 2	**Research Problem and Hypotheses**	
	A	Defining the research problem, The importance of problems	CO2,CO3
	B	Formulation of the research hypotheses, The importance of hypothesis	CO2,CO3
	C	Experimental and Non-experimental research design	CO2,CO3
	Unit 3	**Data Collection**	
	A	Field research, and Survey research	CO4,CO5
	B	Methods of data collection– Secondary data collection methods	CO4,CO5
	C	Methods of data collection– qualitative methods of data collection, and Survey methods of data collection	CO4,CO5
	Unit 4	**Data Analysis**	
	A	Attitude measurement and scaling – Types of measurement scales; Questionnaire designing – Reliability and Validity	CO5,CO6
	B	Sampling techniques – The nature of sampling, Probability sampling design, Non-probability sampling design, Determination of sample	CO5,CO6
	C	Processing and analysis of data	CO5,CO6
	Unit 5	**Report Writing**	
	A	Ethical issues in conducting research	CO6
	B	Report generation and report writing	CO6
	C	APA format – Title page, Abstract, Introduction, Methodology, Results, Discussion, References, and Appendices	CO6

	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	• Chawla, Deepak & Sondhi, Neena (2011). Research methodology: Concepts and cases, Vikas Publishing House Pvt. Ltd. Delhi • Bryman, Alan & Bell, Emma (2011). Business Research Methods (Third Edition), Oxford University Press.			
	Other References	• Kerlinger, F.N., & Lee, H.B. (2000). Foundations of Behavioural Research (Fourth Edition), Harcourt Inc. • Rubin, Allen & Babbie, Earl (2009). Essential Research Methods for Social Work, Cengage Learning Inc., USA.			

TERM -VI

Batch : 2023-27		School:SSET	
1	Course Code	EEE334	
2	Course Title	Switchgear and Protection	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	The objective of the course is to expose students to the techniques of protecting the various subsystems of a power system during their normal operation and also under fault condition. The students will also be acquainted with the techniques to coordinate these protecting devices and systems	
6	Course Outcomes	On successful completion of this course students will be able to CO1:Understand the basic terminologies related to power system protection and analyse power system faults for balanced and unbalancedconditions. CO2: compare the protection techniques used for protection of differentpower system components CO3: Identify, apply, and calculate settings for transformers, generatorsand transmission line protection schemes. CO4: Discuss the theory of circuit interruption and physical phenomena of arcCO5: Identify the challenges and solutions to industrial power system protection problems. CO6 An ability to develop protection schemes/algorithms for allcomponents of power system.	
7	Course Description	Reliability of electrical energy systems to a large extent is a consequence of the reliability of its protection system. Basic building blocks of the protection system are fuses, over current and distance relays and differential protection schemes. In this course, we will introduce theirprinciples and applications to apparatus and system protection.	
8	Outline syllabus		
	Unit 1	**Introduction to Power System Protection**	
	A	Nature and causes of faults on power system elements need of protection.	CO1,CO6
	B	Zones of protection, essential qualities of protection, primary and backup protection	CO1,CO6
	C	CTs and VTs and their applications in protection.	CO1,CO6
	Unit 2	**Operating Principles and Construction of Relays**	
	A	Principle of various Electromagnetic relays and their constructions.	CO2,CO6
	B	over-current, directional, differential and distance relays and their operating characteristics	CO2,CO6
	C	Introduction to digital/numerical relays and Intelligent Electronic Device (IED) relays	CO2,CO6

	Unit 3	**Protection of Power Apparatus**	
	A	Faults on transformers and its protection: protection against external faults, protection against internal faults, protection against magnetic inrush, concept of lightningphenomenon, protection against lightning surges	CO3,CO6
	B	Faults on Generator and its protection: Stator protection, protection against inter-turn faults, stator-overheating, Rotor protection, field ground-faultprotection, bloss of excitation protection, overvoltage protection, over speed protection.	CO3,CO6
	C	Faults on transmission lines and its protection: wire pilot protection, carrier current protection	CO3,CO6
	Unit 4	**Theory of Circuit Interruption**	
	A	Physics of arc phenomena and arc interruption.	CO4,CO6
	B	Restriking voltage & recovery voltage, rate of rise of recovery voltage.	CO4,CO6
	C	Resistance switching, current chopping, interruption of capacitive current.	CO4,CO6
	Unit 5	**Circuit Breakers**	
	A	Types of circuit breakers,	CO5,CO6
	B	principle of operation and construction of air-break, air blast, oil, SF6 and vacuum circuit breakers, their merits and demerits, MCB and MCCB.	CO5,CO6
	C	Concept of HVDC circuit breaker.	CO5,CO6

	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		25%	25%	50%
	Text book/s*	1. Badri Ram, D.N. Vishwakarma, „Power System Protection & Switchgear“, Tata McGraw –hill publishing company ltd, New Delhi. ISBN:9780071077743, 007107774X 2. C.L Wadhwa, “Electrical Power Systems“, New Age International (p) limited. ISBN:9788122417739, 8122417736		
	Other References	Bhavesh Bhalja, R.P. Maheswari and Nilesh G. Chothani,“Protection and Switchgear”, Oxford. ISBN:9780199470679, 0199470677		

School: SSET		**Batch: 2023-27**	
Programme: B.Tech			
Branch: EEE		**Semester: VI:**	
1	Course Code	EEP334	
2	Course Title	Switchgear and Protection Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	The objective of the course is to expose students to the techniques of protecting the various subsystems of a power system during their normal operation and also under fault condition. The students will also be acquainted with the techniques to coordinate these protecting devices and systems	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Understand the basic terminologies related to power system protection and analyse power system faults for balanced and unbalanced conditions. CO2: compare the protection techniques used for protection of different power system components CO3: Identify, apply, and calculate settings for transformers, generators and transmission line protection schemes. CO4: discuss the theory of circuit interruption and physical phenomena of arc CO5: Identify the challenges and solutions to industrial power system protection problems. CO6 : understand techniques to coordinate the protecting devices and systems	
7	Course Description	Reliability of electrical energy systems to a large extent is a consequence of the reliability of its protection system. Basic building blocks of the protection system are fuses, over current and distance relays and differential protection schemes. In this course, we will introduce their principles and applications to apparatus and system protection.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on Power System Protection**	
		To analyse the single-phase fault on a power system network using MATLAB/PSCAD	CO1
		To analyse the Line-Line fault on a power system network using MATLAB/PSCAD	CO1
		To analyse the three-phase fault on a power system network using MATLAB/PSCAD	CO1

	Unit 1I	**Practical based on Relays**			
		To determine the operating characteristics of over-current relay.			CO2, CO6
		To determine the operating characteristics of over-voltage relay.			CO2, CO6
	Unit III	**Practical based on Power Apparatus**			
		To determine the operating characteristics of inverse definite mean time relay.			CO3, CO6
		To determine the operating characteristics of bimetallic Thermal relay.			CO3, CO6
	UniT IV	**Practical based on Circuit Interruption**			
		To obtain the characteristics of a circuit breaker during circuit interruption in a power system using MATLAB/PSCAD			CO4, CO6
	UNIT V	**Practical based on Circuit Breakers**			
		To study the working and application of ac circuit breaker and dc circuit breaker			CO5, CO6
	Mode of examination	Practical			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	-			
	Other References	-			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE		**Semester: 6th**	
1	Course Code	**EEP344** Course Name: Project Based Learning -4	
2	Course Title	Project Based Learning -4	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory	
5	Course Objective	1. To align student's skill and interests with a realistic problem or project. 2.To understand the significance of problem and its scope. 3.Students will make decisions within a framework.	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Identify and formulate problem statement. CO2: Design relational circuit. CO3: Develop the solution by Hardware or software. CO4: Classify and understand various test techniques for verification and validation of project. CO5: Analyze and make use of modern for solving real word problems. CO6: Develop teamwork and need to engage in life-long learning, along with the ability to communicate effectively with others.	
7	Course Description	In PBL-4, the students will learn how to define the problem for developing projects, and Design applicable solutions in one or more application domains using engineering approaches that integrate ethical, social, legal and economic concerns.	
8	Outline syllabus		CO Mapping
	Unit 1	Problem Definition and identification, Team/Group formation and Project Assignment. Finalizing the problem statement, resource requirement, if any.	CO1,CO4
	Unit 2	Requirement of hardware/software. Develop the flowchart for the proposed system	CO2,CO6
	Unit 3	Design; implement project work in in hardware or software.	CO3
	Unit 4	Use of various test tools and techniques for software verification and validation of project	CO4,CO5

	Unit 5	Demonstrate and execute Project with the team.		CO6
		Report should include Abstract, Hardware / Software Requirement, Problem Statement, Design/Algorithm, ER diagrams, Use Case Diagrams, State Diagrams, Sequence Diagrams, Communication Diagrams, and Activity Diagrams, Implementation Detail. Validation Reports. References, Test cases if any. The presentation, report, work done during the term supported by the documentation, forms the basis of assessment.		
	Mode of examination	Practical /Viva		
	Weightage Distribution	CA	CE(VIVA)	ETE
		25%	25%	50%

School: SSET		**Batch : 2023-2027**	
Programme:		**B.Tech**	
Branch: EEE		**Semester: VI**	
1	Course Code	**ARP 306**	
2	Course Title	**Campus to Corporate**	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Active	
5	Course Objective	To enhance holistic development of students and improve their employability skills. Provide a 360 degree exposure to learning elements of Business English readiness program, behavioural traits, achieve softer communication levels and a positive self-branding along with augmenting numerical and altitudinal abilities. To up skill and upgrade students' across varied industry needs to enhance employability skills. By the end of this semester, a will have entered the threshold of his/her 4thphase of employability enhancement and skill building activity exercise.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Develop a creative resumes, cover letters, interpret job descriptions and interpret KRA and KPI statements and art of conflict management. CO2: Build negotiation skills to get maximum benefits from deals in practical life scenarios. CO3: Develop skills of personal branding to create a brand image and self-branding CO4: Acquire higher level competency in use of logical and analytical reasoning such as direction sense,strong and weak arguments CO5: Develop higher level strategic thinking and diverse mathematical concepts through building analogies, odd one out CO6: Demonstrate higher level quantitative aptitude such as average, ratio & proportions, mixtures & allegation for making business decisions.	
7	Course Description	This penultimate stage introduces the student to the basics of Human Resources. Allows the student to understand and interpret KRA | KPI and understand Job descriptions. A student also understands how to manage conflicts, brand himself/herself, understand relations and empathise others with level-4 of quant, aptitude and logical reasoning	
8	Outline syllabus – ARP 306		
	Unit 1	**Ace the Interview**	**CO MAPPING**
	A	HR Sensitization (Role Clarity | KRA | KPI | Understanding JD) | Conflict Management	CO1

	B	Negotiation Skills | Personal Branding	CO3, CO4
	C	Uploading & Curating Resumes in Job Portals, getting Your Resumes Noticed | Writing Cover Letters | Relationship Management | Verbal Abilities-4	CO1, CO3
	Unit 2	**Introduction to APTITUDE TRAINING- Reasoning- Logical/ Analytical**	
	A	Sitting Arrangement & Venn Diagrams | Puzzles | Distribution | Selection	CO4
	B	Direction Sense | Statement & Conclusion | Strong & Weak Arguments	CO4
	C	Analogies,Odd One out | Cause & Effect	CO5
	Unit 3	**Quantitative Aptitude**	
	A	Average , Ratio & Proportions,Mixtures & Allegation	CO6
	B	Geometry-Lines,Angles& Triangles	CO6
	C	Problem of Ages | Data Sufficiency - L2	CO6
	Weightage Distribution	(CA)Class Assignment/Free Speech Exercises / JAM – 75% | (ETE) Group Presentations/Mock Interviews/GD/ Reasoning, Quant & Aptitude – 25%	
	Text book/s*	**Wiley's Quantitative Aptitude-P Anand | Quantum CAT – Arihant Publications | Quicker Maths- M. Tyra | Power of Positive Action (English, Paperback, Napoleon Hill) | Streets of Attitude (English, Paperback, Cary Fagan, Elizabeth Wilson) The 6 Pillars of self-esteem and awareness – Nathaniel Brandon | Goal Setting (English, Paperback, Wilson Dobson**	

