SHARDA UNIVERSITY

Beyond Boundaries

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Programme Structure

Sharda School of Engineering & Technology

Department of Electrical, Electronics and Communication Engineering

B.Tech in Electronics and Communication Engineering

Programme Code: SET0501

Batch: 2023-2027

Sharda School of Engineering & Technology
B.Tech-ECE
Batch: 2023-2027
TERM: I

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[1]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	CSE113	Programming for Problem Solving	3	0	0	3	Basics of Computers	SEC
2	EEE112	Principles of Electrical and Electronics Engineering	3	0	0	3	Physics	CC
3.	CVL103	Environmental Studies	2	0	0	0	Science	SC
4.	MTH141	Calculus, Analysis, and linear Algebra	3	1	0	4	Math's	SC
5.	PHY125	Engineering Physics (Semiconductor Physics)	3	1	0	4	Intermediate Physics	SC
Practical/Viva-Voce								
6.	CSP113	Programming for Problem Solving Lab	0	0	2	1	Computer operations	CC
7.	ECP110	CADD Lab	0	0	3	1.5		SEC
8.	ECP101	Tinkering Lab	0	0	2	1	Physics	SEC C
9.	PHY161	Engineering Physics (Semiconductor Physics) lab	0	0	2	1		SC
10.	ARP101	Communicative English-I	0	0	4	2	English	CC
11.	EEP112	Principles of Electrical and Electronics Engineering Lab	0	0	2	1	Physics	CC
TOTAL CREDITS						21.5		

[1] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology
B.Tech-ECE
Batch: 2023-2027
TERM: II

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[2] 1.CC 2. AECC 3. SEC 4.DSE
			L	T	P			
Theory Subjects								
1.	CSE114	Application based Programming in Python	3	0	0	3	C-Programming	SEC
2.	MTH143	Diff. Equation Special T &Comp variables	3	1	0	4	Math's	SC
3.	HMM111	Human Values and Ethics	2	0	0	2	Moral Values	SC
4.	ECE121	Circuit designing and PCB layout	1	0	0	1		CC
5.	ECE240	Digital System Design	3	0	0	3		CC
Practical/Viva-Voce								
6.	CSP114	Application based Programming in Python lab	0	0	2	1	Concepts of Computers	SEC
7.	ECP120	Fault finding and Circuit testing lab	0	0	3	1.5		SEC
8.	ECP121	Circuit designing and PCB layout lab	0	0	2	1	Basics Physics	PC
9.	ARP102	Communication English -2	0	0	4	2	English	AEC
10.	ECP240	Digital System Design Lab	0	0	2	1		PC
TOTAL CREDITS						**19.5**		
Note: Industrial Internship after completion of 2nd semester and will be evaluated in 3rd Semester.								

[2]CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology

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

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[3]: 1. CC 2. AECC 3. SEC 4. DSE
			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	Math's	SC
3.	ECE237	Analog Circuits –I	3	0	0	3	Electronics	CC
4.	ECE242	Signal and Systems	3	0	0	3	Electrical	CC
5.	ECE098	Sensors and Transducers	3	0	0	3	Electronics	CC
6.	ECE248	EMFT	3	0	0	3		CC
Practical/Viva-Voce								
7.	ARP207	Logical Skills Building and Soft Skills	0	0	4	2		AEC
8.	ECP237	Analog Circuit-I lab	0	0	2	1	Basics Circuits	CC
9.	ECP098	Sensors and Transducers Lab	0	0	2	1	Electronics	CC
10.	ECP251	Project Based Learning (PBL) -1	0	0	4	2	-	SEC
11.	ECP294	Summer Internship-I	-	-	-	2	-	SEC
TOTAL CREDITS						**26**		

[3] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology
B.Tech-ECE
Batch: 2023-2027
TERM: IV

S. No.	Course Code	Course	Teaching Load			Credit	Pre-Requisite/Co Requisite	Type of Course[4]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	ECE238	Network Theory	3	1	0	4	Engineering Math	CC
2.	ECE243	Analog Circuits-II	3	1	0	4	Analog Circuit-I	CC
3.	ECE244	Communication Engineering	3	0	0	3	Basic Electronics	CC
4	PE1	Program Elective-I	3	0	0	3		DSE
5.	BTY223	Introduction to Biology for Engineers	2	0	0	2	Basic Sciences	SC
6.	OE-I	Open Elective-I(NPTEL)	2	0	0	2	-	OE
Practical/Viva-Voce								
7.	ECP290	Project Based Learning (PBL) -2	0	0	4	2	-	SEC
8.	ECP244	Communication Engineering Lab	0	0	2	1	Basic Electronics	CC
9.	ECP238	Network Theory lab	0	0	2	1	Digital Electronics	CC
10.	ARP208	Quantitative Aptitude Behavioral and Interpersonal Skills	0	0	4	2	-	AEC
TOTAL CREDITS						**24**	Interpersonal Skills	
Note: Industrial Internship after completion of 4th semester and will be evaluated in 5th Semester.								

[4] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology

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

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[5]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	ECE356 (PE3)	Control systems	3	0	0	3	Network Theory	DSE
2.	ECE357	Digital Communication	3	0	0	3	Basic Communication	CC
3.	ECE359(PE2)	Microprocessors and Microcontrollerwith Interfacing	2	0	0	2	Digital Electronics	DSE
4.	MRM001	Research Methodology	2	0	0	2	-	SC
5.	OE2	Open Elective – 2	3	0	0	3	-	OE
Practical/Viva-Voce								
6.	ECP356	Control systems Lab	0	0	2	1		
7.	ECP357	Digital Communication Lab	0	0	2	1	Signals Systems	CC
8	ECP359	Microprocessors and Microcontrollerwith Interfacing Lab	0	0	2	1		CC
9.	ECP351	Technical Skill Enhancement Course-I	0	0	2	1	-	CC
10.	ECP392	Project Based Learning (PBL) -3	0	0	4	2	-	SEC

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11.	ARP305	Personality Development and Decision-making Skills	0	0	4	2	-	AEC
12.	ECP395	Industry Connect	-	-	-	2	-	SEC
13.	ECC301	Community Connect	-	-	-	2	-	SEC
TOTAL CREDITS						**25**		

6 CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology
B.Tech-ECE
Batch: 2023-2027
TERM: VI

- No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[6]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	ECE361	Digital Signal Processing	3	0	0	3	Signals & Systems	CCC
2.	ECE931	Antenna and Wave Propagation	3	0	0	3		C
3.	PE4	CMOS Design	3	0	0	3	-	DSE
4	ECE098	Industrial IoT Smart Manufacturing	3	0	0	3		CC
5	PE5	Program Elective -5	2	0	0	2	-	DSE
6	OE3	Open Elective – 3	2	0	0	2	-	OE
Practical/Viva-Voce								
7	ARP306	Campus to Corporate	0	0	4	2		AEC
8	ECP361	Digital Signal Processing Lab	0	0	2	1	Signals & Systems	CC
9.	ECP394	Project Based Learning (PBL) -4	0	0	4	2	-	SEC
10.	ECP365	Technical Skill Enhancement Course-2	0	0	2	1	-	SEC
TOTAL CREDITS						**22**		
Note: Industrial Internship after completion of 6th semester and will be evaluated in 7th Semester.								

[7] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology
B.Tech-ECE
Batch:2023-2027
TERM: VII

S. No.	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[7]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	PE6	Program Elective-6	2	0	0	2	-	DSE
2.	PE7	Program Elective-7	2	0	0	2	-	DSE
3.	HMM305	Management for Engineers	3	0	0	3		CC
4.	OE4	Open Elective – 4	3	0	0	3	-	OE
Practical/Viva-Voce								
6.	ECE491	Major Project- 1	-	-	-	2	-	CC
7.	E-CP481	Industrial Internship	-	-	-	2	-	SEC
TOTAL CREDITS						**14**	-	

[8] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific Courses

Sharda School of Engineering & Technology

B.Tech-ECE
Batch: 2023-2027
TERM: VIII

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits	Pre-Requisite/Co Requisite	Type of Course[8]: 1. CC 2. AECC 3. SEC 4. DSE
				L	T	P			
Practical/Viva-Voce/Jury									
1.		ECE492	Major Project – 2	-	-	-	8	-	SEC
TOTAL CREDITS							**8**	-	

[8] CC: Core Course, AECC: Ability Enhancement Compulsory Courses, SEC: Skill Enhancement Courses, DSE: Discipline Specific

Course Module

SYLLABUS TERM-I

School: SSET
Batch:2023-27
Programme: B.Tech
Current Academic Year: 2023-24
Branch: ECE
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, Storage 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 byvalue, 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 andpointers, 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-referentialstructure, 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 andrandom 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:2023-27
Programme: B.Tech
Current Academic Year: 2023-24
Branch: ECE
Semester:1

1	Course Code	EEE112	
2	Course Title	Principles of Electrical and Electronics Engineering	
3	Credits	3	
4	Contac tHours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objectiv e	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 Outcome s	After completion of Course Students will be able to: CO1: Analyze and solve basic electrical circuits. CO2: Explain the working principle of transformer and identify itsapplications. CO3: Illustrate the working principle of dc and ac motors andidentify the starting methods of single-phase induction motor. CO4: Apply the basics of diode to describe the working of rectifiercircuits such as half and full wave rectifiers. CO5: 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 Descriptio n	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 alsointroduces 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:2023-27 **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **.Semester:1**		
Course Code	MTH 141	
Course Title	CALCULUS, ANALYSIS AND LINEAR ALGEBRA	
Credits	4	
Contact Hours (L-T-P)	3-1-0	
Course Status	Compulsory	
Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. Itaims 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.	
Course Outcomes	The student is 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.	
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.	
Outline Syllabus		**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, minima and saddle points; Method of Lagrange multipliers.	CO1
Unit 2	**Integral Calculus**	
A	Beta and Gamma functions and their properties; Multiple,	CO2

	Integration: Double integrals (Cartesian), change of order of integration in double integrals			
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:2023-2027** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **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 the completion of this course, student will be able to CO1: Explain the various fundamental theories of materials and concept of solid classification. CO2: Illustrate 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: Interpret formation of depletion region, barrier potential, Zener diode, Characteristics of Zener diode etc. CO4: Compare of Coherent sources, interactionof radiation with matter (spontaneous and stimulated emission), Einstein‟s relation, population inversion and pumping, etc. CO5: Explain the operation of optical sources: Light emitting diode (construction, basic working principle), semiconductor laser (construction, basic working principle), and optical detectors. CO6: Illustrate the 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 valenceband, 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 andPN 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 (spontaneousand 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 (working principle),	CO5, CO6
	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: ECE** **Semester:1**		
Course Code	CSP113	
Course Title	Programming for problem solving lab	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Compulsory	
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	
Course Outcomes	After Completion of Course Students will be able to: CO1: Demonstrate the algorithm, Pseudo-code and flow chart for thegiven problem. CO2: Develop better understanding of basic concepts of Cprogramming. 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 C.	
Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm	
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
C	Write a c program to find the smallest element of the array	
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

C	Write a c program to find smallest 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
C	Write a c program to store information of a student using class			CO5, CO6
Mode of examination	Practical			
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:2023-27
Programme: B.Tech
Current Academic Year: 2023-24
Branch: ECE
Semester:1

Course Code	ECP110
Course Title	CADD Lab
Credits	1.5
Contact Hours (L-T-P)	0-0-3
Course Status	Compulsory
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.
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 advanced 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.
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 drawingtechniques and be able to replicate specific drawings in multipleperspectives. 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.