TERM -VII

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE		**Semester: VII**	
1	Course Code	HMM305	
2	Course Title	Management for Engineers	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	The objective of this course is to expose the students to understand the basics of Management Foundations. The students will be given a detailed grounding for the theories and cases related to the general management. The aim of the course is to orient the students in theories and practices of Management so as to apply the acquired knowledge in actual business practices. This is a gateway to the real world of management and decision-making.	
6	Course Outcomes	After completion of this course, students will be able to: CO1: Define basic principles and concepts related to management in an organization including the functions, different theories of management androles they play in an organization. CO2: Explain the primary function Planning with its process. Also, how forecasting is done in organizations with various techniques are used. CO3: Use of organizing by studying different types of organization and also usingdecentralization and span of control in organizations. CO4: Analyse jobs, recruitment process, manpower planning, job rotation, trainingsand rewards in various organizations. CO5: Measure motivation and management control concepts to obtain effectivecontrolling in management system in organizations. CO6: Develop proper system in an organization by using all the functions ofmanagement.	
7	Course Description	This course gives an overview of engineering management and help to understand the various functions of management used in an organization. The focus of the course is the development of individual skills and team work.	
8	Outline syllabus		
	Unit 1	Introduction of Management & Organisation	
	A	Management-Definition of Management & Organisation	CO1,CO6
	B	Concept, Nature, Scope and Functions of Management, Levelsof Management, Management Theories - Taylors principle, Fayol‟s Principles, Hawthorne Studies, Systems Approach and Contingency Approach to Management.	CO1,CO6

	C	Mintzberg"s Managerial Roles, Skills of Manager, Functions ofmanagement	CO1,CO6
	Unit 2	Management Planning Process	
	A	Planning objectives and characteristics.	CO2,CO6
	B	Hierarchies of planning.	CO2,CO6
	C	The concept and techniques of forecasting.	CO2,CO6
	Unit 3	Organizing	
	A	Meaning, Importance and Principles	CO3,CO6
	B	Departmentalization, Span of Control	CO3,CO6
	C	Types of Organization, Authority, Delegation of Authority	CO3,CO6
	Unit 4	Staffing	
	A	Meaning, Job analysis	CO4,CO6
	B	Manpower planning, Recruitment, Transfers and Promotions	CO4,CO6
	C	Appraisals, Management Development, Job Rotation, Training,Rewards and Recognition,	CO4,CO6
	Unit 5	Directing & Controlling	
	A	Motivation, Co-ordination, Communication,	CO5,CO6
	B	Directing and Management Control, Decision Making,	CO5,CO6
	C	Management by objectives (MBO) the concept and relevance.Objectives and Process of Management Control	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	1. Principles & practice of Mgmt., L.M. Prasad	
	Other References	1. Management Today, Burton & Thakur 2. Principles & Practices of Mgmt., C.B. Gupta 3. Understanding Management, Richard L.Daft 4. Management, Stoner, Freemand & Gilbert 5. Essential of Management, Koontz O' Donnel	

School:SSET	Batch: 2023-2027
Programme: B.Tech	
Branch: EEE	Semester: VII

1	Course Code	**EEP430**	Course Name: Major Project -1	
2	Course Title	Major Project -1		
3	Credits	3		
4	Contact Hours (L-T-P)	0-0-0		
	Course Status	Compulsory		
5	Course Objective	Project being the student"s last activity at the institution, it fulfills a purpose of synthesis ofall the knowledge they have acquired throughout the different years. In addition, this knowledge must be used in a particular way, in order to solve a specific problem, which lets student demonstrate their aptitude by applying this knowledge.		
6	Course Outcomes	After completion of this course, students will be able to: CO1: Identify problem statement in engineering and technology in selected field of interest.CO2: Analyze the gathered information required to develop a project. CO3: Participate in different teams and to focus on getting a working project done on timewith each student being held accountable for their part of the project. CO4: Prepare the designs requirements, functional and conceptual design CO5: Initiate the actual implementation of the project work to produce the deliverables CO6: Communicate project work effectively with at large in written and oral forms,preferably research paper/patent/technical competitions, as a part of the project work.		
7	Course Description	The object of Major Project-I is to enable the student to take up investigative study in thebroad field of Electronics & Communication Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on anindividual basis or two/three students in a group, under the guidance of a Supervisor.		
8	Outline syllabus			CO Mapping
	Unit 1	Problem identification, Literature survey/Gather & analyze information from multiple sources		CO1, CO2,CO4,
	Unit 2	Formulate solution/ Problem Description: Project Planning, Time and Cost Estimation and budgeting, Risk Management, Project scheduling and Planning Tools: Work Breakdown structure/ LRC/ Ganttcharts/CPM/PERT Networks. Creating System Requirement Specifications (Functional & Non Functional)		CO1, CO2, CO3
	Unit 3	Preparing Design: Circuit Diagrams, Use of appropriate tools and techniques for project design		CO3, CO4
	Unit 4	Identify and Implement Project Modules.		CO4, CO5

	Unit 5	Use of appropriate tools/technologies for coding the modules			CO2, CO5, CO6
		Report on final problem statement, specifications, project schedule, final concept design and project schedule Report and Presentation - Project Modules development. Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.			
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	

TERM -VIII

School: SSET		**Batch: 2023-2027**			
Programme: B.Tech					
Branch: EEE		**Semester: VIII**			
1	Course Code	**EEP432** Course Name: Major Project -2			
2	Course Title	Major Project -2			
3	Credits	8			
4	Contact Hours (L-T-P)	0-0-16			
	Course Status	Compulsory			
5	Course Objective	1. To understand the concept of project design after the completion of project planning 2. Students making decisions within a framework 3. Continuous evaluation of the project 4. A final product to be evaluated for quality			
6	Course Outcomes	Students will be able to: CO1: Demonstrate the implementation of the project. CO2: Identify the test procedure for each implemented module. CO3: Deploy and evaluate the modules to verify the required need of the project. CO4: Use different tools for testing and report writing. CO5: Develop the attitude and ethics of a professional engineer. CO6:Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.			
7	Course Description	The objective of Major Project-II is to enable the student to extend further the development of project till testing and deployment under the guidance of a Supervisor.			
8	Outline syllabus				CO Mapping
	Unit 1	Complete the implementation of the project. Testing of the modules, Use of appropriate tools/techniques for testing			CO1, CO2
	Unit 2	Deploy & demonstrate developed modules of the project			CO2, CO3
	Unit 3	Preparing a Project Report in the standard format for being evaluated by the Supervisor			CO4, CO5
	Unit 4	Submission of Project and Report to Departmental Committee			CO4, CO5, CO6
	Unit 5	Final Presentation before Departmental Committee.Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.			CO6
	Mode of examination	Practical			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	

PROGRAMME ELECTIVES

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	EEE 444	
2	Course Title	HVDC and FACTS	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Department Elective	
5	Course Objective	To provide students with the ability of: 1. Understanding the concept behind planning of HVDC transmission and comparison with AC power transmission. 2. Implementing control strategies for the power flow control in AC-DC Systems. 3. An understanding on the fundamentals of power flow control 4. An understanding on the fundamentals of FACTS controllers	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Explain the objective and functions of different components of HVDC System. CO2: Differentiate between different controls schemes for the control of DC link. CO3: Analyzed the process of commutation failure and also understand the techniques to protect the HVDC system against over-voltage and over-currents. CO4: Summarized the benefits of FACTS devices. CO5: Describe principle of operation and configuration of FACTS devices	
7	Course Description	This subject deals with the importance of HVDC transmission, analysis of HVDC Converters, Harmonics and Filters, Reactive power control and Power factor improvements of the system. It also deals with basic FACTS concepts, static shunt and series compensation and combined compensation techniques	
8			
	Unit 1	**HVDC System Configuration and Components**	
	A	Classification of HVDC links, components of HVDC transmission system.	CO1
	B	Comparison of AC and DC Transmission, application of DC Transmission.	CO1
	C	Graetz Bridge, Choice of converter configuration, characteristics of a twelve pulse converter.	CO1
	Unit 2	**HVDC System Control**	
	A	Basic principle of control, control implementation.	CO2

	B	Starting and stopping of DC link, firing angle control, current and extinction angle control.			CO2
	C	Harmonics and filters			CO2
	Unit 3	**Converter Faults and Protection**			
	A	Types of converter faults, commutation failure.			CO3
	B	DC line fault, AC system fault			CO3
	C	Smoothing reactors, DC Breakers, surge arresters.			CO3
	Unit 4	**Introduction to FACTS**			
	A	Introduction to power flow control, loading capability.			CO4
	B	Steady state and dynamic limits of power transmission.			CO4
	C	Applications of FACTS and its benefits.			CO4
	Unit 5	**Types of FACTS Controllers**			
	A	Shunt controllers: Principle of operation, configuration and control of SVC and STATCOM			CO5
	B	series controllers : Principle of operation, configuration and control of SSSC and TCSC			CO5
	C	Hybrid controllers: Principle of operation, configuration and control of UPFC and IPFC			CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Padiyar K.R., HVDC Transmission Systems, 1st Ed., Wiley Eastern Ltd., 2. .G. Hingorani and L. Gyugi, "Understanding FACTS: concepts and technology of Flexible AC Transmission systems", Wiley IEEE Press,.			
	Other References	1. Prabbha Kundur, "Power system stability and control", Tata McGraw-Hilll Publishing Company Limited,. 2. Y. H. Song and A. T. Johns, "Flexible AC Transmission Systems", IEEE Power Series, IET.			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	MPS129	
2	Course Title	Distributed Generation Technology	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status		
5	Course Objective	To introduce the concept of distributed generation, microgrids, electric vehicles and energy storage. To familiarize the students with renewable generation system modelling, and their grid integration issues. To impart an understanding of economics, policies and technical regulations for DG integration	
6	Course Outcomes	On successful completion of this course students will be able to CO1 : Analyse the concept and importance of distributed generation. CO2: Understand different renewable energy sources, micro-grid and storage Devices. CO3: Evaluate the technical impact of DG in power system CO4: Analyze the operation and control strategies for grid connected and off-grid System. CO5: Evaluate the effect of DG placement in the existing system CO 6: Industrial experiences in renewable energy integration	
7	Course Description	This syllabus gives an overview of distributed energy resources, photovoltaic systems, small hydro, fuel cells, energy storage technologies; wind turbines, Principles of control of distributed generation systems; Electric power distribution systems, installation, interconnection and integration; Economic and financial aspects of distributed generation, the regulatory environment and standards.	
8	**Outline syllabus**		CO mapping
	Unit 1	**Introduction to Distributed Generation**	
	A	Concept of DG and, its definition, Current scenario in distributedgeneration	CO1,CO6
	B	Need for distributed generation	CO1,CO6
	C	Advantage and limitation of DG	CO1,CO6
	Unit 2	**Renewable based Distributed generation**	
	A	Wind power plant	CO2,CO6
	B	Solar power plant	CO2,CO6
	C	Small hydro other alternate DG	CO2,CO6
	Unit 3	**Technical impacts of DG**	
	A	Transmission systems, Distribution systems	CO3,CO6

Unit 4	**Operation and Economic aspects of DGs**		
A	De-regulation of power system		CO4,CO6
B	Voltage control techniques, Reactive power control, Harmonics,Power quality issues, Reliability of DG based systems		CO4,CO6
C	Economic impacts: Market facts, issues and challenges		CO4,CO6
Unit 5	**Grid integration of DGs**		
A	Optimal placement of DG sources in distribution systems		CO5,CO6
B	Different types of interfaces , Inverter based DGs and rotatingmachine based interfaces , Aggregation of multiple DG units		CO5,CO6
C	Energy storage elements, Batteries, ultra capacitors, flywheels		CO5,CO6
Mode of examination	Theory		
Weightage Distribution	CA	MTE	ETE
	25%	25%	50%
Text book/s*	1. Renewable Energy- Power for a sustainable future, third edition, Edited by Godfrey Boyle, Oxford University Press, 2013.		
Other References	2. Microgridsand Active Distribution Networks, S. Chowdhury, S.P. Chowdhuryand P. Crossley, The Institutionof Engineeringand Technology, London, U.K, 2009		