Outline syllabus		CO Mapping
List of Experiments		
Experiment 1	Introduction to AutoCAD and its interface with assignment 1	CO1
Experiment 2	Working with coordinates, drawing of line, circle, arc, polygon and creating sketches by using them assignment2	CO2
Experiment 3	Editing of drawing by using editing Tools and Power tools with assignment 3	CO2

Experiment 4	Creating of advanced feature like fillet, chamfer, hatch and using of reusable items with assignment 4			CO3, CO6
Experiment 5	Representing text and dimensioning in AutoCADwith assignment 5			CO4
Experiment 6	Creating the drawing of the given assignment 6 by using AutoCAD features.			CO2, CO3
Experiment 7	Creating the drawing of the given assignment 7 in AutoCAD.			CO2,CO6
Experiment 8	Creating the drawing of the given diagram and giving dimensions in AutoCAD.			CO2, CO4
Experiment 9	Creating the drawing of TajMahal in Autocad 2D			CO3, CO6
Experiment 10	Creating of orthographic projections from a 3D figure			CO5, CO6
Mode of examination	Practical			
Weightage Distribution	CA	CSE	ETE	
	25%	25%	50%	
Text book/s*	1. Ibrahim Zaid,"CAD/CAM- Theory and Practice", McGraw Hill, International Edition. ISBN 0–07–072857–7			
Software	AutoCAD			

School: SSET **Batch: 2023-2027** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: I**			
Course Code	ECP101		
Course Title	Tinkering Labs		
Credits	1		
Contact Hours (L-T-P)	0-0-2		
Course Status	Compulsory		
Course Objective	To be acquainted with hardware's in Consumer Electronics goods		
Course Outcomes	After successful completion of this course the student will be able to: CO1: Identify and explain the parts of Cell phone charger CO2: Identify and describe the parts of Mobile phones CO3: Interpret the need of USB CO4: Explain and Identify the parts of Speakers CO5: Identify and describe the parts of Computers CO6: Apply the hardware knowledge for different projects.		
Course Description	Justify and enhance their Knowledge on consumer products		
	Outline syllabus		CO Mapping
	Unit 1	**Inside Cell phone Charger**	
	A	Unscrew	CO1
	B	Identifying parts	CO1
	C	Working	CO1, CO6
	Unit 2	**Mobile phones**	
	A	Unscrew	CO2
	B	Identifying parts	CO2
	C	Working	CO2, CO6
	Unit 3	**USB**	
	A	Basics	CO3
	B	Inside USB cable/Port	CO3
	C	Working	CO3, CO6
	Unit 4	**Speakers**	
	A	Unscrew	CO4
	B	Identifying parts	CO4
	C	Working	CO4, CO6
	Unit 5	**Computers**	
	A	Unscrew	CO5
	B	Identifying parts ,Working	CO5
	C	Screw up	CO5, CO6
	Mode of examination	Practical & Viva	

	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Lab Manuals			
	Other References	https://www.youtube.com/watch?v=WNRzU5DLA0I https://www.youtube.com/watch?v=jghFENiUsBI			

School: SSET **Batch: 2023-27** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: Physics** **Semester: I**	
Course Code	PHY 161
Course Title	Physics Lab 1
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Compulsory
Course Objective	To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
Course Outcomes	On successful completion of the course the students will be able to CO1: Explain of basic physics experiments based on simpleharmonic motion CO2: Apply the concept of stress, strain to calculate modulus of rigidity, Young'smodulus. CO3: Illustrate the moment of inertia of different bodies. CO4: Explain and draw characteristic curves of different electroniccomponents CO5: Apply the concept of frequency using Melde's Experiment CO6: Apply the mathematical concepts/equations to obtain quantitative resultsand ability to conduct, analyze and interpret experiments

Outline Syllabus		CO Mapping
Unit 1		
A	To verify the relation of time period using simplependulum.	CO1
B	To determine the acceleration due to gravity and radiusof	
C	Gyration of compound pendulum and compare with theoretical value.	
Unit 2		
A	To measure the moment of inertia of a flywheel.	CO2
B	To determine the young's modulus of a beam using cantilever beam experiment apparatus	
C	To determine vertical distance between two points usingsextant.	
Unit3		
A	To set up the experiment the modulus of rigidity of a material of a given wire with an inertia table (torsion pendulum) by dynamical method.	CO3
B	To determine the modulus of rigidity of a material of a given wire with an inertia table (torsion pendulum) by dynamical method.	
C	To calculate Moment of inertia of different irregularshapes.	
Unit 4		
A	To determine the frequency of an electrically maintained t uning fork using Melde"s Apparatus. Transverse mode of vibration	CO4,CO6
B	To determine the frequency of an electrically maintained t uning fork using Melde"s Apparatus Longitudinal mode of vibration.	
C	To determine the coefficient of viscosity of water by Poiseuille"s method.	

	Unit 5				
	A	To draw the characteristic curve of a PN junction diode.			CO5,CO6
	B	To trace the circuit of a Half Wave Rectifier circuit			
	C	Determine efficiencies and ripple factors with capacitor			
	Mode of Examination	Practical/Viva			
	Weightage Distribution	CA	CE	ESE	
		25%	25%	50%	
	Text books	1. B.Sc. Practical Physics- Harnam Singh, S. Chand Publishing. B.Sc. Practical Physics- C L Arora, S. Chand Publishing.			
	Other References	1. GeetaSanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co. 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: ECE** **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:Apply the working of transformer and calculate its efficiency CO3: Explain 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: Evaluate 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 electroniccircuits 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, To verify superposition theorem	CO1 CO1
	C	To find the real power, reactive power, apparent power and power factor of RL & RC load	CO1
	Unit 2	**Practical related to Transformers**	
		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 rectifier circuits for theirinput and output waveform			CO4,CO6
	C	To assemble and test 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
	C	Validation of BJT as an amplifier			CO5, CO6
	Mode of examination	Practical/viva			
	Weightage Distribution	CA	CE	ESE	
		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			

School: SSET **Batch:2023-2027** **Programme: B.Tech** **Current Academic Year: 2023-2024** **Branch: ECE** **Semester: I**	
Course Code	**ARP101**
Course Title	Communicative English-1
Credits	2
Contact Hours (L-T-P)	1-0-2
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.
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
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.

	Outline syllabus – ARP 101	
UNIT 1	Sentence Structure	CO Mapping
A	Subject Verb Agreement	CO1
B	Parts of speech	CO1
C	Writing well-formed sentences	CO1
Unit 2	Vocabulary Building & Punctuation	CO1
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-lengthfeature 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			CO4, CO5
B	Brainstorming Techniques & Models			CO4, CO5
C	Social and Cultural Etiquettes, Internal Communication			CO4, CO5
Unit 6	Leadership and Management Skills			
A	Managerial Skills			CO6
B	Entrepreneurial Skills			CO6
C	Case Study			CO6
Evaluations	CA	CE	ESE	*N/A*
	25%	25%	50%	
Texts & References | Library Links	• Blum, M. Rosen. *How to Build Better Vocabulary*. London: Bloomsbury Publication • Comfort, Jeremy (et.al). *Speaking Effectively*. Cambridge University Press			

SYLLABUS TERM-II

School: SSET **Batch: 2023-2027** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **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. Apply 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: 2023-27
Programme: B.Tech
Current Academic Year: 2023-24
Branch: ECE
Semester: II

Course Code	MTH 143	
Course Title	Differential Equations, Special Transforms & Complex Variable	
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	Students will be able to: CO1: Solve the Ordinary differential equation of first order & second order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy-Euler equation, Power series solutions. CO2: Classify Partial differential equation, Solution of Wave equation, Heat equation and Laplace equation using method of separation of variables. CO3: Apply the Laplace transform of some standard functions and its properties, Inverse Laplace transform and Convolution theorem. Introduction to Z transforms. CO4: Evaluate Fourier series with change of interval, Half range sine and cosine series. CO5: Apply Fourier Transforms, Fourier Cosine and sine Transform with properties of Fourier Transform. CO6: Explain Differentiation, Analytic functions, Cauchy-Riemann equations, Harmonic functions,	
Unit No.	Outline syllabus	CO Mapping

	Unit 1	**ORDINARY DIFFERENTIAL EQUATION**			
	A	Exact differential equations			CO1
	B	Second order linear differential equations with constant coefficients, Method of variation of parameters, Cauchy-Euler equation			CO1
	C	Power series solutions			CO1
	Unit 2	**PARTIAL DIFFERENTIAL EQUATIONS**			
	A	Definition, Classification of Partial differential equation, Method of separation of variables			CO2
	B	Solution of Wave equation, Heat equation using Method of separation of variables			CO2
	C	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 in change of interval, Half range sine and cosine series			CO4
	B	Fourier Transforms, Fourier Cosine and sine Transform			CO5
	C	Properties of Fourier Transform			CO5
	Unit 5	**COMPLEX VARIABLE**			
	A	Differentiation, Analytic functions, Cauchy-Riemann equations, Harmonic functions			CO6
	B	Contour integrals, Cauchy-Integral theorem, Cauchy Integral formula (without proof)			CO6
	C	Taylor's series and Laurent's series (without proof)			CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.			
	Other References	• W. E. Boyce and R. C. Di Prima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., WileyIndia, 2009. • S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984. • E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995. • E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004			

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

1	Course Code	ECE121	
2	Course Title	Circuit Designing and PCB Layout	
3	Credits	1	
4	Contact Hours (L – T – P)	1 – 0 – 0	
	Course Status	Compulsory	
5	Course Objective	To provide the students with an introductory concept about the steps involved in the design of circuits and to provide the students with more hands-on experience and also enable them to develop and test simple PCB circuits. Selection of components, wiring, soldering, desoldering, testing and troubleshooting are some of the basic skills acquired by the students.	
6	Course Outcomes	**The student will be able to** **CO1:** Illustrate the basics of semiconductor material and most commonly used electronic components. **CO2:** Apply various circuit analysis techniques for designing basic circuits using commonly used electronic components. **CO3:** Explain the basics of PCB designing. **CO4:** Apply advance techniques, skills and modern tools for designing and fabrication of PCBs. **CO5:** Apply the knowledge and techniques to fabricate Multilayer, SMT and HDI PCB. **CO6:** Design Circuits and PCB Layout using hardware and software techniques.	
7	Course Description	This initial course introduces the concepts and fundamentals of steps involved in the design of any circuit. Topics include basic circuit design steps, diode and transistor fundamentals and applications. This course also introduces to printed circuit boards (PCBs), their types and steps involved in obtaining the PCB layout.	
8	Outline Syllabus		CO Mapping
	UNIT-I	**Electronics Fundamentals:**	
	A	Material classification based on conductivity, Basic Semiconductors, Diodes, Characteristics of Diodes, Classification of Diodes.	**CO1**
	B	Transistors, Classification of Transistors, BJT characteristics, JFET & MOSFET Characteristics, Transistor Amplification Circuits	**CO1, CO6**
	C	OP Amp, Basic Characteristics of OP Amp, Feedback circuits, Introductions to Digital circuits.	**CO1**
	UNIT-II	**Fundamentals of Circuit Design:**	
	A	Basic Circuit Laws, Current and Voltage Division Rules, Introduction to Linear and Non-linear elements, Classification of Sources, Equivalent Impedance, Calculations in Series and Parallel Circuits.	**CO2**
	B	Basic Network Theorems, Current, Voltage and Power calculations in a Circuit, Diode Applications	**CO2, CO6**

	C	Clipping and Clamping Circuits with Diodes, Rectifier Circuits			**CO2**
	UNIT-III	**Introduction to Printed Circuit Board:**			
	A	Fundamental of electronic components, basic electronic circuits,			**CO3**
	B	Basics of printed circuit board designing: Layout Planning, General rules and Parameters,			**CO3**
	C	Ground Conductor Considerations, Thermal Issues, Check and Inspection of Artwork.			**CO3, CO6**
	UNIT-IV	**Design Rules for PCB and PCB Technology Trends:**			
	A	Design rules for Digital Circuit PCBs, Analog Circuit PCBs, High Frequency and Fast Pulse Applications, Power Electronic and Microwave Applications			**CO4, CO6**
	B	Multilayer PCBs, Multiwire PCBs, Flexible PCBs, Surface mount PCBs,			**CO4**
	C	Reflow soldering, Introduction to High-Density Interconnection (HDI) Technology.			**CO4**
	UNIT-V	**Introduction to Electronic design automation (EDA) tools for PCB designing:**			
	A	Brief Introduction of various simulators, SPICE and PSPICE Environment, Selecting the Components Footprints as per design.			**CO5, CO6**
	B	Making New Footprints, Assigning Footprint to components, Net listing, PCB Layout Designing, Auto routing and manual routing.			**CO5, CO6**
	C	Assigning specific text (silkscreen) to design, creating report of design, creating manufacturing data (GERBER) for design.			**CO5**
	Mode of Examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text Book/s*	1. Printed circuit board design, fabrication assembly and testing, by R. S. Khandpur, Tata McGraw Hill, 2006. ISBN No.: 9780070588141. 2. Robert Boylestad, Electronic Devices and Circuit Theory, Pearson Education, 2019. ISBN: 9780133109047. 3. Complete PCB Design Using OrCAD Capture and PCB Editor, Kraig Mitzner Bob Doe Alexander Akulin Anton Suponin Dirk Müller, 2nd Edition 2009. ISBN: 9780128176849. 4. Introduction to System-on-Package, Rao R Tummala & Madhavan Swaminathan, McGraw Hill, 2008. ISBN: 9780071459068. 5. EMC and Printed circuit board, Design theory and layout, Mark I Montrose IEEE Compatibility Society. ISBN: 9780780347038. 6. Flexible Printed Circuit Board Design and Manufacturing, by Robert Tarzwell. 7. Web-based Current literature			

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

1	Course Code	ECE240	
2	Course Title	Digital System Design	
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: Explain combinational logic circuits CO2: Analyze modular combinational circuits with MUX/DEMUX,Decoder, Encoder CO3: Illustrate synchronous sequential logic circuits. CO4: Apply HDL & appropriate EDA tools for digital logic design and simulation. CO5: Apply HDL for the functional verification of FSM. CO6: Design a combinational circuit with given conditions	
7	Course Description	This course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, medium scale integration (MSI) and large scale integration (LSI) circuits, analog to digital (AD) and digital to analog (DA) conversion, and other related topics. Upon completion, students should be able to construct, analyse, verify, and troubleshoot digital circuits using appropriate techniques and test equipment.	
8	Outline syllabus		CO Mapping
	Unit 1	**Logic Simplification**	
	A	Review of Boolean Algebra and De-Morgan‟s Theorem, SOP & POS forms.	CO1
	B	Canonical forms, Karnaugh maps up to 5 variables	CO1
	C	Binary codes, Code Conversion.	CO1
	Unit 2	**Combinational Logic Design**	CO1
	A	Half and Full Adders, Subtractors, Serial and Parallel Adders	CO2
	B	Parity Generator-Even and Odd, ALU	CO2
	C	MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display	CO2

	Unit 3	**Sequential Logic Design**	
	A	Building blocks like S-R, D,JK,T and Master-Slave JK FF, Edge triggered FF	CO3
	B	Ripple Counter, Synchronous counters, Shift registers	CO3
	C	Finite state machines, Design of synchronous FSM, Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation	CO3
	Unit 4	**Logic Families and Semiconductor Memories**	
	A	TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, ECL, CMOS families	CO4
	B	Memory elements, Concept of Programmable logic devices like PLDs, FPGA.	CO4
	C	Logic implementation using Programmable Devices.	CO4
	Unit 5	**VLSI Design flow**	
	A	Design entry: Schematic, FSM & HDL, different modelling styles in HDL	CO5,CO6
	B	Data types and objects, Dataflow, Behavioural and Structural Modelling.	CO5, CO6
	C	Synthesis and Simulation HDL constructs and codes for combinational and sequential circuits.	CO5, CO6
	Mode of examination	Theory	
	Weightage Distribution	CA | MTE | ETE	
		25% | 25% | 50%	
	Text book/s*	Digital Logic and Computer Design by Marris Mano- ISBN:9788120304178 1979	
	Other References	1. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002- ISBN: 9780071400701 . 2. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989- ISBN: 9780471301592 3.R.P. Jain, "Modern digital Electronics", Tata McGraw Hill,4th edition,2009 ISBN: 9780070534766	

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

Course Code	CSP114
Course Title	Application Based Programming in Python Lab
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Compulsory
Course Objective	Emphasis is placed on procedural programming, algorithm design, and language constructscommon to most high level languages through Python Programming.
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
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.

Outline syllabus		CO Mapping
Unit 1	**Practical based on conditional statements and control structures**	
	1. Program to implement all conditional statements 2. Program to implement different control structures	CO1
Unit 2	**Practical related to List, Tuples and dictionaries**	
	1. Program to implement operations on lists 2. Program to implement operations onDictionary 3. Program to implement operations on Tuple	CO2
Unit 3	**Practical related to Functions and Exception Handling**	
	1. Program to implement Exception Handling 2. Program to use different functions	CO3
Unit 4	**Practical related to Object Oriented Programming**	

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

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

Course Code	ECP120
Course Title	Fault Finding and Circuit Testing Lab
Credits	1.5
Contact Hours (L-T-P)	0-0-3
Course Status	Compulsory
Course Objective	The objective of this introductory course is to make students familiar with fault finding and circuit testing in electronic ciruits
Course Outcomes	After successful completion of this course the student will be able to: CO1: Identify the fundamental features passive and active components. CO2: Applying continuity of components with multimeter CO3: Applying continuity of components with CRO. CO4: Applying testing methods on circuits without power supply. CO5: Applying testing methods of circuits with power supply. CO6: Demonstration of ability of fault finding of circuits.
Course Description	This course will make students familiar with fault finding and circuit testing in electronic ciruits using multimeter and CROs

Outline syllabus		CO Mapping
List of Experiments		
Experiment 1	Introduction to possible faults in passive components	CO1
Experiment 2	Introduction to possible faults in active components	CO1
Experiment 3	Hands on with fault finding instruments(Multimeter)	CO2
Experiment 4	Hands on with fault finding instruments(CRO)	CO2
Experiment 5	Testing of resistors (Lumped and distributed)	CO
Experiment 6	Testing of capacitors and inductors.(Transformers)	CO2, CO3
Experiment 7	Testing of electronic circuits (amplifier circuits, power supply such as small circuits) without supply	CO2
Experiment 8	Testing of electronic circuits (amplifier circuits, power supply such as small circuits) with supply	CO2, CO4
Experiment 9	Testing of Electrical circuits (mother board like complex circuits)	CO3
Experiment 10	Testing of Electrical circuits such as dc and ac motors	CO5

Mode of examination	Practical			
Weightage Distribution	CA	CE(Viva)	ETE	
	25%	25%	50%	
Text book/s*	Manual			

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

Course Code	ECP240
Course Title	**Digital System Design Lab**
Credits	1
Contact Hours (L-T-P)	0-0-2
Course Status	Compulsory
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. 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: the structure of various number systemsand its application in digital design. CO2: Analyze and design various combinational,sequential circuits and logic familie CO3: Model circuits and systems in System Verilog or VHDL CO4: Describe sequential digital systems in a hardware description language. CO5: Apply HDL for the functional verification of FSM. CO6: Analyze a given combinational circuit
Course Description	The 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.

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*	Lab Manual			
Other References				

School: SSET **Batch: 2023-2027** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch:ECE** **Semester: II**	
Course Code	**ARP102**
Course Title	Communicative English -2
Credits	2
Contact Hours (L-T-P)	1-0-2
Course Objective	To Develop LSRW skills through audio-visual languageacquirement, creative writing, advanced speech et al and MTI Reduction with the aid of certain tools like texts, movies, longand short essays.
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
Course Description	The course takes the learnings from the previous semester to anadvanced 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.
Outline syllabus – ARP 102	
Unit 1	**Acquiring Vision, Goals and Strategies throughAudio-visual Language Texts**
A	Pursuit of Happiness / Goal Setting & Value Propositionin life
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	
C	Learning Diary Learning Log – Self-introspection	
Unit 3	**Writing Skills 1**	
A	Precis	CO2
B	Paraphrasing	
C	Essays (Simple essays)	
Unit 4	**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	
C	Speech Sounds | Speech Music| Tone | Volume| Diction |Syntax |Intonation | Syllable Stress |	
Unit 5	**Gauging MTI Reduction Effectiveness through Free Speech**	
A	Jam sessions	CO3
B	Extempore	
C	Situation-based Role Play	
Unit 6	**Leadership and Management Skills**	
A	Innovative Leadership and Design Thinking	CO4
B	Ethics and Integrity	CO4
Unit 7	**Universal Human Values**	
A	Love & Compassion, Non-Violence & Truth	CO5
B	Righteousness, Peace	CO5
C	Service, Renunciation (Sacrifice)	CO5
Unit 8	**Introduction to Quantitative aptitude & Logical Reasoning**	
A	Analytical Reasoning & Puzzle Solving	CO6
B	Number Systems and its Application in Solving Problems	CO6
C	Case Study	CO6

Evaluations	**CA**	**CE**	**ETE**
	25	*25*	*50*

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	

SYLLABUS TERM-III

School: SSET **Batch: 2023- 2027** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: III**		
Course Code	**MTH 145**	
Course Title	**Probability and Statistics**	
Credits	4	
Contact Hours (L-T-P)	3-1-0	
Course Status	Compulsory	
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.	
Course Outcomes	CO1: Explain the concept of probability and Random Variable. CO2: Explain the concept of distribution functions, densities andprobability 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.	
Course Description	This course is an introduction to the fundamental of Mathematics. The primary objective of the course is to develop the basic understandingof statistics including measures of central tendency, correlation and regression,statistical methods of data sampling, probability and random variables and various discrete andcontinuous probability distributions and their properties.	
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, 35thEdition, 2000. Veerarajan T.,Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi,- ISBN:9788174091956 2013.			