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	MIA113	
2	Course Title	Intelligent Actuators and Mechatronics	
3	Credits	3	
4	Contact Hours L-T-P)	3-0-0	
	Course Status		
5	Course Objective	• Discussing of basic components of actuators and mechatronics • Discussing of electronics and digital circuits concepts of the subject • Explaining concept of intelligent and smart system • Discussing of interfacing concepts of mechatronics systems • Giving case studies and exploring knowledge on designing	
6	Course Outcomes	On successful completion of this course students will be able to CO 1: Getting knowledge on basic components of actuators and mechatronics CO 2: Exploring knowledge and getting design concepts of circuits CO 3: Identifying concepts smart and intelligent on mechatronics systemsCO 4: Able to design of interfacing circuits for the subject CO 5: Able to design of tailor-made systems CO 6: Industrial experiences in mechatronics systems	
7	Course Description	The field of mechatronics has broadened the scope of the traditional field of electro mechanics. The subject is made to know modern trends on mechatronics system, hybrid of different engineering's, standalone mechatronics systems.	
8	Outline syllabus		CO mapping
	Unit 1	**Introduction**	
	A	Definitions: Mechatronics & actuator; Overview of sensors, current & voltage sources; Grounding	CO1,CO6
	B	Solenoids, relays, electrical motors for actuators	CO1,CO6
	C	Basics of open loop and closed loop systems, block diagram ofmechatronics system ; Scope of the course	CO1,CO6
	Unit 2	**Overview of Analog and Digital Electronics**	
	A	Active electronic devices form electronics, basics of operationamplifiers and instrumentation amplifiers	CO2,CO6
	B	Display systems, measurement systems, testing and calibration	CO2,CO6
	C	Combination logic and logic classes; Flip-flops and their applications; Microcontroller concepts	CO2,CO6
	Unit 3	**Smart and Intelligent Actuators**	
	A	Definitions: Smart and intelligent actuators; Architecture andoperation of smart actuator	CO3,CO6
	B	Intelligent actuator without feedback sensor in detail	CO3,CO6
	C	Intelligent actuator with feedback sensor in detail	CO3,CO6

	Unit 4	**Mechanical-Electronic Interfacing**			
	A	Concept of three-state (tri-state) outputs; Interfacing ofpushbutton, keyboard and sensors			CO4,CO6
	B	Interfacing of relays, solenoids, DC, AC motors and special motors to microcontrollers			CO4,CO6
	C	Selecting of motor for actuators			CO4,CO6
	Unit 5	**Case studies & Design Exercise**			
	A	Case study 1: Mechatronic design of a coin counter; Case study			CO5,CO6
	B	Case study 2: Mechatronics for conveyor-based material handling system			CO5,CO6
	C	Design exercise on mechatronic system			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. David G, Alciatore et al., "Introduction to Mechatronics and Measurement Systems", Tata McGraw Hill, 2003			
	Other References	2. W.Bolton,"Mechatronics ", Pearson Education, 2005 GodfreyC.Onwubolu,"Mechatronics",Elsevier,2005			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch:EEE			
1	Course Code	MPS132	
2	Course Title	**Operation and Control of smart grid**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status		
5	Course Objective	The objective of the subject on smart grid technologies is to integrate and optimize distributed energy resources to achieve a more efficient and reliable grid, enable active participation of consumers with more environmental constraints	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Identify different tools and approaches to modelling a Smart Grid. CO2: Apply Optimal Power Flow (OPF) solutions to evaluate the performance of a power system with renewable energy sources. CO3: Analyze power system dynamics (frequency stability) to achieve active power balance. CO4: To familiarize the students with modeling of smart grids components. CO5:Identify control-room technologies for system-wide remote monitoring, protection, and risk management of smart grid cyber security CO6: Able to design, implementation, evaluation and management of smart electricity infrastructure.	
7	Course Description	Smart grid communications and control, covering several special topics in the field of smart grid including advanced metering infrastructures, demand response, distributed storage, vehicle-to-grid systems, wide area measurement, smart grid cyber security, etc	
8	Outline syllabus		
	Unit 1	**Modeling of Smart Grids**	
	A	Operating principles and models of smart gird components,;.	CO1,CO6
	B	Key technologies for generation, networks, loads and their control capabilities decision-making tools	CO1,CO6
	C	Hardware, Software, Communication. Approaches to estimation, scheduling, management and control of next generation smart grid	CO1,CO6
	Unit 2	**Smart Grid Communications**	
	A	Two-way Digital Communications Paradigm, Network Architectures	CO2,CO6
	B	IP-based Systems, Power Line Communications	CO2,CO6
	C	Advanced Metering Infrastructure,	CO2,CO6
	Unit 3	**Security and Privacy**	
	A	Cyber Security Challenges in Smart Grid, Load Altering Attacks	CO3,CO6

	B	False Data Injection Attacks, Defense Mechanisms	CO3,CO6
	C	Privacy Challenges Data handling functions; Bit functions	CO3,CO6
	Unit 4	**IoT for power systems**	
	A	Internet of things for electricity infrastructure and energy management.	CO4,CO6
	B	SCADA, Demand response, AMI, IoT aided smart grid,	CO4,CO6
	C	Big data for power system and introduction to data analytics.	CO4,CO6
	Unit 5	**Flexible AC transmission system (FACTS)**	
	A	Congestion management and loadability enhancement, reactive power compensation,.	CO5,CO6
	B	concept of series compensation, shunt compensation, FACTS: working principle	CO5,CO6
	C	Classification, series controllers, shunt controllers, series-series controllers, series-parallel controllers	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	1. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley & sons inc, 2015. 2. James Momoh, "Smart Grid: Fundamentals of design and analysis", John Wiley& sons Inc, IEEEpress 2012	
	Other References	1. Fereidoon P. Sioshansi, "Smart Grid: Integrating Renewable, Distributed& Efficient Energy", Academic Press, 2012. 2. ClarkW.Gellings,"Thesmartgrid:Enablingenergyefficiency and demand response", Fairmont Press Inc, 2009. 3. H.K.Verma,SCADA,e-monographatww.profhkverma.info,.	

School: SSET		**Batch : 2023-27**	
Programme: **B. Tech**.			
Branch: EEE			
1	Course Code	MPS133	
2	Course Title	**Operation and Control of smart grid Lab**	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status		
5	Course Objective	Learn modern numerical techniques and analytical methods for dealing with and solving operation and protection related problems in electric power systems	
6	Course Outcomes	After the completion of course student will be able to CO1: Explore the concept of automatic generation control. CO2: Apply the modes of excitation systems and exercises voltagecontrol. CO3: Employ incremental cost curve and penalty factor for economic operation. CO4: Plan unit commitment for optimal operation. CO5: Evaluate power system security and methods of improvement. CO6: Compare the protection techniques used for protection of differentpower system components	
7	Course Description	This course aims to convince the student that constancy of frequency andvoltage are the primary health indicator of the power system for maintaining the real and reactive power balance in systems. The conceptsof economic load dispatch and unit commitment are also given in thecourse. The concept of close coordination between thermal and hydro power plant to meet the load demand has been included in the course.	
8			
	Unit 1	**Practical related to economic load dispatch and Unit Commitment**	
	A	To perform economic load dispatch without considering losses using MATLAB	CO1,CO6
	B	To perform economic load dispatch with considering losses using MATLAB	CO1,CO6
	C	To solve unit commitment method using priority list scheme in MATLAB	CO1,CO6
	Unit 2	**Practical related to load frequency control and voltage**	
		control	
	A	To design load frequency control model in MATLAB	CO2,CO6
	B	To connect shunt capacitor in most optimal location andto study improvement in voltage profile using MATLAB/PSCAD.	CO2,CO6

	C	To connect series capacitor in most optimal location and to study improvement in power transfer capability using MATLAB/PSCAD	CO2,CO6
	Unit 3	**Practical related to power system security and excitation control**	
	A	To design DC/AC excitation control model in PSCAD.	CO3,CO6
	B	To design static excitation control model in PSCAD.	CO3,CO6
	C	To evaluate security index of a system using contingency analysis in MATLAB	CO3,CO6
	Unit 4	**Practical related to fault analysis**	
	A	To simulate single line to ground in PSCAD and to measure voltage and current at different locations	CO4,CO6
	B	To simulate line to line in PSCAD and to measure voltage and current at different locations	CO4,CO6
	C	To simulate double line to ground in PSCAD and to measure voltage and current at different locations	CO4,CO6
	Unit 5	**Practical related to relay**	
	A	Principle of various Electromagnetic relays and their constructions.	CO5,CO6
	B	Over-current, directional, differential and distance relays and their operating characteristics	CO5,CO6
	C	Modern relays: introduction to static and digital/numerical (microprocessor based) relays and Intelligent Electronic Device(IED) relays	CO5,CO6
	Mode of examination	Practical/Viva	
	Weightage Distribution	CA: 25% / CE(VIVA): 25% / ETE: 50%	
	Text book/s*	Allen. J. Wood and Bruce F. Wollenberg, "Power Generation, Operation and Control",John Wiley & Sons,Inc., 2003.	
	Other References	1. P.Kundur, "Power System Stability and Control"MC Craw Hill Publisher, USA, 1994. 2. Olle.I.Elgerd, "Electric Energy Systems Theory An Introduction" Tata McGraw Hill Publishing Company Ltd. New Delhi, Second Edition 2003	

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	**EEE448**	
2	Course Title	**PLC and SCADA**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status		
5	Course Objective	To provide students with: 1.The conceptual as well as practical knowledge of the Industrial Automation & latest technologies being used to achieve Industrial Automation.	
6	Course Outcomes	After the completion of course student will be able to CO1: understand the concepts of computer based Industrial Control, including PLC, DCS and SCADA. CO2: understand hardware of PLC and ladder programming for PLC. CO3: use various PLC functions and develop PLC programs for industrial control and automation applications. CO4: understand the purpose, layout, components and functions of SCADA systems and use the knowledge for the operation of SCADA systems in Industry CO5.design SCADA system including layout, communication system and software. CO 6: Industrial experiences in PLC and SCADA.	
7	Course Description	This course is aimed at equipping students with appropriate knowledge and skills required in configuring, programming and operating Industrial automation systems with the use of Industrial Field Instruments, PLC and SCADA systems.	
8	Outline syllabus		CO Mapping
	Unit 1	**Computer Based Industrial Control**	CO1,CO6
	A	Microprocessor/microcontroller based industrial controller: concept and configuration	
	B	Computer based industrial controller: concept and configuration	
	C	Introduction to direct digital control (DDC), distributed control system (DCS) and supervisory control and data acquisition(SCADA)	
	Unit 2	**PLC Basics**	CO2,CO6
	A	Introduction to PLC, PLC versus microprocessor/microcontroller/computer; Advantages and disadvantages of PLC	
	B	Hardware, internal architecture and physical forms of PLC; Digital inputs/ outputs; Analog inputs/ outputs	