School: SSET **Batch 2023-27** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: III**		
Course Code	**ECE237**	
Course Title	**Analog Circuits-I**	
Credits	3	
Contact Hours (L-T-P)	3-0-0	
Course Status	Compulsory	
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.	
Course Outcomes	The students will be able to: CO1: Explain the various diodes as high speed switch for RF applications. CO2: Illustrate the functioning of BJT and design differentcircuits. CO3: Interpret the functioning of J-FET and design differentcircuits. CO4: Explain the functioning of MOS-FET and operating indifferent modes. CO5: Illustrate knowledge of amplifiers using BJT and FET. CO6: Design and analysis of differential, multi-stage andoperational amplifier circuits usingBJT and MOSFET	
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.	
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

	applications. Schottky diodes:Structure of metal- semiconductorjunction, characteristics.			
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-p transistor.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 andCircuit Theory”, PHI - ISBN: 9780131189058 2. S. Sedra and K. C. Smith, “MicroelectronicCircuits”, 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 Devicesand Circuits”, McGraw-Hill- ISBN:9780071337069 2. S. Salivahanan, N. Suresh Kumar, “Electronics Devices and Circuits”,2003- ISBN: 9780070534766	

School: SSET **Batch : 2023-2027** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch:ECE Semester: III**		
Course Code	ECE 242	
Course Title	Signals & Systems	
Credits	3	
Contact Hours (L-T-P)	3-0-0	
Course Status	Compulsory	
Course Objective	The main aim of this course is to make aware students with basics of signalsand systems. To explain the basic of systems that we use for communication anddesign purpose. To basics of LTI system and their solutions. To acquire knowledge about Fourier Transform and its significance insignal analysis. To acquire knowledge about Z-Transform and its use to solvedifference equations.	
Course Outcomes	After successful completion of this course the student will be able to: CO1: Explain the concepts of continuous time and discrete time systems. CO2:Analyse systems in complex frequency domain. CO3:Explain sampling theorem and its implications. CO4: Analyze difference equations using Z-Transform. CO5: Apply the concept of Sampling and reconstruction of a signal. CO6: Analyse the real time systems by using various types of Transforms.	
Course Description	This course is about various classifications of both continuous and discrete time signals and systems. The spectral analysis of periodic & aperiodic signals using Fourier Series and Fourier transform is discussed for both CT as well as for DT signals. Analysis and characterization of the CT-LTI systems through Laplace Transform and Fourier Transform and for LTI-DT systems through Z Transform and DTFT is also discussed.	
Outline syllabus		CO Mapping
Unit 1	**Introduction to signals and system**	
A	Introduction to signals, Types of signals, Transformation in Independent variable.	CO1
B	Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals.	CO1
C	System properties: linearity, additivity and homogeneity, shift-invariance,causality, stability, realizability	CO1
Unit 2	**LTI System**	
A	Continuous time and discrete time LTI systems their properties.	CO2
B	Convolution Sum and convolution Integral. Characterization of causality and stability of linear shift-invariant systems.	CO2

C	System representation through differential equations and Difference equations.			CO2,CO6
Unit 3	**Fourier Transform**			
A	Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and itsrelation to the impulseresponse, Fourier series representation, the Fourier Transform.			CO3
B	Convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain Duality			CO3
C	The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval‟s Theorem.Theidea of signal space and orthogonal			CO3,CO6
Unit 4	**Z-Transform**			
A	Z-transform, ROC, Unit circle, with DTFT.			CO4
B	Properties, Inverse ZT.			CO4
C	Solving difference equation using ZT			CO4,CO6
Unit 5	**Sampling and Laplace Transform,**			
A	State-space analysis and multi-input, multi-output representation. The state-transition matrix.The Sampling Theorem. Reconstruction: ideal interpolator, Aliasing and itseffects. Relation between continuous and discrete time systems.			CO5
B	The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence,			CO5
C	Poles and zeros of system, Laplace domain analysis, solution to differential equations and system behaviour.			CO5,CO6
Mode of examination	Theory			
Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Text book/s*	1. V.Oppenheim, A.S.Willsky and S.HamidNawab, “ Signals& system”, PEARSON Education, Second Edition, 2003-ISBN:9780070669277			
Other References	P.RamakrishnaRao,”Signal and System”, 2008 Edition, TMH publication-ISBN:9781259062742			

School: SSET **Batch: 2023-27** **Programme: B.Tech** **Current Academic Year: 2023-24** **Branch: ECE** **Semester:III**	
Course Code	ECE098
Course Title	SENSORS AND TRANSDUCERS
Credits	3
Contact Hours (L-T-P)	3-0-0
Course Status	Compulsory
Course Objective	Set up testing strategies to evaluate performance characteristics of different types of sensors and transducers and develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system.
Course Outcomes	The students will be able to: CO1: Intrepert the principle of various Transducers, CO2: Explain the construction of Transducers, CO3: Apply the analog signal conditioning for measurements. CO4: Apply the digital signal conditioning for measurements. applications and principles of operation, standards and units of measurements. CO 5 : D evelop basic skills in the design of electronic equipment. CO6: Explain various measurements techniques for industrial applications based on transducers.
Course Description	Electromagnetic field theory is the most fundamental subject in the curriculum of electrical engineering education. Electromagnetic field theory defines capacitors, inductors and resistors in terms of its primary electric and magnetic quantities like electric charge, electric potential, electric current, electric and magnetic flux. Electromagnetics explains universal concepts in three-dimension real world, i.e., electro-magnetic wave propagation in free-space.

Outline syllabus		CO Mapping
Unit 1	**Introduction to Electronics Measurement and Instrumentation**	
A	Transducers and sensors- Accuracy and precisions multiplication.	CO1
B	types of errors, statistical analysis, probability of errors, limiting errors.	CO1
C	sensitivity, linearity, hysteresis, resolution, reproducibility, transfer function.	CO1
Unit 2	**Analog Signal Conditioning**	
A	Signal conditioning, Loading effects, Bridges for measurement techniques, Wheatstone, Wein, Kelvin's, Maxwell bridge and Hey bridge,	CO2
B	Attenuators and Amplifiers, Passive filters, Op-amp based signal conditioning circuits,	CO2
C	Inverting and Non-Inverting Amplifiers, Linearization, Differential amplifiers and Instrumentation amplifiers.	CO2
Unit 3		

A	Digital measuring techniques, Sample and Hold Circuits, Comparator, Buffers, D/A Conversion and A/D Conversion			CO3
B	Weighted Resistor DAC, R-2R ladder DAC, Dual Slope, Parallel-comparator.			CO3
C	Successive Approximation ADC techniques, Single channel and multi-channel Data Acquisition System (DAS).			CO3
Unit 4	**Temperature Sensors**			
A	Resistance Vs Temperature characteristics for different materials.			CO4, CO6
B	Thermistors, Thermocouples - thermoelectric effects for thermocouples			CO4,CO6
C	thermocouple tables, RTD, Other Thermal Sensors.			CO4,CO6
Unit 5	**Pressure, force, displacement, and weight measurement:**			
A	Capacitive and inductive transducers, Displacement Sensor (LVDT)			CO5,CO6
B	Strain Sensors – strain gauges, its principle, applications gauges, Load cells, Piezo-electric sensors, Motion sensors.			CO5,CO6
C	Basic principle of flow meter, Differential pressure flow meters, Variable area flow meter, Volumetric flow meter, Hotwire anemometer, Magnetic and ultrasonic flow meter, Rota meter, Hall effect transducer working and measurement techniques			CO5,CO6
Mode of examination	Theory			
Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Text book/s*	1. Curtis D. Johnson, *"Process Control Instrumentation Technology"*, Prentice Hall India. 2. D.V.S. Murty, "*Transducers and Instrumentation"*, Prentice Hall India. 3. Helfrick Albert D. and Cooper W. D., "*Modern Electronic Instrumentation and Measurement Techniques"*, Prentice Hall India.			
Other References	1. Kalsi H. S. *"Electronic Instrumentation"*, Tata McGraw-Hill Education. 2. Shawhney A. K. "*A Course In Electrical and Electronics Measurements and Instrumentation",* DhanpatRai& Sons, 11th Ed., 1999. 3. Bell David A. "*Electronic Instrumentation and Measurements",* PHI / Pearson Education			

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

1	Course Code	ECE248	
2	Course Title	ELECTROMAGNETIC FIELD THEORY	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Compulsory	
5	Course Objective	1. Define the sources, effects and application of electromagnetic field theory. 2. Apply and compute basic problems in vector algebra, including dot product, cross product, gradient, curl, divergence, etc. 3. Knowledge of different coordinates systems and its transformation. 4. Describe and analyse electrostatic fields and currents. 5. Describe and analyse static magnetic fields and currents. 6. Analyse time varying fields using Maxwell's equations. 7. Explain basic principles of plane wave propagation in different medium.	
6	Course Outcomes	The students will be able to: CO1: Define electromagnetism and its effects, application of electromagnetism and classify 3D coordinate systems. CO2: Explain divergence theorem, stokes theorem and laplacian and their application in electromagnetism. CO3: Compare between field and circuit theory and define the basic concepts of conductors, dielectrics, inductance and capacitance, electric and magnetic fields. CO4: Explore knowledge on the nature of magnetic materials and concept of static and time varying fields. CO5: Describe and analyse electromagnetic wave propagation. CO6: Explain wave reflection and refraction in different medium and poynting vector.	
7	Course Description	Electromagnetic field theory is the most fundamental subject in the curriculum of electrical engineering education. Electromagnetic field theory defines capacitors, inductors and resistors in terms of its primary electric and magnetic quantities like electric charge, electric potential, electric current, electric and magnetic flux. Electromagnetics explains universal concepts in three-dimension real world, i.e., electro-magnetic wave propagation in free-space.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction**	
	A	Sources of electromagnetic field, effects of electromagnetic field and application of electromagnetic field theory, review of vector addition, vector subtraction and vector multiplication.	CO1

	B	Review of 3D coordinate systems : cartesian, cylindrical, spherical and inter-transformation.			CO1
	C	Gradient, divergence and divergence theorem, Curl and stokes theorem, Laplacian of a scalar and its application.			CO2
	Unit 2	**Electrostatics**			
	A	Coulomb's Law, electric field intensity , field due to point and continuous charges, Gauss's law and application , electrical potential , electric field and equipotential plots.			CO3
	B	Electric field in free space, conductors and dielectrics, dielectric polarization.			CO3
	C	Electric field in multiple dielectrics, boundary conditions, Poisson's and Laplace's equations, capacitance-energy density, dielectric strength.			CO3
	Unit 3	**Magnetostatics**			
	A	Lorentz Law of force, magnetic field intensity, Biot–Savart's Law, Ampere's Law, magnetic field due to straight conductors, circular loop, infinite sheet of current.			CO3
	B	Magnetic flux density, magnetic flux density in free space, conductor, and magnetic materials , magnetization, magnetic field in multiple media.			CO3
	C	Boundary conditions, scalar and vector potential, magnetic force, torque, inductance, energy density magnetic circuits vis-à-vis electric circuit.			CO3
	Unit 4	**Electrodynamic Fields**			
	A	Faraday's laws, induced emf, transformer and motional EMF.			CO4,CO6
	B	Maxwell's equations (differential and integral forms).			CO4,CO6
	C	Displacement current, relation between field theory and circuit theory.			CO4,CO6
	Unit 5	**Electromagnetic Waves**			
	A	Generation of EM waves, EM wave equations.			CO5,CO6
	B	Wave parameters: velocity, intrinsic impedance, propagation constant, waves in free space.			CO5,CO6
	C	Waves in lossy and lossless dielectrics and conductors-loss tangent, skin depth, Power and Poynting vector.			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Sadiku, 'Elements of Electromagnetics', Second edition, Oxford University Press, 1995. 2. William .H.Hayt, 'Engineering Electromagnetics', Tata McGraw Hill edition, 2001.			
	Other References	3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 1999. 4. John.D.Kraus, 'Electromagnetics', McGraw Hill book Co., New York, Fourth Edition, 1991.			

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

Course Code	**ARP207**	Course Name: **Logical Skills Building and Soft Skills**
Course Title	**Logical Skills Building and Soft Skills**	
Credits	2	
Contact Hours (L-T-P)	0-0-4	
Course Status	Active	
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.	
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	
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.	

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			CO6
C	| 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			

School: SSET **Batch: 2023-27** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **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: Apprehend the various diodes as high speed switch for RF applications. CO2: Explain the functioning of BJT and design different circuits. CO3: Apply the functioning of J-FET and design different circuits. CO4: Apply the functioning of MOS-FET and operating in differentmodes. CO5: Analyseefficiency of various Amplifiers. 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
	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	CO2, CO2
	C	To design Zener diode as a wave shaping.	CO2
	Unit 3	**Practical related to FET**	
	A	To plot the output characteristics of FET and measure pinch- off voltage.	CO3

	B	Examine the relationship between the drain current (I_D) and terminal voltages (V_{DS}& V_{GS}) of n-channel MOS transistor.			CO3
	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)			CO3
	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
	C	Design and characterization of filter using operational amplifier.			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			

School: SSET **Batch: 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: III**			
1	Course Code	ECP098	
2	Course Title	Sensors and Transducers Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	Set up testing strategies to evaluate performance characteristics of different types of sensors and transducers and develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Ability to calculate errors, accuracy, and precision. CO2: Understand the terminology of Instrumentation and analyze various sensors. CO3: Able to apply signal conditioning for measurements. CO4: Apply temperature measurement using temperature sensors. CO5: Explain various measurements techniques for industrial applications based on transducers. CO6: Set up testing strategies to evaluate performance characteristics of different types of sensors and transducers and develop professional skills in acquiring and applying the knowledge outside the classroom through design of a real-life instrumentation system. .	
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 drawingtechniques 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
	List of Experiments		
	Experiment 1	Designing DC bridge for Resistance Measurement (Quarter, Half and Full bridge)	CO1

	Experiment 2	Designing AC bridge Circuit for capacitance measurement			CO2
	Experiment 3	Designing signal Conditioning circuit for Pressure Measurement			CO3
	Experiment 4	Designing signal Conditioning circuit for Temperature Measurement			CO4, CO6
	Experiment 5	Designing signal Conditioning circuit for Torque Measurement			CO5
	Experiment 6	Designing signal Conditioning circuit for Strain Measurement.			CO5, CO6
	Experiment 7	Experimental study for the characteristics of ADC and DAC			CO5,CO6
	Experiment 8	Error compensation study using Numerical analysis using MATLAB (regression).			
	Mode of examination	Practical/viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Lab Manual			

School: SSET
Batch : 2023 – 2027
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
Semester: III

1	Course Code	**ECP251**	Course Name: Project Based Learning -1
2	Course Title	Project Based Learning -1	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	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	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*	Relevant books			
	Other References	Relevant publications			

SYLLABUS TERM-IV

School: SSET **Batch : 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: IV**			
1	Course Code	ECE238	
2	Course Title	Network Theory	
3	Credits	4	
4	Contact Hours (L-T-P)	3-1-0	
	Course Status	Compulsory	
5	Course Objective	To develop problem solving skills and understanding of network and systems through the application of techniques and principles of signals and network analysis to common circuit problems.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Explain signals and systems and its properties. CO2: Apply and design the circuits using Network Theorems CO3: Analyse various parameters of two port network. CO4: Illustrate Laplace transforms and their significance in signalanalysis. CO5: Synthesis various networks based on analysis of network. CO6: Apply various synthesis & analysis techniques to design various circuits.	
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.	
8	Outline syllabus		CO Mapping
	Unit 1	**Signals and Systems**	
	A	Introduction to signals, Types of signals	CO1
	B	Signal analysis, Singularity functions and associated waveforms.	CO1
	C	Introduction to system. System classifications. Continuous time and discrete time LTI systems. Their properties, Convolution Sum and convolution Integral	CO1
	Unit 2	**Network Theorem(DC Independent and dependent sources)**	
	A	Review of KCL and KVL, Node and Mesh Analysis, Superposition Theorem, Source Transformation	CO2
	B	Thevenin and Norton‟s Theorem	CO2
	C	Max Power Transfer theorem, Millman‟sTheorem, Tellegen‟s theorem.	CO2
	Unit 3	**Two Port Networks**	
	A	Z, Y, h & Transmission Parameter.	CO3

	B	Conversion of parameters from one to other.			CO3
	C	Combination of two port network (Series, parallel, series-parallel, cascade).			CO3, CO6
	Unit 4	**Circuit Analysis in S- domain**			
	A	Introduction to Laplace transform, Properties of Laplace Transform			CO4, CO6
	B	Poles, Zeros & Transfer Functions.			CO4, CO6
	C	Convolution, Natural Response and the s-plane.			CO4, CO6
	Unit 5	**Network Synthesis**			
	A	Techniques for Synthesizing the Voltage Ratio H(s).			CO5, CO6
	B	Network realization & synthesis			CO5, CO6
	C	Foster I &II ,Cauer I & II.			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Signals and Systems, Alan V. Oppenheim, Prentice Hall, 2nd Ed - ISBN: 9788178086880 2. Franklin F. Kuo,"Network Analysis and Synthesis", John Wiley & Sons- ISBN: 9780471511182			
	Other References	1. M.E. Van Valkenburg," Network Analysis", Prentice Hall of India- ISBN: 9780471899914 2. Networks and Systems, D. Roy Chaudhary, New Age Publishers 2. Donald E. Scott: "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company- ISBN:9781781830673 3. M.E. Van Valkenburg,"An Introduction to Modern Network Synthesis", Wiley Eastern Ltd.- ISBN: 9780471511182			

School: SSET **Batch : 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester:IV**		
Course Code	ECE243	
Course Title	Analog Circuits-II	
Credits	4	
Contact Hours (L-T-P)	3-1-0	
Course Status	Compulsory	
Course Objective	• To explain the basic concept of feedback and types of feedback. • To explain the operational amplifier and their applications. • To acquire knowledge about filters and oscillators. • To acquire knowledge about multivibrators. To explain analog to digital converter(ADC),digital to analog converter(DAC),integrated circuit timer and phased looked loop(PLL)..	
Course Outcomes	After successful completion of this course the student will be able to: CO1: Define and explain basics of feedback amplifier CO2: Demonstrate the concepts of op-amp and analyze its characteristics CO3: Analyse and design linear applications of op-amp CO4: Analyse and compare nonlinear applications of op-amp and study of D/A,A/D PLL,555 timer CO5: Analyse the advance circuits like converters and multivibrators. CO6: Analyse the functioning of OP-AMP and design OP-AMP based circuits.	
Course Description	This is a course on the design and applications of operational amplifiers and analog integrated circuits. This course introduces basic op-amp principles and show how the op-amp can be used to solve a variety of application problems. Much attention is given to basic op-amp configurations, linear and non-linear applications of op-amp and active filter synthesis, including switched capacitor configurations. It h also deals with oscillators, waveform generators and data converters.	
Unit 1	**Feedback Amplifier**	
A	The general feedback structure, properties of negative Feedback	CO1
B	The four basic feedback topologies: the series-shunt feedback Amplifier	CO1
C	The series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.	CO1
Unit 2	**Introduction of Operational Amplifiers**	
A	Introduction, ideal Op-Amp, the Op-Amp terminals, Function and Characteristics of the ideal Op-Amp,the close loop gain.	CO2
B	Differential and Common-Mode Signals, Inverting and non-inverting configuration, the close loop gain, Input and output resistance and slew rate.	CO2
C	Weighted Summer, Voltage follower, Difference Amplifier, Integrator and Differentiator.	CO2

	Unit 3	**Opamp Applications**			
	A	An Overview of Op-Amp based circuits V-I and I-V converters.			CO3
	B	Generalized impedance converter, simulation of inductors.			CO3
	C	First and second order LP,HP,BP,BS and All pass active filters.			CO3
	Unit 4	**Nonlinear Applications of Operational Amplifiers**			
	A	Log-Antilog Amplifiers, Instrumentation Amplifier, Isolation Amplifier.			CO4
	B	Precision Rectifiers, Peak Detectors, Sample and HoldCircuits, Schmitt trigger, stable Multi-vibrator,Monostable Multi-vibrator, Generation of Triangular Waveforms.			CO4, CO6
	C	Analog Multipliers and their applications, Op-Amp as a comparator, Zero Crossing detector.			CO4,CO6
	Unit 5	**D/A and A/D Converters**			
	A	Basic circuits using Binary weighted Resistors, R-2R ladder D/A converters.			CO5
	B	Dual Slop,Parallel,SAR A/D converters.			CO5
	C	The 555 circuit, implementing a MonostableMultivibrator using 555 IC, AstableMultivibrator Using 555 IC, *Ex*-OR Gates and multipliers as phase detectors, Block Diagram of IC PLL (NE565).			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	*1. Sedra and Smith, "Microelectronic Circuits", 5th Edition, Oxford University Press*- ISBN: 9780195172683 *2.Ramakant A. Gayakwad, "Op-Amp and Linear Integrated Circuits" Pearson Education, 6th Edition* - ISBN: 9780131224568			
	Other References	*1.SSalivahanan and VSK Bhaaskaran, "Linear Integrated Circuits", Tenth Reprint 2012, TMH Education Pvt. Ltd*- ISBN:9780070648074			

School: SSET **Batch: 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: IV**			
1	Course Code	ECE 244	
2	Course Title	Communication Engineering	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	1. To recall the concept of signals 2. To introduce the concepts of analog communication systems. 3. To equip students with various issues related to analogue communication such as modulation, demodulation, transmitters andreceivers and noise performance. 4. To discriminate various pulse modulation techniques 5. To understand multiplexing	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1:Explain the fundamentals and functionality of modulation and demodulation environment CO2: Analyze the concepts of AM and AM Demodulation process inCommunication. CO3: Explain the origin of FM and FM-Demodulation process in communication CO4: Analyse the behaviour of a communication system in presence ofnoise CO5: Interpret pulsed modulation system and analyse their system performance CO6: Analyze the effect of noise on basic AM and FM receivers	
7	Course Description	The course will introduce the participants to the signal representation in time and frequency domain, basic analog communication techniques like modulation theory, system design for analog modulator and demodulator, random process and noise analysis.	
8	Outline syllabus		CO Mapping
	Unit 1	**REVIEW OF SIGNALS**	
	A	Types of signals, Fourier Transform	CO1
	B	Frequency domain representation of signals	CO1
	C	Elements of communication system	CO1
	Unit 2	**ANALOG MODULATION**	
	A	Need of modulation, Types of modulation	CO2
	B	Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations	CO2
	C	Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.	CO2,CO3

	Unit 3	**PROBABILITY THEORY AND NOISE**	
	A	Review of probability and random process	CO3,CO6
	B	Types of Noises: Internal and External Noise, Noise Figure, Noise Calculation	CO3,CO6
	C	Gaussian and white noise characteristics	CO3,CO6
	Unit 4	**NOISE IN VARIOUS ANALOG MODULATION**	
	A	Noise in amplitude modulation systems	CO4, CO4,CO6
	B	Noise in Frequency modulation systems	CO4, CO6
	C	Pre-emphasis and Deemphasis, Threshold effect in angle Modulation	CO4, CO6
	Unit 5	**PULSE MODULATION**	
	A	Pulse modulation, Sampling process	CO5
	B	Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Introduction to Pulse code modulation	CO5
	C	Multiplexing- TDM and FDM	CO5
	Mode of examination	Theory	
	Weightage Distribution	CA | MTE | ETE	
		25% | 25% | 50%	
	Text book/s*	1. Haykin S., "Communications Systems", John Wiley and Sons, 2013- ISBN: 9781118476772. 2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education,2002- ISBN: 9788120327504	
	Other References	1. Taub H. and Schilling D.L.,"Principles of Communication Systems", Tata McGraw Hill,2003- ISBN: 9780070629233 2. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering", John Wiley, 2009- ISBN:9780881335545	

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

1	Course Code	**ECP290** Course Name: Project Based Learning -2	
2	Course Title	Project Based Learning -2	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	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	Students will be able to: CO1: Expalin 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: Illustrate and accumulate the background information CO4: Develop effective communication skills for presentation of project related activities CO5: Build 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.	CO5, CO6

		References if any. The presentation, report, work done during the term supported by the documentation, forms the basis of assessment.			CO5, CO6
	Mode of examination	Practical/viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*				
	Other References				