	C	PLC programming: ladder programming, function blocks, Instruction lists, Sequential function chart, mnemonic programming	
	Unit 3	**PLC Functions**	CO3,CO6
	A	Registers: holding, input and output registers; Timers and timer functions; Counters and counter functions	
	B	Data handling functions; Bit functions;	
	C	Advanced functions; PLC programming using various functions	
	Unit 4	**SCADA Basics, Layout and Functions**	CO4,CO6
	A	Introduction; Definition and purpose; Controlled / uncontrolled variables and remotely / locally controlled objects in controlled plant	
	B	Layout and parts of SCADA system; Detailed block schematic of SCADA system	
	C	Functions of SCADA system: data acquisition and transmission, monitoring, control, data collection and storage, data processing and calculation, report generation	
	Unit 5	**SCADA Design**	CO5,CO6
	A	Master Terminal Unit (MTU): functions, single processor and multiprocessor MTU, single and dual computer configurations of MTU; Remote Terminal Unit (RTU): functions, architecture / layout; RTU programming	
	B	MTU-RTU communication and RTU-field device communication	
	C	Design of SCADA system: HARDWARE, Communication and Software.	
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	1. J.W. Webb and R.A. Reis, Programmable Logic Controllers, Prentice-Hall India 2. . Stuart A. Boyer, SupervisoryControland Data Acquisition (SCADA),4th Edition, International Society of Automation, 2010.	
	Other References	. J.R. Hackworth and F.D. Hackworth, Programmable Logic Controllers, Pearson Edition 2. W. Boston, Programmable Logic Controllers, Newnes,(Elsevier). 3. H.K. Verma, SCADA, e-monograph at www.profhkverma.info	

School:SSET		**Batch : 2023-27**			
Programme: B.Tech					
Branch: EEE					
1	Course Code	MIA151			
2	Course Title	PLC and SCADA Lab			
3	Credits	2			
4	Contact Hours(L-T-P)	0-0-4			
	Course Status	Elective			
5	Course Objective	To equip students with the working knowledge about the PLC based processcontrol and SCADA functions.			
6	Course Outcomes	After the completion of course student will be able to CO1: To study and perform basic experiments on PLC. CO2: To perform process control using PLC. CO3: To perform motor control using PLC. CO4: To implement basic SCADA functions. CO5: To implement advanced SCADA functions CO6: Industrial experiences in PLC and SCADA.			
7	Course Description	The contents of this course covers the implementation of basic and advancedfunctions of PLC and SCADA and their applications in controls.			
8	Outline syllabus				CO Mapping
	Unit 1	PLC based basic experiments			CO1,CO6
	A	To study and use of NO and NC bit To study and use of S (Set) and R (Reset) bit			
	B	To study and use of Timer instruction To study and use of Cumulative timer instruction			
	C	To study and use of Counter instruction To study logic gates in PLC.			
	Unit 2	PLC based process control			CO2,CO6
	A	Water Level Control using PLC			
	B	Conveyor Belt Control Module using PLC			
	C	Traffic control using PLC			
	Unit 3	PLC based Motor Control			CO3,CO6
	A-B	Ac motor speed control module using PLC.			
	C	Dc motor speed control module using PLC			
	Unit 4	Basic SCADA functions			CO4,CO6
	A	Parameter reading of PLC in SCADA.			
	B-C	Alarm annunciation using SCADA.			
	Unit 5	Advanced SCADA functions			CO5,CO6
	A	SCADA communication with PLC			
	B	Trend Monitoring on SCADA			
	C	Reporting on SCADA			
	Mode of examination	Practical & Viva			
	Weightage	CA	CE(VIVA)	ETE	

	Distribution	25%	25%	50%
	Text book/s*	`1. J.W. Webb and R.A. Reis, Programmable Logic Controllers, Prentice-Hall India 2. . Stuart A. Boyer, Supervisory Control and Data Acquisition(SCADA),4thEdition,InternationalSocietyof Automation, 2010.		
	Other References	Refer lab manuals		

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	MIA115	
2	Course Title	Robotics and Industrial Robots	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	1. To understand the construction industrial robotics 2. To explore knowledge on selection of end-effectors of robotics 3. To get knowledge of electrical drive systems of industrial robotics 4. To know types of sensors of industrial robotics 5. To understand of electrical and electronics interfacings	
6	Course Outcomes	After the completion of course student will be able to CO1: Basic construction of robot and robotics components CO2: Understanding interfacing & building techniques of robots CO3: Knowing different types of actuators of robotics CO4: Getting knowledge of robotics sensors and transducers CO5: Developing interfacing circuits for robotics applications CO 6: Industrial experiences in Robotics	
7	Course Description	This course gives coverage of robotics components, architecture, and electronics interfacing circuits knowledge. Students can also practice programming of robotics using embedded C on open source software after going through this subject. Finallystudents are able to do tailor-made projects on robotics engineering	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Robotics and Motion Analysis**	CO1,CO6
	A	Historical background; Laws of robotics and robot definitions;	
	B	Robotics systems and robot anatomy: Basic diagram, basic components and their uses; Specifications of robots.	
	C	Position representation Forward and reverse transformation: 2&3 DOF	
	Unit 2	**Robot End-Effectors, Robot Drives and Actuators**	CO2,CO6
	A	Classification of end-effectors; Mechanical grippers, Magnetic grippers and vaccum grippers; Gripper force analysis	.
	B	Functions of drive systems; Electrical drives: DC, BLDC motors, AC motors, stepper motor, piezoelectric actuators;	
	C	Drive Mechanisms: rack and pinion, ball screws, gear trains and harmonic drive.	
	Unit 3	**Sensors of Robotic System**	CO3,CO6
	A	Uses of sensors in robotics; Shaft Encoders(linear and rotational)	
	B	Proximity Sensors (inductive and capacitive); Tactile sensors;	
	C	Basic block diagram of vision systems of robotic system.	
	Unit 4	**Controlling Technologies of Industrial Robots**	CO4,CO6

	A	Basics of PC interfacings			
	B	Microcontroller interfacings			
	C	Robot languages and classification; Robot software.			
	Unit 5	**Industrial Robot Applications**			CO5,CO6
	A	Material handling robots			
	B	Welding Robots			
	C	Assembling robots			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1.S.R. Deb and S. Deb, "Robotics Technology and Flexible Automation", Second edition, McGraw Hill, 2011.			
	Other References	2. Mikell P Groover et al., "Industrial Robotics", fifth print, McGrawHill, Special Indian Edition, 2013			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	MPS121	
2	Course Title	Smart Power Grid and Micro-Grid	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status		
5	Course Objective	1. To understand the concepts of smart power grid and micro grid 2. To acquire in depth knowledge of smart distribution, distribution automation, smart transmission and substation automation 3. To identify various components of smart grid and micro grid 4. To apply principles of automation to transmission and distribution 5. To design smart micro grid for a given application	
6	Course Outcomes	After the completion of course student will be able to CO1: To understand concept, motivation and benefits of Smart Power Grid CO2: To develop knowledge of demand-side management as a tool of smart distribution CO3: to design advanced metering infrastructure for Distribution Automation CO4: To design AC, DC and hybrid micro grids CO5: To design phasor measurement and develop wide area monitoringsystem using PMU CO6: Industrial experiences in renewable energy integration in distributionsystem	
7	Course Description	The course deals with the concept of smart power grid and includes inv depth study of its its various components, namely smart distribution, distribution automation and management, advanced metering infrastructure , smart micro grid, smart transmission and substation automation.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to Smart Power Grid (4 hours)**	CO1,CO6
	A	Traditional power grid, Smart power grid (or smart grid) concept and objectives	
	B	Benefits of smart power grid, traditional-grid and smart-grid comparison	
	C	Stake-holders in smart-grid development, Smart grid solutions.	
	Unit 2	**Smart Distribution**	CO2,CO6
	A	Demand-side management: Energy efficiency, time of useand spinning reserve	
	B	Demand response: Market driven DR and operation-drivenDR, incentive-based DR and TOU-based rates DR	

	C	Distributed generation, Energy storage, Use of pluggedelectric and hybrid electric vehicles	
	Unit 3	**Distribution Automation and Management**	CO3,CO6
	A	Overview of distribution system, Components of DA: customer automation, feeder automation and substationautomation, Distribution control centre (DCC)	
	B	Distribution management system (DMS), Outage management system (OMS)- unplanned and planned outages, Asset management system (AMS), Customerinformation system (CIS)	
	C	Meaning and benefits of advanced metering, Structure and components of AMI, AMI integration with DA, DMS and OMS.	
	Unit 4	**Smart Microgrid**	CO4,CO6
	A	Definition, components and benefits of microgrid	
	B	Types of micro grid: AC, DC and hybrid, Modes ofoperation: grid-connected and island modes	
	C	Meaning of smart micro grid, Micro grid operation andcontrol	
	Unit 5	**Smart Transmission and Substation Automation**	CO5,CO6
	A	Meaning and challenges of smart transmission	
	B	Phasor measurement unit: concept, layout, components andapplications, Wide area monitoring system: concept and impact on EMS and DMS	
	C	Need of substation automation (SA), Technical issues ofSA, SA architecture, SA function.	

	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		25%	25%	50%
	Text book/s*	1. Mini S. Thomas and John D. McDonald, PowerSystem SCADA and Smart Grids, CRC Press,2015.		
	Other References	1. Janak Eknayake at el., Smart Grid: Technology and Applications, John Wiley and Sons, 2012 H. K. Verma , e-Monograph on " Smart – Grid", www.profhkverma.info		

School:		SSET
Programme:		B.Tech
Branch: EEE		
1	Course Code	MIC008
2	Course Title	Virtual Instrumentation
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Elective
5	Course Objective	1. Introduction to the various models of Virtual Instruments, their comparison with traditional instruments and major application areas of VI. 2. Introduction to basics of LabVIEW 3. VI Programming techniques like loops, arrays, clusters, plotting and Strings and files. 4. Basics of signal conditioning techniques along with DAQ hardware and software and various signal processing techniques available in LABVIEW. 5. Advanced concepts in LabVIEW with main concepts of real time applications in Image acquisition and Motion control. 6. Building of Virtual Instruments with various types of controls and indicators. 7. Configuring DAQ card and acquisition of real time signals from sources and sensors. 8. Simulate a signal in LabVIEW and generate a virtual source using DAQ cards.
6	Course Outcomes	After the completion of course student will be able to CO1: Understand various models and areas of application of Virtual Instrumentation. CO2: Understand various components of LabVIEW required for the development of VI. CO3: Understand and apply various programming functions of LabVIEWlike loops, arrays, clusters and file I/Os for building of simple Virtual instruments. CO4: Understand the concepts of Data acquisition hardware and software and to apply basic signal processing techniques available inLabVIEW. CO5: Understand the real time applications of LabVIEW in motion control and Image acquisition. CO6: Able to build VI for simulated and real time applications.
7	Course Description	The course content of this subject includes an introduction to graphical

		system design. This course also focuses on introduction to LabVIEWwhich extensively elaborate the Graphical programming language .InUnit 3, building of VI by using loops, arrays, clusters etc. have beendealt with. Use of strings and I/O are also elaborated in this course.Data acquisition and various signal processing techniques are alsocovered in this course. Two real time applications motion control andImage acquisition by using LabVIEW have been elaborated in this course.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	CO1,CO6
	A	Graphical system design model - design model, prototypemodel, deployment model	
	B	Building blocks of VI; Virtual instrument versus traditional instrument, Hardware and software in VI	
	C	Graphical system Design using LabVIEW; Graphicalprogramming and Textual programming	
	Unit 2	**Graphical system Design using LabVIEW**	CO2,CO6
	A	Advantages of LabVIEW; Components of VI Software - Frontpanel windows, Block diagram windows, Icon /connector pane	
	B	Creating and saving a VI; Toolbars, Palettes, Front panel controls and indicators, Block diagram – terminals, nodes,functions	
	C	Sub VIs, Express VIs and VIs, wires; Data types, Data flowprogram	
	Unit 3	**Programming Techniques**	CO3,CO6
	A	Modular Programming in Lab View; Building VI front paneland block diagram	
	B	Loops – for and while loops, Local and Global variables inLabVIEW, Arrays in LabVIEW,	
	C	Clusters in LabVIEW; Conversion between arrays and clusters, Plotting data in LabVIEW, Strings and File I/O inLabVIEW	
	Unit 4	**Data Acquisition and Signal Processing in LabVIEW**	CO4,CO6
	A	Transducers and Signal conditioning ,sampling and aliasing	
	B	Basics of DAQ hardware and software, DAQ modules anddrivers for building virtual instruments	
	C	Fourier transforms; Power spectrum, Correlation methods;Windowing & filtering	
	Unit 5	**Advanced concepts in LabVIEW**	CO5,CO6
	A	Data Socket, TCP/IP VI's synchronization	
	B	Serial interface buses - RS 232, RS485,USB	
	C	Concepts of real time systems; Image acquisition; Motioncontrol	
	Mode of examination	Theory	