School: SSET **Batch: 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: IV**			
1	Course Code	ECP244	
2	Course Title	Communication Engineering Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0 0 2	
	Course Status	Compulsory	
5	Course Objective	• To understand analog communication system by analyzing the signal and applying it to various modulation techniques • To analyze the signal in presence of noise	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Identify the functionality of communication system blocks. CO2: Demonstrate practical knowledge of the fundamental principles of Amplitude Modulation (AM) and Frequency Modulation (FM) systems. CO3: Analyze various random processes CO4: Evaluate the effect of noise in communication system. CO5: Demonstrate the Time Division Multiplexing CO6: Apply AM and FM in various applications.	
7	Course Description	This course gives students deep knowledge in analog communication systems at the practical level. This lab focuses the fundamental concepts on Signals, Analog Modulation Techniques, Probability, Noise, TDM and Pulse modulations.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on signals**	
	A	To identify given signal in time domain and frequency domain using MATLAB	CO1
	B	To analyze given signal in time domain using MATLAB	CO1
	C	To analyze given signal in frequency domain using MATLAB	CO1
	Unit 2	**Practical related to Amplitude and Frequency Modulation**	
	A	To analyze and interpret amplitude modulation and demodulation	CO2,CO6
	B	To analyze and interpret DSB-SC modulation and demodulation	CO2,CO6
	C	To analyze and interpret SSB modulation and demodulation	CO2,CO6
	Unit 3	**Practical related to Modulation**	
	A	To analyze and interpret frequency modulation and demodulation	CO3, CO6
	B	**Practical related to probability in MATLAB**	CO3, CO6
	C	To analyze the given random process using MATLAB	CO3,CO6
	Unit 4	**Practical related to noise**	

A	To analyze and interpret noise in Amplitude Modulation			CO4,CO6
B	To analyze and interpret noise in Frequency Modulation			CO4,CO6
C	To analyze and interpret noise in Pulse Modulation			CO4,CO6
Unit 5	**Practical related to TDM**			
A	To demonstrate Time Division Multiplexing using PAM signals			CO5,CO6
B	To demonstrate Frequency Division Multiplexing using PAM signals			CO5,CO6
C	To demonstrate Code Division Multiplexing using PAM signals			
Mode of examination	Practical/Viva			
Weightage Distribution	CA	CE	ETE	
	25%	25%	50%	
Text book/s*	1. Haykin S., "Communications Systems", John Wiley and Sons, 2013- ISBN: 9781118476772. Proakis J. G. and Salehi M., "CommunicationSystems Engineering", Pearson Education,2002-ISBN: 9788120327504			
Other References	1. Taub H. and Schilling D.L.,"Principles of Communication Systems", Tata McGraw Hill,2003- ISBN: 9780070629233 Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering", John Wiley, 2009- ISBN:9780881335545			

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

Course Code	ECP238	
Course Title	Network Theory Lab	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Compulsory	
Course Objective	To understand network and systems through the application of techniquesand principles of signals and network analysis to practical circuit problems.	
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: Analyse and design linear applications of op-amp CO5: Analyse the advanced circuits like converters and multivibrators CO6: Design and analysis of various networks	
Course Description	Students will learn and understand Network Systems through practical approach	
Outline syllabus		CO Mapping
Unit 1	**Signals & LTI Systems**	
A	To recognize various signals and show on CRO	CO1
B	To apply the signal to the system and verify the output	CO1
C	To verify KCL and KVL of the given network	CO1
Unit 2	**Network Theorem (DC Independent and Dependent Sources)**	
A	To verify superposition theorem of the given network	CO2
B	To verify Thevinin‟s and Norton‟s theorem of the given network	CO2
C	To verify Maximum Power Transfer theorem of the given network	CO2
Unit 3	**Two Port network**	
A	To find impedance parameters	CO3
B	To find admittance parameters	CO3
C	To find hybrid parameters	CO3
Unit 4	**Circuit Analysis in S-domain**	
A	To calculate driving function and transfer function of the ladder network	CO4,CO6
B	To find transmission parameters	CO4
C	To calculate driving function of the T- network	CO4,CO6

Unit 5	**Network Synthesis**			
A	To calculate transfer function of the T- network			CO5,CO6
B	To design a network of a given transfer function			CO5,CO6
C	To design a network of a given driving function			CO5, CO6
Mode of examination	Practical/Viva			
Weightage Distribution	CA	CE	ETE	
	25%	25%	50%	
Text book/s*	1. Signals and Systems, Alan V. Oppenheim, Prentice Hall, 2nd Ed- ISBN: 9781292025902 2. Franklin F. Kuo,"Network Analysis and Synthesis", John Wiley & Sons- ISBN: 9780471511182			

School: SSET
Batch : 2023-2027
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
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			CO5
	C	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			

SYLLABUS TERM-V

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

1	Course Code	ECE356	
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 tools discussed 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 successful completion of this course the student 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: Evaluate system response in time domain CO3: Design a closed-loop control system to satisfy dynamic performance specifications using frequency response CO4: Analyse closed-loop control systems for stability and steady-state performance CO5: Design simple feedback controllers and compensators to meet desired performance specifications CO6: Apply the concept of basics of linear time-invariant control 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
	B	Mathematical models of physical systems, signal flow graph	CO1
	C	Transfer function models of linear time-invariant systems	CO1
	Unit 2	**Time Response Analysis**	
	A	Standard test signals, time response of first order systems for standard test inputs	CO2
	B	Time response of second order systems for standard test inputs	CO2
	C	Design specifications for second-order systems based on the time-response	CO2
	Unit 3	**Frequency Response Analysis**	
	A	Introduction and frequency domain specifications	CO3
	B	Correlation between frequency domain and time domain.	CO3

	C	Polar plot and Bode plot			CO3
	Unit 4	**Stability of Control Systems**			
	A	Concept of stability			CO4
	B	Characteristic equation, location of roots in s plane for stability, Routh Hurwitz criterion.			CO4
	C	Root-locus technique. Construction of root-loci			CO4
	Unit 5	**Modern Control System**			
	A	Lag, lead, lag-lead compensator and their performance criteria			CO5
	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", PrenticeHall, 2010- ISBN: 9780136156734. 2. M. Gopal, "Control Systems: Principles and Design", McGraw Hill Education, 2002-ISBN:9780070482890.			
	Other References	1. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009- ISBN: 9781848290037 2. B. C. Kuo, "Automatic Control System", PrenticeHall, 1995.IEEE Industry Applications Society, IEEE Inst of Electrical & Electronics			

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

1	Course Code	ECE357	
2	Course Title	Digital Communication	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Compulsory	
5	Course Objective	1. To understand the concept of digital transmission system 2. To impart the knowledge of intersymbol interference. 3. To discriminate various digital modulation and demodulationtechniques. 4. To analyse various source coding and channel coding schemes.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Explain the concept of digital communication. CO2: Interpret Intersymbol Interference. CO3:Apply the knowledge of signals and system to understand various modulation techniques. CO4:Apply and interpret entropy and channel capacity. CO5: Analyse various error detecting and correcting codes. CO6: Explain the techniques used for waveform coding viz. (ASK,FSK, PSK)	
7	Course Description	This course gives the basic structures and fundamental principles of modern digital communication systems, source coding, concepts of information, entropy, channel capacity, channel coding.	
8	Outline syllabus		CO Mapping
	Unit 1	**DIGITAL TRANSMISSION SYSTEM**	
	A	General concept of digital communication systems	CO1
	B	Sampling, quantization; Companding	CO1
	C	PCM, Delta modulation; Adaptive delta modulation; Differential PCM.	CO1
	Unit 2	**INTERSYMBOL INTERFERENCE**	
	A	Intersymbol Interference, Non-ideal channel transmission, Eye diagram, pulse shaping	CO2
	B	Bit synchronization, word synchronization	CO2
	C	Optimal Receiver Design, Matched filter, bit error rate, coherent receiver	CO2
	Unit 3	**DIGITAL MODULATION TECHNIQUES**	
	A	Coherent receivers: ASK, FSK, PSK modulation	CO3, CO6
	B	Incoherent receivers: ASK, FSK, PSK modulation, Differential PSK modulation	CO3, CO6
	C	Detection of M-ary signals	CO3, CO6

	Unit 4	**INFORMATION THEORY**			
	A	Information, Entropy for discrete signals, Self information, mutual information, Entropy rate			CO4,CO6
	B	Channel capacity: Entropy for continuous random variables; Channel capacity; Shannon's second theorem; Capacity of a band-limited Gaussian channel			CO4,CO6
	C	Source coding: Huffman coding; Shannon-Fano coding; Shannon's first theorem			CO4,CO6
	Unit 5	**CHANNEL CODING**			
	A	Error correcting codes, Linear block codes			CO5,CO6
	B	Cyclic codes			CO5,CO6
	C	Convolutional codes, Viterbi's decoding algorithm			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. J.G. Proakis, Digital Communication (4/e), McGraw – Hill,2001. 2. S. Haykin, Communication Systems (4/e), Wiley,2001.			
	Other References	1. B. Sklar, Digital Communications: Fundamentals& Applications, Pearson Education, (2/e), 2001.			

School: SSET **Batch:2023-27** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: V**		
Course Code	ECE359	
Course Title	Microprocessor and Microcontroller with Interfacing	
Credits	2	
Contact Hours (L-T-P)	2-0-0	
Course Status	Elective	
Course Objective	To identify and realize the basic features of basic microcontrollers. To learn programming of 8051 using Assembly language. To design a real time module interfacing. Development of a projects based on interfacing. Integrating of different real time modules interfacing with a microcontroller	
Course Outcomes	After successful completion of this course the student will be able to: CO1: Interpret the features, functioning of basic 8-bit microprocessor andcomparison with microcontroller CO2: Illustrate addressing modes and concept of programming CO3: Apply assembly language programming of microcontrollers usingprogramming tools CO4: Access and develop interfacing with different modules like memory, ADC, DAC, LCD, stepper motor etc. CO5: Design the interfacing with communication modules CO6: Apply the concept of microcontroller in the field of IoT and other application	
Course Description	This course introduces microprocessor architecture and microcomputer systems,including memory and input/output interfacing. Topics include assembly language programming, bus architecture, bus cycle types, I/O systems, memory systems, interrupts, and other related topics. Upon completion, students should be able to interpret, analyse, verify, and troubleshoot fundamental microprocessor circuits and programs using appropriate techniques and test equipment.	
Outline syllabus		CO Mapping
Unit 1	**Fundamentals of Microprocessors**	
A	Fundamentals of Microprocessor Architecture. 8-bit Microprocessor	CO1
B	Addressing Modes and Instruction set of 8085	CO1
C	Introduction to microcontroller; compare microcontroller. and microprocessor, Overview of the 8051 family.	CO1
Unit 2	**The 8051 Architecture**	
A	Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs	CO2
B	Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports,	CO2

	C	Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles			CO2
	Unit 3	**Instruction Set and Programming**			
	A	Addressing modes: Introduction, Instruction syntax, Data types, Subroutines Immediate addressing, Register addressing, Direct addressing, Indirect addressing, Relative addressing, Indexed addressing, Bit inherent addressing, bitdirect addressing			CO3
	B	8051 Instruction set, Instruction timings. Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bitmanipulation instruction			CO3
	C	Assembly language programs, C language programs. Assemblers and compilers. Programming and debugging tools.			CO3
	Unit 4	**Memory and I/O Interfacing**			
	A	Memory and I/O expansion buses, control signals, memory wait states			CO4
	B	Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices.			CO4
	C	LED, LCD and keyboard interfacing, Stepper motor interfacing, DC Motor interfacing, sensor interfacing.			CO4
	Unit 5	**External Communication Interface**			
	A	Synchronous and Asynchronous Communication			CO5,CO6
	B	RS232, SPI, I2C			CO5,CO6
	C	Introduction and interfacing to protocols like Blue-tooth and Zig-bee.			CO5,CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	M. A.Mazidi, J. G. Mazidi and R. D. McKinlay, "The8051Microcontroller and Embedded Systems: Using Assembly and C",PearsonEducation, 2013- ISBN: 9781292026572			
	Other References	1. K. J. Ayala, "8051 Microcontroller", Delmar Cengage Learning,2004-ISBN:9780314772787 2. R. S. Gaonkar, ", Microprocessor Architecture:Programming and Applications with the 8085", Penram International Publishing, 2002-ISBN:9780130340016			

School: SSET **Batch: 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: V**			
1	Course Code	ECP356	
2	Course Title	Control System Laboratory	
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:Explain the modeling of linear-time-invariant systems using transferfunction models, signal flow graphs and block diagram algebra CO2: Illustrate the concept of stability and its assessment for linear-time invariant systems. CO3: Evaluate system response in both time domain and frequency domain CO4: Analyze dynamic systems for their stability and performance CO5: Evaluate 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**	
	A	To determine the speed-torque characteristics of an ACServomotor	CO1, CO6
	B	To study synchro transmitter and receiver pair and obtainoutput versus input characteristics	CO1, CO6
	C	To control the speed of an AC motor using TRIAC	CO1, CO6
	Unit 2	**Practical related to time response analysis**	
	A	Time domain analysis and error analysis of first order control system using MATLAB	CO2
	B	Time domain analysis analysis of second order control system	CO2

		using MATLAB			
	C	Error analysis of second order control system using MATLAB			CO2
	Unit 3	**Practical related to frequency response analysis**			
	A	Frequency domain analysis and error analysis of first order control system using MATLAB			CO3
	B	Frequency domain analysis analysis of second order control system using MATLAB			CO3
	C	Error analysis of second order control system using MATLAB			CO3
	Unit 4	**Practical related to Stability**			
	A	Stability analysis using Bode Plot of Linear Time Invariant system using MATLAB			CO4, CO6
	B	Stability analysis using Root Locus Technique of Linear TimeInvariant system using MATLAB			CO4, CO6
	C	Stability analysis using Routh's creiteria of Linear TimeInvariant system using MATLAB			CO4, CO6
	Unit 5	**Practical related to State Space Analysis**			
	A	To obtain state space representation of a given system using MATLAB.			CO5, CO6
	B	To transform a given state space model to transfer functionand vice versa using MATLAB			CO5, CO6
	C	To transform transfer function and a given state space model using MATLAB			CO5, CO6
	Mode of examination	Practical/viva			
	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.
Current Academic Year: 2023-24
Branch: ECE
Semester: V

1	Course Code	ECP357	
2	Course Title	DIGITAL COMMUNICATION LAB	
3	Credits	1	
4	Contact Hours (L-T-P)	0 0 2	
	Course Status	Compulsory	
5	Course Objective	• To develop knowledge of digital communication • To use MATLAB to simulate various modulation techniques	
6	Course Outcomes	CO1: Analyze and interpret Sampling Theorem and PCM CO2: Analyze an eye diagram to understand the concept of ISICO3: Simulate and analyze various modulation techniques CO4: Simulate and analyze source coding CO5: Simulate and anayze error detecting and correcting codes CO6: Able to explain the techniques used for waveform coding viz. (ASK, FSK, PSK)	
7	Course Description	To do hands-on practice on kits of digital communication and to simulate using MATLAB software.	
8	Outline syllabus		CO Mapping
	Experiment 1	To analyse and prove sampling theorem	CO1
	Experiment 2	To analyse and interpret PCM modulation and demodulation using MATLAB	CO1
	Experiment 3	To analyse and interpret delta modulation and demodulation using MATLAB	CO1
	Experiment 4	To analyze an Eye Diagram by introducing error	CO2
	Experiment 5	To analyze ASK modulation technique and interpret the modulated and demodulated waveforms	CO3
	Experiment 6	To analyze FSK modulation technique and interpret the modulated and demodulated waveforms	CO3
	Experiment 7	To analyze PSK modulation technique and interpret the modulated and demodulated waveforms	CO3
	Experiment 8	To simulate BASK modulation technique using MATLAB	CO3,CO6
	Experiment 9	To simulate BPSK modulation technique using MATLAB	CO3,CO6
	Experiment 10	To simulate BFSK modulation technique using MATLAB	CO3, CO6

	Experiment 11	To find entropy and length of a given message using Huffman Coding(MATLAB)			CO4
	Experiment 12	To find entropy and length of a given message using Shannon Fano Coding(MATLAB)			CO4
	Experiment 13	To simulate Linear Block codes using MATLAB			CO5,CO6
	Experiment 14	To simulate Convolutional codes			CO5,CO6
	Mode of Examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	1. J.G. Proakis, Digital Communication (4/e), McGraw – Hill,2001-ISBN: 9780071002691 2. S. Haykin, Communication Systems (4/e), Wiley,2013-ISBN: 9781118476772.			
	Other References	1. B. Sklar, Digital Communications: Fundamentals & Applications, Pearson Education- ISBN: 9780134724058			

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

1	Course Code	ECP359	
2	Course Title	Microprocessor and Microcontroller with Interfacings Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	• To identify and realize the basic features of basic microcontrollers. • To learn programming of 8051 using Assembly language. • To design a real time module interfacing. • Development of a projects based on interfacing. • Integrating of different real time modules interfacing with a microcontroller	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Interpret the features, internal architecture and functioning of basic microcontrollers. CO2: Apply assembly language programming of basic microcontrollers. CO3:Examine various interfacings using programming tools such as (keil,Proteus) CO4: Asses and develop interfacing with different modules like ADC, DAC, CO5: Develop interfacing with LCD, stepper motor and DC motor CO6: Design the projects for real time systems	
7	Course Description	The course includes assembly language programming, I/O systems, memory systems, interrupts, and other related topics. Upon completion, students should be able to interpret, analyze, verify, and troubleshoot fundamental microcontroller circuits and programs using appropriate techniques and test equipment.	
8	Outline syllabus		CO Mapping
	Unit 1	**Practical based on 8-bit microcontroller**	
	A	Write a program using 8051 and verify- a) Addition and subtraction of two 8-bit numbers. b) Addition and subtraction of two 16-bitnumbers (with carry).	CO1
	B	Write a program using 8051 and verify- a) Multiplication and division of two 8-bitnumbers. b) Multiplication and division of two 16-bitnumbers.	CO1
	C	Write a program using 8085 for block transfer of 10 memory locations	CO1
	Unit 2	**Practical related to interfacing LED and 7 segment**	
	A	Write a program to turn „ON“ and „OFF“ LEDs connected toany port(0 to 4) creating delay of 1ms with registers	CO2

	B	Write a program to create any pattern with LEDs connectedto any port(0 to 4) creating delay of 1ms with timers	CO2
	C	Write a Program to display 0-9 numbers on 7-segment display to any port(0 to 4) creating delay of 1ms with timers	CO2
	Unit 3	**Practical related to interfacing of LCD and keyboard**	
	A	Write a Program to interface LCD to 8051 Microcontroller and display “Sharda University” on it.	CO3
	B	Write a Program to interface LCD to 8051 Microcontroller and display “Sharda University” moving right and left as well	CO3
	C	Write a Program to interface LCD to 8051 Microcontroller and display the character typed by keyboard.	CO3
	Unit 4	**Practical related to interfacing of ADC and sensors**	
	A	Interface ADC 0804 with 8051	CO4,CO6
	B	Interface temperature sensor LM35D with ADC and display temperature on LCD	CO4,CO6
	C	Interface DAC with 8051 and check output on CRO	CO4,CO6
	Unit 5	**Practical related to interfacings of DC motor and stepper motor**	
	A	Write a Program to interface D.C. Motor to 8051 Microcontroller.	CO5
	B	Write a Program to interface Stepper Motor to 8051 Microcontroller.	CO5, CO6
	C	Design a project for robo arm	CO5, CO6
	Mode of examination	Jury/Practical/Viva	
	Weightage Distribution	CA | CE | ETE	
		25% | 25% | 50%	
	Text book/s*	M. A.Mazidi, J. G. Mazidi and R. D. McKinlay, “The8051Microcontroller and Embedded Systems: Using Assembly and C”,Pearson Education,2013- ISBN: 9781292026572	
	Other References	1. K. J. Ayala, “8051 Microcontroller”, Delmar CengageLearning,2004-ISBN:9780314772787 2.R. S. Gaonkar, “, Microprocessor Architecture: Programmingand Applications with the 8085”, Penram International Publishing, 2002- ISBN: 9780130340016	

School: SSET **Batch : 2023- 2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: V**		
Course Code	**ECP392**	Course Name: Project Based Learning -3
Course Title	Project Based Learning -3	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Compulsory	
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	
Course Outcomes	Students will be able to: CO1: Illustrate 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: Build as an individual or in a team indevelopment of technical projects CO6: Demonstrate effectively the module designed	
Course Description	In PBL-3, 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.	
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
Mode of examination	Practical/viva	

Weightage Distribution	CA	CE	ETE	
	25%	25%	25%	
Text book/s*	Relevant publications			
Other References	Relevant publications			

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

1	Course Code	**ARP 305**	Course Name : **Quantitative Apptitude Behavioural and Interpersonal Skills**
2	Course Title	**Quantitative Apptitude Behavioural and Interpersonal 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
	Mode of examination	Practical/viva			
	Weightage Distribution	CA	CE	ESE	
		25%	25%	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			

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

	Course Code	**ECE301**
2	**Course Title**	**Community Connect**
3	**Credits**	**2**
3.01	**(L-T-P)**	**0-2-0**
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-room learning with practical situations in the society.
6	**Course Outcomes**	The student will be able to CO1: Interpret regarding the various kinds of social issues and their optimum resolution. CO2: Illustrate the various ways in which social responsibility can be undertaken. CO3: develop skills to break an issue into various modules and resolve them effectively. CO4: conduct independent research and generate relevant reports. CO5: Evaluate the issues of community. CO6: Design a system to overcome issues of community
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

	Members	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 the related 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 theReport**	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 Acknowledgeme ntContent

SYLLABUS TERM-IV

School: SSET **Batch : 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**		
Course Code	ECE361	
Course Title	Digital Signal Processing	
Credits	3	
Contact Hours (L-T-P)	3-0-0	
Course Status	Compulsory	
Course Objective	• To categorise various types of Signals and Systems • To use Discrete and Fast Fourier and Z Transforms for system analysis • To implement Digital Systems both FIR and IIR. • To design Digital Filters.	
Course Outcomes	After successful completion of this course the student will be able to: CO1: Analyse various discrete time signals by Discrete Fouriertransform. CO2:Apply other fast algorithm to find DFT CO3: Apply various realisation techniques CO4: design and apply various methods for FI systems CO5: design and apply various methods for IIR systems. CO6:design FIR and IIR filters by various techniques.	
Course Description	Digital signal processing (DSP) is at the heart of many applications in a wide array of fields: speech and audio processing, system monitoring and fault detection, biomedical signal analysis, mobile and internet communications, radarand sonar, vibration measurement and analysis, seismograph analysis, image/video coding and decoding, etc. The objective of this course is to strengthen students‟ knowledge of DSP fundamentals and familiarize them with practical aspects of DSP algorithm development and implementation.	
Outline syllabus		CO Mapping
Unit 1	**Discrete Fourier Transforms:**	
A	Definitions and DFT as linear transform, Relationship of DFTwith other transform	CO1
B	Properties of the DFT- Periodicity, Linearity, Symmetry and Multiplication of two DFT	CO1
C	Circular Convolution, Linear Convolution	CO1
Unit 2	**Fast Fourier Transform Algorithms:**	
A	Introduction FFT Algorithm , Computational complexity of the direct computation of the DFT and FFT	CO2
B	Decimation –In Time (DIT) Algorithm, Computational Efficiency	CO2
C	Decimation in Frequency (DIF) Algorithm, IDFT using FFTgraph	CO2
Unit 3	**Realization of Digital Systems:**	
A	Introduction to Digital Filter Structure: Block Diagram	CO3

	representation, direct form realization of IIR systems, cascade realization of an IIR systems, parallel for realization of an IIR systems,			
B	Ladder structures: continued fraction expansion of H (z), example of continued fraction, realization of a ladder structure, example of a Ladder realization.			CO3
C	Basic FIR structures- Direct form, Cascade form.			CO3
Unit 4	**Design of Infinite Impulse Response Digital Filters:**			
A	Introduction to Filters, Design by Impulse Invariant Transformation,			CO4
B	Design by Bi-Linear Transformation			CO4
C	All- Pole Analog Filters: Butterworth and Chebyshev, Designof Digital Butterworth and Chebyshev Filters.			CO4
Unit 5	**Finite Impulse Response Filter Design:**			
A	Concept of Windowing and the Rectangular Window			CO6, CO5
B	Other Commonly Used Windows, Examples of Filter Designs using Windows			CO6, CO5
C	The Kaiser Window.			CO6, CO5
Mode of examination	Theory			
Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Text book/s*	1 .G. Proakis and D.G. Manolakis, “Digital Signal Processing, Principals,Algorithms, and Applications”, Pearson Education,2006- ISBN: 9780131873742			
Other References	1. A. Y. Oppenhein and R. W. Schater, “Digital Signal Processing”,PHI - ISBN: 9780131988422 2. 2.A. Y. Oppenhein, R. W. Schater and J. R. Buck, “Discrete TimeSignal Processing”, - ISBN: 9780131988422			

School: SSET

Batch: 2023-2027

Programme: B.Tech.