	Weightage Distribution	CA	MTE	ETE
		25%	25%	50%
	Text book/s*	1. Jovitha Jerome, "Virtual Instrumentation andLABVIEW", PHI Learning		
	Other References	1. C.L. Clark, "LabVIEW Digital Signal Processing", TMH Publishing Company. 2. Technical Manuals for DAQ Modules, Advantechand National Instruments 3. www.profhkverma.info: Chapter 2: Technologies/Protocols for Wired Sensor Network 4. NI USER MANUAL http://www.ni.com/pdf/manuals/376445b.pdf 5. www.ni.com		

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	EEE 455	
2	Course Title	**Wireless Sensor Networks: Architecture and protocols**	
3	Credits	2	
4	Contact Hours (L-T-P)	2-0-0	
	Course Status	Elective/Open Elective	
5	Course Objective	To provide students : 1. basic concepts of communication and networking. 2. knowledge in wireless sensor networks and to apply this knowledge in various applications like environmental monitoring, biomedical and greenhouse monitoring. 3. knowledge related to the hardware and software requirements of WS nodes and various wireless communication protocols.	
6	Course Outcomes	After the completion of course student will be able to CO1: Generalize the concepts of communication and networking. CO2: Interpret and compare the types of wireless sensor networks. CO3: understand the software and hardware requirements of Wireless sensor node. CO4: understand principles of wireless sensor networks and differentiate among various wireless network protocols. CO5: Differentiate among various wired network protocols. CO6: On a profound level to implement hardware & software for wireless sensor networks in day to day life	
7	Course Description	The course content of this subject includes an introduction to the basics of communication and networking. It also introduces wireless sensor networks and the types of same. This course focuses on the architecture of the wireless sensor node along with wireless communication protocols. Applications related to environmental monitoring, biomedical field as well as greenhouse monitoring are also dealt in it.	
8	Outline syllabus		CO Mapping
	Unit 1	**Basics of Communication and Networking**	CO1,CO6
	A	Introduction to data communication;	
	B	data network concept and topologies	
	C	LAN, PAN and WAN	
	Unit 2	**Wireless Sensor Network**	CO2, CO6
	A	Introduction to WSN,	
	B	Need and advantages of WSN	
	C	Sensor and actuator network (SAN) - homogeneous and heterogeneous SAN	

	Unit 3	**WS Node Architecture**			
	A	Functions of WS Node			
	B	Hardware components of WS Node			
	C	Software components of WS Node			
	Unit 4	**Sensor Networking Protocols**			**CO4,** CO6
	A	Zigbee (IEEE – 802.15.4) protocol,			
	B	Highlights of Wi-Fi and Bluetooth			
	C	Comparison of protocols			
	Unit 5	**Wired Network Protocols**			**CO5,CO6**
	A	RS485			
	B	Modbus			
	C	Foundation field bus			
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. William Stallings, "Data and Computer Communications", Pearson Education, 8th Edition, Pearson- Prentice Hall, 2007. 2. E.H. Callaway, "Wireless Sensor Networks : Architecture and Protocols"			
	Other References	1. H.K. Verma, e-monograph on "WSN", at www.profhkverma.info, Chapter 1 – Wireless Sensor Network, Chapter 2 – Wireless Sensor Node, Chapter 3 – Applications of Wireless Sensor Networks.			

School: SSET		**Batch : 2023-27**	
Programme: B. Tech.			
Branch: EEE			
1	Course Code	MIP153	
2	Course Title	Virtual Instrumentation Lab	
3	Credits	2	
4	Contact Hours (L-T-P)	0-0-4	
	Course Status	Compulsory/Elective	
5	Course Objective	• To develop VI supporting various types of data. • To generate and acquire real time signals using DAQ cards and LabVIEW. • To develop VI using LabVIEW and DAQ cards.	
6	Course Outcomes	After the completion of course student will be able to CO1:To select appropriate controls, indicators and functions from the various pallets of LabVIEW. CO2: To implement arithmetic and Boolean systems using LabVIEW. CO3: To create VI using arrays. CO4: To build VI using cluster operations of LabVIEW. CO5: To acquire and generate signals using DAQ cards. CO6: Build VI for simulated and real time applications using LabVIEW and DAQ cards.	
7	Course Description	The main focus of this course is to give hands on training to the students on the LabVIEW software. It aims at the acquisition and generation of the real time signals. Design and development of real time VI using the DAQ cards and LabVIEW are covered in it.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical related to --**	**CO1,CO2**
		1. To study various types of numeric controls and indicators and numeric programming functions available in function palate. 2. Create the front panel and block diagram of VI to show the trigonometric values of sine and cosine of a given angle in degrees. 3. To study various types of Boolean controls and Indicators. Also study various Boolean programming functions available in function palate. 4. Create a VI to compute the Boolean expression (A*B) +(C*D*E).	

		5. Create a front panel and block diagram to implement half ladder and full adder. 6. To create front Panel of CRO, Meters and Function Generator	
	Unit 2	**Practical related to---**	**CO3,CO4**
		7. Create a VI to create 2D numeric arrays & add them. 8. Create a VI consisting of two clusters of LEDs Perform the AND operation between the clusters and display the output in another clusters of LEDs. 9. Create a VI using cluster to display information of student, name, age, status, marks. Use Bundle and Unbundle Functions.	
	Unit 3	**Practical related to---**	**CO5**
		10. Create a VI to acquire an analog signal from a source using USB6008. Also extract the information related to the various voltage parameters and frequency of this signal. 11. Acquire an analog signal of LM35 temperature sensor on a DAQ signal accessory. Plot its Characteristics using graph function in LabVIEW.	
	Unit 4	**Practical related to---**	**CO6**
		12. Create a VI to produce voltage output from 0 to 10 volts in steps of 0.5 volts. View the same on the CRO using an appropriate DAQ card. 13. Design controller for the automation of temperature and humidity in LabVIEW. 14. Design a Virtual Resistance Meter. 15. Design a virtual sinusoidal voltage source. 16. Design a Virtual CRO. 17. Design a multifunction voltage meter.	
	Mode of examination	Practical/Viva	
	Weightage Distribution	CA: 25% / CE(VIVA): 25% / ETE: 50%	
	Text book/s*	1. Jovitha Jerome, "Virtual Instrumentation and LABVIEW", PHI Learning	
	Other	1. C.L. Clark, "LabVIEW Digital Signal	

	References	Processing", TMH Publishing Company 2. Technical Manuals for DAQ Modules, Advantech and National Instruments. 3. NI USER MANUAL http://www.ni.com/pdf/manuals/376445b.pdf 4. www.ni.com	

School: SSET
Batch : 2023-27
Programme:
B.Tech
Branch:EEE
Semester: VII

1	Course Code	ECE941	
2	Course Title	**Fiber Optic Communication**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory /Elective/Open Elective	
5	Course Objective	1. To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures 2. To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes 3. To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration 4. To learn the fiber optical network components and operational principles WDM &self-phase modulation.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Understand the principles fiber-optic communication, the components and the bandwidth advantages. CO2: Illustrate the properties of the optical fibers and optical components CO3:Evaluate the concepts of lasers, LEDs, and detectors CO4: Analyze system performance of optical communication systems CO5: Design optical networks and understand non-linear effects in optical fibers CO6: Able to explain elements of an optical fiber transmission link, and applications of optical fiber communication	
7	Course Description	The optical fiber characteristics are studied and different types of optical fibers are introduced. Signal distortion on optical fibers is investigated subsequently. Theoretical aspects of optical sources like LEDs and Lasers are introduced. Semiconductor based optical detectors are studied and analysis of optical links is presented. Advanced topics DWDM systems, solution based communication are introduced.	
8	Outline syllabus		CO Mapping
	Unit 1	**Overview of optical fiber communication**	
	A	Introduction to vector nature of light, propagation of light, propagation oflight in a cylindrical dielectric rod, Raymodel, wave model	CO1,CO6

	B	Different types of optical fibers, Modal analysis of a step index fiber.	CO1,CO6
	C	Signal degradation on optical fiber due to dispersion and attenuation.Fabrication of fibers and measurement techniques like OTDR	CO1,CO6
	Unit 2	**Optical sources**	
	A	LEDs and Laser, Structures, Efficiency and Characteristics	CO2,CO6
	B	Semiconductor injection Laser, External Quantum Efficiency.	CO2,CO6
	C	Laser diode rate equations, resonant frequencies.	CO2,CO6
	Unit 3	**Optical Detectors/Link Design**	
	A	Photo-detectors - pin-diodes, APDs,	CO3,CO6
	B	detector responsively, noise, optical receivers.	CO3,CO6
	C	Optical link design - BER calculation, quantum limit,power penalties.	CO3,CO6
	Unit 4	**Optical switches and Amplifiers**	
	A	coupled mode analysis of directional couplers	CO4,CO6
	B	electro-optic switches.	CO4,CO6
	C	EDFA, Raman amplifier.	CO4,CO6
	Unit 5	**Optical Networks**	
	A	WDM and DWDM systems. Principles of WDM networks.	CO5,CO6
	B	Nonlinear effects in fiber optic links. Concept of self-phasemodulation,	CO5,CO6
	C	group velocity dispersion and solition basedcommunication.	CO5,CO6
	Mode of examination	Theory	
	Weightage Distribution	CA: 25% / MTE: 25% / ETE: 50%	
	Text book/s*	1. Gerd. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 -ISBN: 9780073380711	
	Other References	1. John M. Senior, "Optical Fiber Communications",PEARSON, 3rd Edition, 2010- ISBN: 9780136382485 2. Joseph C. Plais, "Fiber Optic Communication",Pearson Education, 6th Ed, 2010- ISBN: 9780131989276 3. T. Tamir, Integrated optics, (Topics in AppliedPhysics Vol.7), Springer-Verlag, 1975	

School: SSET
Batch : 2023-27
Programme: B.Tech
Branch: EEE

1	Course Code	ECE946	
2	Course Title	Biomedical Instrumentation	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Program Elective	
5	Course Objective	1.Getting knowledge electronics engineering applications in Biomedical 2.Getting knowledge of interdisciplinary 3.Exploring ideas on biomedical electronics and instrumentation	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1:Knowledge of biomedical of sensors and engineering analogies in human anatomy CO2: Knowledge of different techniques of instruments for recording diagnostic systems CO3: Knowledge of different techniques of instruments for patient monitoring systems CO4: Knowledge of different techniques of instruments for imaging systems CO5: Knowledge of different techniques of instruments for therapeutic systems CO6:Identify, explain and judge patient safety issues related to biomedical instrumentation.	
7	Course Description	The Biomedical Instrumentation subject gives knowledge about electronics equipments which are used in medical field. It is also give details about how touse these equipments to diagnose the problems of human body. It is a theoretical subject and very interesting also. Since wehave lot of developmentin technologies, there are lots of developments inmedical field also. So, this subject leads you to become an entrepreneur in the field of biomedical equipments marketing or service or distribution.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to BMI and its sensors**	
	A	Brief description of human body; Engineering in human body	CO1,CO6
	B	Silver-silver chloride electrode; microelectrodes; Jellies andCreams	CO1,CO6
	C	Sensors and electrodes of BMI	CO1,CO6
	Unit 2	**Biomedical Recorder Systems**	

	A	Electrocardiograph; Vectorcardiograph;			CO2,CO6
	B	Electroencephalograph; Electromyograph;			CO2,CO6
	C	Spirometry			CO2,CO6
	Unit 3	**Patient Monitoring Systems**			
	A	Cardiac Monitor; Heart rate and pulse monitor;			CO3,CO6
	B	BP & Temperature Monitor			CO3,CO6
	C	Respiration rate, blood flow measurement			CO3,CO6
	Unit 4	**Medical Imaging, Patient Care and Monitoring**			
	A	Diagnostic X-rays and CAT			CO4,CO6
	B	MRI			CO4,CO6
	C	Medical			CO4,CO6
	Unit 5	**Biomedical Therapetic Equipment**			
	A	Pace makers; Defibrillators			CO5,CO6
	B	Ultrasonic therapy unit;			CO5,CO6
	C	Pain relief system			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Khandpur R. S., "Handbook on Biomedical Instrumentation", 2nd Ed., Tata McGraw-Hill, 2015- ISBN: 9781119068013			
	Other References	1. Cromwell L., Weibell F. J. and Pfeifer E. A., "Biomedical Instrumentation and Measurements", Prentice Hall of India, 2003 2. Geddes L. A. and Baker L. E., "Principles of Applied Biomedical Instrumentation", John Wiley & Sons,1989-ISBN:9780471608998			

School: SSET			
Programme: B.Tech			
Branch:EEE			
1	Course Code	EEE344	
2	Course Title	Advanced Electric Vehicles	
3	Credits	4	
4	Contact Hours (L-T-P)	4-0-0	
	Course Status	Department Elective	
5	Course Objective	1.Understand the concept, configuration and efficiency of Electric drives 2. Understand the battery management system and its applications. 3. Understand charging stations and its components 4. Understand Modelling of Hybrid Electric Vehicle Range	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Knowledge on concept, configuration and efficiency of Electric drives train CO2: Learning of battery management system and its applications in HEVs CO3:Knowledge on charging stations, types and components of Electric vehicles CO4: Knowledge on Modelling of Hybrid Electric Vehicle Range with its case study CO5: Describe challenges and business applications for HEVs CO6: Interpret working of different configurations of electric drive train and charging station	
7	Course Description	EV and HEV are vital to overall automotive industries. HEV is applicable to regular vehicles and other vehicles like locomotives. HEVs are having lot of applications in different fields. This subject gives knowledge about understanding and applying of concepts on HEVs. It is also gives knowledge on power electronics circuits of HEVs. Finally, students can get knowledge on energy storage and trouble shooting of HEVs.	
8	Outline syllabus		CO Mapping
	Unit 1	**Electric Drives Trains**	
	A	Basic concept of electric traction, introduction to various electric drivetrain topologies, power flow control in electric drive-train topologies, fuelefficiency analysis.	CO1,CO6
	B	Configuration and control of DC Motordrives, Induction Motor drives, Permanent Magnet Motor drives, Switch Reluctance Motor drives	CO1, CO6
	C	Drive system efficiency.	CO1, CO6
	Unit 2	**Battery Management Systems**	
	A	Fundamentals of battery management systems and controls	CO2

	B	Battery Recycling Technologies, Technology, and economic aspects of battery recycling			CO2
	C	Battery Applications for Stationary and Secondary Use			CO2
	Unit 3	**Electric Vehicles Charging Stations**			
	A	Introduction to various charging techniques and schematic of charging stations.			CO3, CO6
	B	Type of charging station, selection, sizing of charging station			CO3, CO6
	C	Component of charging station			CO3, CO6
	Unit 4	**Modelling of Hybrid Electric Vehicle Range**			
	A	Driving Cycles, Types of Driving Cycles, Range modelling for Battery Electric Vehicle			CO4
	B	Hybrid (ICE & others), Fuel Cell EV, Solar Powered Vehicles			CO4
	C	Case study of 2-wheeler, 3-wheeler, and 4-wheeler vehicles.			CO4
	Unit 5	**Business and Policy**			
	A	E-mobility business, electrification challenges, Business- E-mobility business, electrification challenges, Connected Mobility			CO5
	B	Autonomous Mobility- case study E-mobility Indian Roadmap Perspective.			CO5
	C	EVs in infrastructure system, integration of EVs in smart grid, social dimensions of EVs.			CO5
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, CRC Press, 2nd Edition, 2003			
	Other References	1.James Larminie, John Lowry, “Electric Vehicle Technology”, Wiley publications, 1st Edition, 2003 2.B D McNicol, D A J Rand, “Power Sources for Electric Vehicles”, Elsevier publications, 1st Edition, 1998 3.SethLeitman, “Build Your Own Electric Vehicle” MC Graw Hill, 1st Edition, 2013.			

School: SSET		**Batch : 2023-2027**	
Programme: B.Tech			
Branch:		**Semester: I/II**	
1	Course Code	EEE144	
2	Course Title	Energy Resources and Technology	
3	Credits	2	
4	Contact Hours (L-T-P)	2-0-0	
	Course Status	Compulsory	
5	Course Objective	To provide the students with an introductory concept in the field of Energy Resources and Technology to facilitate better understanding of the different sources of energy, their potentials and assessment.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Able to understand the renewable energy sources available at present. CO2: Able to understand the solar energy operation and its characteristics. CO3: To educate the wind energy operation and its types. CO4: To educate the tidal and geothermal energy principles and its operation. CO5: Able to understand the biomass energy generation and its technologies. CO6: Able to understand and identify different sources of energy and their assessment	
7	Course Description	This initial course introduces the concepts and fundamentals of energy sources and technology. Topics include solar energy, wind energy, biomass energy.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction (4 lectures)**	
	A	Energy reserves and estimates, Indian and global energy scenarios, environmental, social and economic impacts of renewable energy use.	CO1,CO6
	B	Environmental and social impacts of renewable energy use.	CO1,CO6
	C	Economic impacts of renewable energy use.	CO1,CO6
	Unit 2	**Solar Energy (8 lectures)**	
	A	**Solar Thermal System**: Solar radiation spectrum; radiation measurement.	CO2,CO6
	B	Applications: heating, cooling, drying, distillation; solar thermal power generation.	CO2,CO6

	Unit 3	**Wind Energy (4 lectures)**			
	A	Sources and potentials			CO3,CO6
	B	Wind resource assessment and modeling			CO3,CO6
	C	types of wind turbines and generators, types of wind mills.			CO3,CO6
	Unit 4	**Hydro Energy (5 lectures)**			
	A	Schematic arrangement of hydro electric power station, ,.			CO4,CO6
	B	site selection			CO4,CO6
	C	large and small hydro schemes, hydro turbines and generators			CO4,CO6
	Unit 5	**Biomass Energy (5 lectures)**			
	A	Biomass as a source of energy, ,			CO5,CO6
	B	types of biogas plants			CO5,CO6
	C	biomass power generation.			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1 B.H. Khan “Non Conventional Energy Resources ”, Tata McGraw-Hill Publishing Co. Limited.			
	Other References	1. D.P. Kothari, K.C. Singhal and Rakesh Ranjan “Renewable Energy Sources and Emerging Technologies”, PHI Publication. 2. Godfrey Boyle,“Renewable Energy: Power for a Sustainable Future”, Oxford University Press.			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch:EEE			
1	Course Code	EEE242	
2	Course Title	Energy storage for Renewables	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Department Elective	
5	Course Objective	1.Understand the importance of Energy storage for Renewables 2.Understand Electromagnetic energy storage and applications 3.Understand mechanical Energy Storage for Renewables 4.Understand Fuel cell strategies	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1. Identify the importance of Energy storage & the modes energy can be stored, corresponding to energy density and power density. CO2. Understand the concept of Electromechanical Energy Storage systems. CO3. Study the basics of Electromagnetic energy storage systems such as Superconducting Magnetic Energy storage. CO4. Impart the knowledge of Fuel cell and its basic components of fuel cell CO5.Study the types of Fuel cell and its applications. CO6. Comparison of basic societal, techno-economic and geopolitical aspects of different energy storage techniques.	
7	Course Description	The importance of production and storage of energy in a society with increasing use of renewable energy sources is described in this course. The analyse basic operating principles for modern energy production and energy storage technologies are presented in the course. The advantages and disadvantages of different energy storage mechanisms (thermal, mechanical, electromagnetic, chemical, electrochemical energy, etc.) are explained. Comparison of basic societal, techno-economic and geopolitical aspects of different energy storage techniques are explained.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Energy Storage: Need of energy storage; Different modes of energy storage, Flywheel storage,	CO1,CO6
	B	Electrical and magnetic energy storage: Capacitors, electromagnets; Chemical Energy storage:	CO1,CO6
	C	Thermo-chemical, photo-chemical, bio-chemical, electro-chemical, fossil fuels and synthetic fuels. Hydrogen for energystorage.	CO1,CO6

	Unit 2	Electrochemical Energy Storage Systems:			
	A	Batteries: Primary, Secondary, Lithium, Solid- state and molten solvent batteries;			CO2,CO6
	B	Lead acid batteries; Nickel Cadmium Batteries;			CO2,CO6
	C	Advanced Batteries. Role of carbon nano-tubes in electrodes.			CO2,CO6
	Unit 3	Magnetic and Electric Energy Storage Systems:			
	A	Superconducting Magnet Energy Storage (SMES) systems; Capacitor and battery: Comparison and application;,			CO3,CO6
	B	Super capacitor: Electrochemical Double Layer Capacitor (EDLC)			CO3,CO6
	C	principle of working, structure, performance and application.			CO3,CO6
	Unit 4	Fuel Cell:			
	A	Fuel cell definition, difference between batteries and fuel cells, fuel cell components, principle and working of fuel cell,			CO4,CO6
	B	performance characteristics, efficiency, fuel cell stack, fuel cell			CO4,CO6
	C	power plant: fuel processor, fuel cell power section, power conditioner, Advantages and disadvantages.			CO4,CO6
	Unit 5	Types of Fuel Cells:			
	A	Alkaline fuel cell, polymer electrolyte fuel cell, phosphoric acid fuel cell, molten carbonate fuel cell;			CO5,CO6
	B	solid oxide fuel cell, proton exchange membrane fuel cell,			CO5,CO6
	C	problems with fuel cells, applications of fuelcells.			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. J. Jensen and B. Squrensen, Fundamentals of Energy Storage, John Wiley, NY,1984. 2. M. Barak, Electrochemical Power Sources: Primary and Secondary Batteriesby, P. Peregrinus,IEE,1980.			
	Other References	1. P.D.Dunn, Renewable Energies, Peter Peregrinus Ltd, London,1986. 2. B.Viswanathan and M. A. Scibioh, Fuel Cells-Principles and Applications, University Press, 2006. 3. Hart, A.B and G.J.Womack, Fuel Cells: Theory and Application, Prentice Hall, NewYork, 1989. 6. Hydrogen and Fuel Cells: A comprehensive guide, Rebecca Busby, Pennwell corporation (2005) 4. Hydrogen and Fuel Cells: Emerging Technologies and Applications, B.Sorensen, Academic Press (2012).			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch:EEE			
1	Course Code	EEP242	
2	Course Title	Energy storage for Renewables Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Practical	
5	Course Objective	1.Understand the importance of Energy storage for Renewables 2.Understand charging and discharging behaviour of a capacitor 3.Understand Performance estimation of a fuel cell. 4.Understand PV system strategies	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1. To have a knowledge of solar power generation from PV panels. To get an exposure to different cell technologies. CO2. An exposure to advanced cell technology and usage of different materials CO3. Knowledge of manufacturing processes of various types of solar cell is imparted. CO4. Evaluate the performance of fuel cells under different operating conditions CO5. Select appropriate fuel cell technology for a given application CO6. Comparison of basic societal, techno-economic and geopolitical aspects of different energy storage techniques	
7	Course Description	The importance of production and storage of energy in a society with increasing use of renewable energy sources is described in this course. The analyse basic operating principles for modern energy production and energy storage technologies are presented in the course. The advantages and disadvantages of different energy storage mechanisms (thermal, mechanical, electromagnetic, chemical, electrochemical energy, etc.) are explained. Comparison of basic societal, techno-economic and geopolitical aspects of different energy storage techniques are explained.	
8	Outline syllabus		CO Mapping
	1	Study of charge and discharge characteristics of storage battery.	CO1,CO5
	2	Study of charging and discharging behaviour of a capacitor.	CO1,CO6
	3	Determination of efficiency of DC-AC inverter and DC-DC converters	CO1,CO6
	4	Study of charging characteristics of a Ni-Cd battery using solar photovoltaic panel.	CO1,CO6

	5	Performance estimation of a fuel cell.			
	6	Study of effect of temperature on the performance of fuel cell			CO2,CO6
	7	Study of the I-V and P-V Characteristics of Series and Parallel Combination of PV Modules			CO3,CO6
	8	Working out Power Flow Calculations of Standalone PV System of DC and AC Load with Battery.			
	9	Grid Synchronization of Solar PV Inverter and it Performance Analysis			CO4,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE(VIVA)	ETE	
		25%	25%	50%	
	Text book/s*	1. J. Jensen and B. Squrensen, Fundamentals of Energy Storage, John Wiley, NY,1984. 2. M. Barak, Electrochemical Power Sources: Primary and Secondary Batteriesby, P. Peregrinus,IEE,1980.			
	Other References	1. P.D.Dunn, Renewable Energies, Peter Peregrinus Ltd, London,1986. 2. B.Viswanathan and M. A. Scibioh, Fuel Cells-Principles and Applications, University Press, 2006. 3. Hart, A.B and G.J.Womack, Fuel Cells: Theory and Application, Prentice Hall, NewYork, 1989. 6. Hydrogen and Fuel Cells: A comprehensive guide, Rebecca Busby, Pennwell corporation (2005) 4. Hydrogen and Fuel Cells: Emerging Technologies and Applications, B.Sorensen, Academic Press (2012).			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch:			
1	Course Code	EEE243	
2	Course Title	**Solar Energy Technologies and System Design**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Department Elective	
5	Course Objective	To know about necessary of renewable energy sources To know the importance of solar PV systems To know the design of solar PV cells To know the design solar PV electrical systems To know applications of solar PV electrical systems	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Able to explain steps for manufacturing technologies of solar PVs. CO2: Able to identify and can do planning for available resource. CO3: Able to design of solar cells. CO4: Able to do design of electrical system for solar PVs. CO5: Able to explain installations of solar PV systems. CO6: Having awareness of applications of solar PV systems.	
7	Course Description	This subject has been intended to give real time knowledge on PVs. It is also gives an idea about design of PV based systems. Manufacturing technologies of solar PV systems have been discussed. Applications of power electronics in solar PV systems and applications of solar PV systems have added in last two units.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	World Energy Requirement and Need for Sustainable Energy Sources	CO1
	B	Sustainable Sun's Energy : Advantages, Conversion Challenges and Alternatives	CO1
	C	Wafer Si Solar Cell Technologies; Thin Film Amorphous Si, Cadmium Telluride and Copper Indium Selenide; Thin Film; Other Solar Cell Techs	CO1
	Unit 2	**Design of Solar Cells**	
	A	Cell parameters; Losses in Solar Cells.	CO2
	B	Design for Isc and Voc	CO2
	C	Design for FF and Analytical Techniques	CO2

	Unit 3	**Solar Cell Technologies**			
	A	Solar PV Industry and Si Requirement; Steps I Producing Si Wafers; Production of MGS;			CO3
	B	Production of EGS, Si Wafers and Si Sheets			CO3
	C	Emerging Solar Cell Techs: Organic Solar Cells; Dye-Sensitized Solar Cell; GaAs and TPV; Single Junction Efficiency Limit,			CO3
	Unit 4	**Solar Systems Installation**			
	A	Sun-Earth Movement;			CO4
	B	Angle of Sunrays and Tracking			CO4
	C	Design of Structure of PV Modules; PV Module Power Output			CO4
	Unit 5	**Electrical Conversion Systems**			
	A	DC to DC Converters; Charge Controllers; DC to AC Convertors; MPPT			CO5, CO6
	B	Stand alone PV Systems; Hybrid PV Systems; Grid-Connected PV Systems			CO5, CO6
	C	Payback Period and Lifecycle Costing			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Chetan Singh Solanki, SOLAR PHOTOVOLTAICS: Fundamentals, Technologies and Applications, PHI Learning Pvt Ltd.			
	Other References	Heinrich Haberlin, PHOTOVOLTAICS: System Design and Practice, J Wiley.			

School:SSET		**Batch : 2023-27**	
Programme:B.Tech			
		Semester:7	
1	Course Code	EEE443	
2	Course Title	Sensor Integration Lab	
3	Credits	3	
4	Contact Hours (L-T-P)	0-1-4	
	Course Status	Compulsory/Elective	
5	Course Objective	After the completion of the course the students should be able to 1. Select appropriate sensors and actuators for any process to be automated. 2. Integrate various sensors and actuators with subsystems 3. Use various software for analysis 4. To document the complete process of developed automation system	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: To design and develop remote monitoring and control strategy for PV systems. CO2: To design and develop remote monitoring and control strategy for Electric Vehicles CO3: To design and develop remote monitoring and control strategy for automation of structural health CO4: To use sensor integration technology for providing a sustainable solution in agriculture sector. CO5: To use IoT in automation of Industrial applications CO6: To design and develop remote monitoring for Human health.	
7	Course Description	This course gives idea about identification of sensors and actuators for the automation of various applications. Integration of sensors and actuators with appropriate systems so as to build a complete automation for the monitoring and control of selected application will be dealt in this course. The application are PV System, EV, Structural Health , Human health, agriculture and industry.	
8	Outline syllabus		CO Mapping
	Unit 1	**Monitoring and Control of PV system**	
	A	Design a monitoring and control strategy for PV System using an appropriate technology	CO1, CO6
	B	Implement the proposed Methodology	CO1, CO6
	C	Analyze the developed strategy	CO1, CO6
	Unit 2	**Monitoring and Control of Electric Vehicle**	
	A	Design a monitoring and control strategy for Electric Vehicle	CO2, CO6
	B	Implement the proposed Methodology	CO2, CO6
	C	Analyze the developed strategy	CO2, CO6

	Unit 3	**Monitoring and Control of Health Monitoring of Electric Machines / Human**		
	A	Design a monitoring and control strategy for Health monitoring of Electric Machines/Human		CO3, CO6
	B	Implement the proposed Methodology		CO3, CO6
	C	Analyze the developed strategy		CO3, CO6
	Unit 4	**Monitoring and Control for Precision Agriculture**		
	A	Design an IoT based monitoring and control strategy for precision agriculture		CO4, CO6
	B	Implement the proposed Methodology		CO4, CO6
	C	Analyze the developed strategy		
	Unit 5	**Industrial IoT Application**		
	A	Design an IoT based monitoring and control strategy for any industry of choice		CO5, CO6
	B	Implement the proposed Methodology		CO5, CO6
	c	Analyze the developed strategy		CO5, CO6
	Mode of examination	Practical & Viva		
	Weightage Distribution	CA	CE(VIVA)	ETE
		25%	25%	50%
	Text book/s*	Refer lab manuals		
	Other References	1. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) [Kindle Edition] by Cuno Pfister 2. Designing the Internet of Things (Nov 2013) by Adrian McEwen & Hakim Cassimally 3. Internet of Things: A Hands-on Approach (1 Jul 2015) by Arshdeep Bahga & Vijay Madisetti 4. Virtual Instruments using LabView by - Jovitha Jerome		
	Software	MATLAB / LABVIEW/ PLC/SCADA/ONLINE IoT sources		

School: SSET		**Batch :** 2023-2027	
Programme:		B. Tech.	
Branch: EEE			
1	Course Code	EEE 452	
2	Course Title	Wind and Solar Energy Systems	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Department Elective	
5	Course Objective	The objective of the courses is to develop in-depth knowledge for the following: To develop an understanding of India and world renewable energy scenario. To design a power electronic equipped stand-alone PV system. To design a standalone wind power system. To integrate a solar PV system and wind energy system from electrical grid.	
6	Course Outcomes	At the end of this course, students will demonstrate the ability to CO1: Apply the fundamentals of physics for wind and solar power generation. CO2: Appreciate the advancements in turbine technologies and topologies. CO3: Integrate the power electronic interfaces for wind and solar generation. CO4: Understand and Identify modern advancements in solar photovoltaics and the battery energy storage. CO5: Understand and solve issues related to the grid-integration of solar and wind energy systems CO6: Design various aspects of wind and solar power generation.	
7	Course Description	The course is designed to familiarize and train the student with the tools and techniques used to assess the solar energy and wind energy and its potential at any location across the globe, so that a student is able analyse a case quantitatively at the end of the term.	
8	Outline syllabus		CO Mapping
	Unit 1	**Physics of Wind Power**	
	A	History of wind power, Indian and Global statistics, Wind physics	CO1
	B	Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions	CO1,CO6
	C	Wind speed and power-cumulative distribution functions	CO1
	Unit 2	**Wind generator topologies**	
	A	Review of modern wind turbine technologies, Fixed and Variable speed wind turbines	CO2
	B	Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent-Magnet Synchronous Generators	CO2

	C	Power electronics converters. Generator-Converter configurations, Converter Control			CO2,CO3
	Unit 3	**The Solar Resource and Energy Storage Systems**			
	A	Introduction, solar radiation spectra, solar geometry			CO1, CO3
	B	Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability			CO1, CO3,CO6
	C	Impact of intermittent generation – Battery energy storage – solar thermal energy storage			CO1, CO3
	Unit 4	**Solar photovoltaic**			
	A	Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell PV module and array			CO4,CO6
	B	Power Electronic Converters for Solar Systems			CO4,CO6
	C	Various MPPT methods			CO4,CO6
	Unit 5	**Network Integration Issues**			
	A	Overview of grid code technical requirements, Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits			CO5
	B	Solar PV and wind farm behaviour during grid disturbances. Power quality issues. Power system interconnection experiences in the world.			CO4,CO2
	C	Hybrid and isolated operations of solar PV and wind systems			CO2,CO2
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	G. M. Masters, "Renewable and Efficient Electric Power Systems**",** John Wiley and Sons, 2004.			
	Other References	1. T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005. 2. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984. 3. H. Siegfried and R. Waddington, "Grid integration of wind energy conversion systems" John Wiley and Sons Ltd., 2006.			

School: SSET		**Batch : 2023-27**	
Programme:		**B.Tech**	
Branch: EEE			
1	Course Code	EEE 225	
2	Course Title	ELECTRICAL AND ELECTRONICS MEASUREMENTS	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Department Elective	
5	Course Objective	1. To discuss about basic instrument and measurement system 2. To identify basic structure of electrical meters 3. To study techniques of RLC measurement 4. To explain different principle of special instruments 5. To get knowledge and discuss on basic industry sensors and transducers	
6	Course Outcomes	After completion of this course students will be able to: CO1: Getting knowledge of basic instrument and measurement systems CO2: Applying knowledge and concept on construction of different electrical meters CO3: Analyzing concepts of RLC measurements CO4: Understanding knowledge of construction of CRO working and other special instruments CO5: identifying principles and applications of different industry sensors CO6: Studying applications of instruments in industry	
7	Course Description	Instrumentation field is very important in industry field. Internal details of different types of analog and digital instruments will be discussed here. How to find the suitable instrument for a particular application can be done by the student after going through this subject. Some of special instruments of industry and workbench instrument details will be discussed. Basics of sensors and their applications are explained	
8	Outline syllabus		CO Mapping
	Unit 1	**Philosophy Of Measurement**	
	A	Methods of Measurement, Measurement System, Classification of instrument system	CO1,CO6
	B	Characteristics of instruments & measurement system	CO1,CO6
	C	Errors in measurement & its analysis, Standards.	CO1,CO6
	Unit 2	**Analog Measurement of Electrical Quantities**	
	A	Electrodynamic ,Thermocouple, Electrostatic & Rectifier type Ammeters & Voltmeters	CO2,CO6
	B	Different types of wattmeters, measurement of power in single phase and three phase	CO2,CO6
	C	Different types of energy meters, measurement of energy in single phase and three phase	CO2,CO6
	Unit 3	**Measurement of parameters and Instrument transformers**	
	A	Measurement resistance (low, medium & high) using bridge and megger	CO3,CO6
	B	Measurement of inductance & capacitance using AC bridges	CO3,CO6
	C	Instrument transformers: CT & PT	CO3,CO6

	Unit 4	**CRO, DSO & Special Instruments**			
	A	CRO, DSO block diagram, working principle, basic measurements, testing of components using CRO;			CO4,CO6
	B	Electronic multimeter, digital multimeter; Digital tachometer; Digital frequency meter			CO4,CO6
	C	Harmonic analyzer; wave analyzer; distortion analyzer			CO4,CO6
	Unit 5	**Sensors and Transducers**			
	A	Sensors and transducers classification; Temperature sensors types and working principle;			CO5,CO6
	B	Pressure sensors types and working principle; Flow sensors types and working principle;			CO5,CO6
	C	Displacement sensors types and working principle; Calibration of sensors			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler& Co. Pvt. Ltd. India Sensors and Transducers by D. Patranabi			
	Other References	W.D.Cooper," Electronic Instrument & Measurement Technique " Prentice Hall International A.K. Sawhney,"Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons , India			

School: SSET		**Batch: 2023-27**	
Programme:		**B.Tech**	
Branch:EEE			
1	Course Code	EEP 225	
2	Course Title	Electrical & Electronics Measurements Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Elective	
5	Course Objective	1. To know calibration and diagnosing problems electrical instruments 2. To measure and read unknown electrical components value using meters and bridges 3. To measure electrical parameters like voltage , frequency using CROs 4. To know characteristics of sensors and transducers 5. To know constructions of analog and digital insturments	
6	Course Outcomes	After completion of this course students will be able to: CO1: Able to change settings of analog meters CO2: Able to identify and measure components value CO3: Able to explore knowledge on handling of analog and digital instruments CO4: Able to select proper sensors to sense a parameter CO5: Able to construction of analog and digital instruments CO6: Finding applications of instruments	
7	Course Description	This course gives idea about how to use different types of meters in measurements. Some experiments give practice of RLC measurement using AC & DC bridges. One section gives practice of measurement using CRO. The last two sections about sensors and case studies	
8	Outline syllabus		CO Mapping
	Unit 1	**Calibration**	
	A	Calibration of voltmeter and ammeter	CO1,CO6
	B	Measurement of RMS, average and form factor using rectifier and meters	CO1,CO6
	C	Calibration of wattmeter and energy meter	CO1,CO6
	Unit 2	**RLC Bridges**	
	A	DC Bridge for R measurement	CO2,CO6
	B	AC Bridge for L measurement	CO2,CO6
	C	AC Bridge for C measurement	CO2,CO6
	Unit 3	**CRO and DSO**	
	A	Identifying of controls and functions switches on CRO & DSO	CO3,CO6
	B	Measurements using CRO	CO3,CO6
	C	Measurements using DSO	CO3,CO6
	Unit 4	**Sensors Characteristics**	
	A	Characteristics of temperature sensor	CO4,CO6
	B	Characteristics of force sensor	CO4,CO6
	C	Characteristics of displacement or flow sensor	CO4,CO6
	Unit 5	**Case study of Instruments**	
	A	Digital Energy Meter	CO5,CO6

	B	Digital Temperature Meter			
	C	Digital Multimeter			CO5,CO6
	Mode of examination	Practical & Viva			
	Weightage Distribution	CA	CE(VIVA)	ETE	
		25%	25%	50%	
	Text book/s*	Refer lab manuals			
	Other References				

School: SSET
Batch : 2023-2027
Programme: B.Tech
Branch: EEE

1	Course Code	ECE358	
2	Course Title	**Computer Architecture**	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	1. The system is designed to provide students with an introductory but comprehensive knowledge on computer architecture. 2. Familiarize students about hardware design including logic design, basic structure and behaviour of the various functional modules of the computer. 3. The emphasis is on studying and analysing fundamental issues in architecture design and their impact on performance.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1:Learn how computers work CO2:Understand basic principles of computer‟s working CO3:Analyse the performance of control unit CO4:Understand the concept of memory organization CO5:Compare different issues affecting modern processors (parallel processing, pipelines etc.) CO6: Able to Explain the functional units of a processor/CPU.	
7	Course Description	The course is designed to familiarize students about fundamental concepts underlying modern computer organization and architecture. The students get to know that how hardware design interact to provide the processing needs of the user. It will cover machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic.	
8	Outline syllabus		CO Mapping
	Unit 1	**Fundamental of computer architecture**	
	A	Basic Structure of Computers, Functional units, software, performance issues	CO1
	B	Machine instructions and programs, Types of instructions, Instruction sets: Instruction formats	CO1
	C	Assembly language, Stacks, Subroutines	CO1
	Unit 2	**Processor organization**	
	A	Processor organization, Information representation, number formats	CO2
	B	Multiplication & division, ALU design	CO2

	C	Floating Point arithmetic, IEEE 754 floating point Formats			CO2
	Unit 3	**Control Unit**			
	A	Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit			CO3,CO6
	B	Microprogrammed Control - Basic concepts, minimizing micro instruction size, multiplier control unit			CO3 ,CO6
	C	Microprogrammed computers - CPU control unit			CO3, CO6
	Unit 4	**Memory organization**			
	A	Memory organization, device characteristics, RAM, ROM, Memory management			CO4
	B	Concept of Cache & associative memories, Virtual memory			CO4
	C	System organization, Input - Output systems, Interrupt, DMA,Standard I/O interfaces			CO4
	Unit 5	**Parallel processing**			
	A	Concept of parallel processing			CO5
	B	Pipelining, Forms of parallel processing			CO5
	C	Interconnect network			CO5
	Mode of examination	Theory/Jury/Practical/Viva			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. V.CarlHammacher, “Computer Organisation”, FifthEdition-ISBN:9780070712928 2. M.M.Mano, “Computer System Architecture”, EditionSixth- ISBN: 9788131700709			
	Other References				

Programme: B. Tech.		**Batch : 2023-27**	
Branch: EEE		Semester: VI	
1	Course Code	EEE335	
2	Course Title	Power System-II	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	To acquaint the students with the tools for performing power flow and fault analysis in power system and modern method for control of power flow through existing lines.	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Exposure to the modeling of individual power system components like transmission lines and generators CO2: Formulate the load flow problems using various methods CO3: Perform the numerical and phase or analysis of fault occurrences in power system and calculate current and voltages in faulted power system. CO4: Perform stability analysis using various methods CO5: Identify and employ the methods to control real and reactive power and frequency and voltage of power system CO6: Analyse of stability, security and control of power system	
7	Course Description	This course will introduce and explain the fundamental concept in the field of electrical power system engineering. The basic concepts of perunit system will be introduced along with their applications in circuitapplications. Basic load flow algorithms will be cover in details alongwith short circuit analysis and the method of symmetrical components.Unbalanced fault analysis and basic power system stability analysis willalso be covered in these lecture series. By the end of the course, the students should be able to gather high quality knowledge of electricalpower system components, its operation strategies, and stability analysis.	
8	Outline syllabus		CO Mapping
	Unit 1	**Review of Basic Concept**	
	A	Representation of synchronous machine and transformer inpower system	CO1
	B	Single line diagram, Impedance and Reactance Diagram	CO1
	C	Per-unit system and its significance, change of base	CO1
	Unit 2	**Power Flow Analysis**	
	A	Formation of bus admittance matrix (YBUS) using inspection method and singular transformation method	CO 2
	B	Bus classifications, Solution of non-linear algebraic equations comparison of the three methods	CO2

	Unit 3	**Fault Analysis**			
	A	Types of faults, Short circuit capacity			CO3
	B	Symmetrical components of unsymmetrical phasor, Sequence impedances, Sequence networks			CO3
	C	Fault analysis of L-G, L-L and L-L-G faults			CO3
	Unit 4	**Power System Stability**			
	A	Basic concepts and definitions, Classification of stability, rotor angle stability and voltage stability, Comparison of steady-state stability, dynamic stability and transient stability			CO4,CO6
	B	Power angle equation, swing equation, Equal area criteria, Solution of swing equation by step by step method			CO4,CO6
	C	Factors influencing transient stability, Techniques for transient stability improvement			CO4,CO6
	Unit 5	**Power System Control and FACTS**			
	A	Concept of load frequency control			CO5,CO6
	B	Methods of voltage control			CO5,CO6
	C	Introduction to FACTS			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Kothari D.P. and Nagrath I.J., „Modern Power System Analysis" Tata McGraw Hill Publishing Company Limited			
	Other References	1. Grainer J.J. and Stevenson W.D., „Power SystemAnalysis"" McGraw Hill. 2. H. Saadat, „Power System Analysis" McGraw Hill.			

School: SSET		**Batch : 2023-27**	
Programme: B.Tech			
Branch: EEE			
1	Course Code	EEE332	
2	Course Title	Power Electronics	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	1. Analysis of modern power semiconductor devices, their strengths, and their switching and protection techniques 2. Ability to analyze various important topologies of power converter circuits for specific types of applications including controlled and uncontrolled rectifiers, DC-DC converters and inverters 3. Ability to understand and analyze the qualities of waveforms at input and output ends of these converters	
6	Course Outcomes	On successful completion of this course students will be able to CO1: Summaries the characteristics and principle of operation of different types of semiconductor switches CO2: Analyses the principles of operation of silicon controlled rectifiers. CO3: Analyze controlled rectifier circuits CO4: Analyze the operation of DC-DC choppers CO5: Analyse the operation of voltage source inverters. CO6: Classification of different type of controller	
7	Course Description	Power electronics is the application of solid-state electronics for the control and conversion of electrical power. During the course it is taught that how in modern system the conversion is performed with semiconductor switching device such as SCR, MOSFET, IGBT, and GTO.	
8	Outline syllabus		CO Mapping
	Unit 1	Power Semiconductor Devices	
	A	Thyristors: Silicon Controlled Rectifiers(SCR"s),BJT, power MOSFET, power IGBT, TRIAC and their characteristics	CO1,CO6
	B	Gate characteristics of SCR, turn on and turn off methods.	CO1,CO6
	C	Series and parallel operation of SCRs, line commutation and forced commutation circuits.	CO1,CO6
	Unit 2	**Phase Controlled Converters**	
	A	Principle of phase control, circuit, waveform and analysis of	CO2,CO6
		single phase half wave and full wave line commutated converters with R, RL, RLE load.	CO2,CO6
	B	Circuit, waveform and analysis of three pulse and six pulse converters with R and RL load.	CO2,CO6
	C	Operation of dual converter.	CO2,CO6

	Unit 3	**Choppers**			
	A	Principle of operation, time ratio control and current limitcontrol strategies			CO3,CO6
	B	Circuit, operation and analysis of Step down and step upchoppers.			CO3, CO6
	C	Types of choppers: A, B, C, D and E choppers.			CO3,CO6
	Unit 4	**Inverters**			
	A	Principle of operation of single phase inverter, basic series inverter bridge inverter.			CO4,CO6
	B	Three phase Inverter: 120^0and180^0mode, circuit, operation and analysis.			CO4,CO6
	C	Voltage control techniques for inverters, VSI& CSI and theircomparison.			CO4, CO6
	Unit 5	**Other Applications of Power Electronics**			
	A	AC voltage controllers with R and RL loads.			CO5,CO6
	B	Cycloconverters			CO5,CO6
	C	UPS,SMPS, Induction heating, HVDC			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Rashid M.D., " Power Electronics", Pearson Education; Fourth edition ,2017 ISBN:9780080467658, 0080467652			
	Other References	1. Bose B.K.,"Power Electronics and AC drives", Prentice Hall,2017. ISBN:9780780310841,0780310845 2. Sen P.C.," Power Electronics", Mc.Graw Hill,2016. 3. Singh M.D., Kanchandani K.B.Power Electronics, McGraw-Hill, 2017. ISBN:9788126511013, 812651101X			