Current Academic Year: 2023-24

Branch: ECE

Semester: VI

Course Code	ECE931
Course Title	Antenna and Wave Propagation
Credits	3
Contact Hours (L-T-P)	3-0-0
Course Objectives	The objective of this course is to 1. To introduce the various types antennas. 2. To critically analyze the mathematics behind the designing of antennas. 3. To describe the various frequency bands used for antennas operations. 4. To explain the effects of earth in the operation of anteenas. 5. To explain various application of antennas in satellite communication and radio astronomy.
Course Outcomes	After completing this course students will be able: CO1 To analyse the basic working principles of Antenna. CO2 To assess the techniques behind designing an Antenna. CO3 To solve the problems involved in designing Antenna arrays. CO4 To apply design techniques in implementation practical antennas. CO5 To understand the applications of antennas into various deep space applications
Course Description	This course will cover the principles of radiation, basic parameters of anteenas, (radiation resistance, radiationpattern, polarization, reciprocity, effective radiated power), their types, and those commonly used in wirelesssystems. The student learns how to quickly analyse a communication link that uses standard antennas and suffers from the various effects of propagation. The student also learns the various propagation mechanisms/impairments and the basic models of propagation. Atmospheric and weather effects are also reviewed. The student would be able to grasp the idea of link budget analysis and propagation calculations, including: antenna gain, efficiency and directivity calculations; free-space loss; diffraction and obstruction loss; rain loss; depolarisation loss; impedance mismatch loss; etc. The student would be able to apply this to determine the range of a wireless RF/microwave system.

Outline syllabus:		CO Mapping
Unit 1	**Basic Antenna Concepts**	
A	Definition and functions of an antenna, comparison between an antenna & transmission line, radio communication link with transmitting antenna and a receiving antenna.	CO1
B	Radiation patterns of antennas-field and power patterns. Radiation intensity, radiation resistance, and radiation efficiency.	CO1
C	Antenna temperature and signal to noise ratio. Antenna feeding methods.	CO1
Unit 2	**Antenna Parameters and Definitions**	

	A	Beam area, beam width- Half-Power Beam width (HPBW) and First Null Beam width (FNBW), beamefficiency,			CO2
	B	Directivity and directive gain, resolution, antenna aperture-physical and effective apertures, effectiveheight, and polarization.			CO2
	C	Friis transmission formula, antenna field zones. Transmission loss as a function of frequency.			CO2
	Unit 3	**Practical Antennas I**			
	A	Antennas as aperture arrays of point sources.			CO3
	B	Helical antenna: Helical geometry, transmission radiation modes, practical design considerations, wide band characteristics of helical antenna.			CO3
	C	**Reflector antennas**: Parabolic reflector, paraboloidal reflector, off axis operation of paraboloidal reflectors.			CO3
	Unit 4	**Practical Antennas II**			
	A	Broadband antenna, Frequency independent antenna, log periodic antennas.			CO4
	B	Slot patch and Horn antennas: Slot antenna, its pattern, Babinet's principle and complementary antennas, impedance of slot antennas, and horn antenna-function and types.			CO4
	C	Microstrip (patch) antennas: Rectangular and circular etc. types-function, features analysis, designconsiderations and applications			CO4
	Unit 5	**Radio Wave Propagation**			
	A	Modes of propagation, ground wave propagation, structure of Troposphere and Ionosphere. Characteristic of ionospheric layers, skip distance, fading, and ionospheric absorptions. Sky wave propagation. Space wave propagation and super refraction.			CO5,CO6
	B	Antenna Measurements: Introduction, Antenna Measurement ranges, Radiation pattern Measurements.			CO5,CO6
	C	Antennas Applications: Satellite communication and radio astronomy.			CO5,CO6
	Course Evaluation	CA	ETE	MTE	
		25%	25%	50%	
	Text book :	1. Antenna Theory: Analysis and Design- Constantine A. Balanis; 2nd edn, John Wiley and Sons			
	Reference books	1. Antenna and Wave Propagation- John D. Kraus; 4th edn, Tata McGraw Hill Antenna and Wave Propagation- K. D. Prasad; 3rd edn, Satya Prakashan and Sons			

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

Course Code	**ARP 306**	Course Name: **Campus to Corporate**
Course Title	**Campus to Corporate**	
Credits	2	
Contact Hours (L-T-P)	0-0-4	
Course Status	Active	
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 enhanceemployability skills. By the end of this semester, a will have entered the threshold of his/her 4th phase of employability enhancement and skill building activity exercise.	
Course Outcomes	After completion of this course, students will be able to: CO1: Develop a creative resume, 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: to 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.	
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	

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	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 6Pillars of self-esteem and awareness – Nathaniel Brandon* | *Goal Setting (English, Paperback, Wilson Dobson*			

School: SSET **Batch : 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**			
1	Course Code	ECP361	
2	Course Title	Digital Signal Processing Lab	
3	Credits	1	
4	Contact Hours (L-T-P)	0-0-2	
	Course Status	Compulsory	
5	Course Objective	• To categorise various types of Signals and Systems • To use Discrete and Fast Fourier and Fast Fourier Transform for system analysis. • To implement Digital Systems both FIR and IIR. • To design Digital Filters.	
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: understand and analyse various discrete time signals by Discrete Fourier transform. CO2: understand and apply other fast algorithm to find DFT CO3: understand and apply various realisation techniques CO4: design and apply various methods for FIR systems CO5: design and apply various methods for IIR systems. CO6: To design FIR and IIR filters by various techniques.	
7	Course Description	Digital signal processing (DSP) is at the heart of many applications in a wide array of fields: speech and audio processing, system monitoring and fault detection, biomedical signal analysis, mobile and internet communications, radar and sonar, vibration measurement and analysis, seismograph analysis, image/video coding and decoding, etc. The objective of this course is to strengthen students‟ knowledge of DSP fundamentals and familiarize them with practical aspects of DSP algorithm development and implementation.	
8	Outline syllabus		CO Mapping
	Unit 1	To find out DFT and IDFT of asequence. To obtain linear convolution of asequence To obtain circlar convolution	CO1 ,CO2
	Unit 2	To find FFT of a given sequence.	CO2
	Unit 3	To obtain direct realization of FIR and IIR filters.	CO3, CO4
	Unit 4	a) To design FIR using Rectangular Hanning,	CO3, CO4

		b) Hamming and Blackmann window. c) To design Low pass and High pass filter using window technique. To design band pass and band reject filter usingwindows			
	Unit 5	a) To design IIR filter using Bilinear Transformation method. To design IIR filter using impulse invariantmethod.			CO5, CO6
	Value Added	a) Introduction to Simulink, Communication Tool box and Digital processing tool box. b) To display and analyse multiple FIR filters, using FV tool (Plot magnitude and phase response).			CO5, CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Lab Manuals			

School: SSET **Batch : 2023 – 2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**		
Course Code	**ECP394**	Course Name: Project Based Learning -4
Course Title	Project Based Learning -4	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Compulsory	
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	
Course Outcomes	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	
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 specificationsand all subjects of that Semester.	
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
	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*				
	Other References				

SYLLABUS TERM-VII

School: SSET **Batch: 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VII**		
Course Code	**ECE491**	Course Name: Major Project -1
Course Title	Major Project -1	
Credits	2	
Contact Hours (L-T-P)	0-0-0	
Course Status	Compulsory	
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.	
Course Outcomes	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.	
Course Description	The object of Major Project-I is to enable the student to take up investigative study in the broad 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.	
Outline syllabus		CO Mapping
Unit 1	Problem identification, Literature survey/Gather & analyze information from multiple sources	CO1,
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)	CO2
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	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 projectwork.			
Mode of examination	Practical/viva			
Weightage Distribution	CA	CE	ETE	
	25%	25%	50%	

SYLLABUS TERM-VIII

School: SSET **Batch: 2023-2027** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VIII**		
Course Code	**ECE492** Course Name: Major Project -2	
Course Title	Major Project -2	
Credits	8	
Contact Hours (L-T-P)	0-0-16	
Course Status	Compulsory	
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	
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.	
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.	
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/viva	

Weight age Distribution	CA	CE	ETE
Text book/s*	25%	25%	50%
	Relevant Publ lications		

PROGRAMME ELECTIVE

School: SSET
Batch:2023-2027
Department: EECE
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
Semester: IV

1	Course Code	ECE068	
2	Course Title	IoT: Architecture and Programming	
3	Credits	2	
4	Contact Hours (L-T-P)	2-0-0	
	Course Status	Core	
5	Course Objective	This course provides a preliminary view on Logical and Physical Design of IoT systems and gives an overview of Data analytics for IoT.	
6	Course Outcomes	The students will be able to: CO1: Recall the basic concepts of Internet of Things CO2: Explain the concepts of logical design of IoT System using Python. CO3: Demonstrate the Raspberry Pi interfaces with Python CO4: Interpret the IoT Physical Servers and Cloud Offerings CO5: Make use of data analytics for IoT using Apache Hadoop CO6: Utilize the IoT reference architecture required in building IoT based solutions.	
7	Course Description	The course focuses on understanding the vision of IoT from a global perspective, understand its applications, and determine its market perspective, using gateways, devices and data management, building a state of art architecture in IoT and its applications in commercial building automation and real world design constraints.	
8	Outline syllabus		CO Mapping
	Unit 1	**Introduction to IoT**	
	A	Introduction, Physical Design of IOT, Logical design of IoT, IoT Levels & Development Templates	CO1
	B	Difference between IoT and M2M, SDN and NFV for IoT, Need for IoT systems management, Simple Network Management Protocol (SNMP)	CO1
	C	Network operator requirements, NETCONF, YANG, IoT systems Management with NETCONF, YANG	CO1
	Unit 2	**IoT Systems- Logical Design using Python**	
	A	Language features of Python, Data types, data structures, Control of flow	CO1, CO2
	B	Functions, modules, packaging, file handling, data/time operations, classes	CO1, CO2
	C	Python packages for Internet of Things	CO1, CO2
	Unit 3	**IoT Physical Devices and Endpoints**	
	A	Basic building blocks of an IoT device, Exemplary Device: Raspberry Pi	CO1, CO2, CO3
	B	About the board, Raspberry Pi interfaces	CO1, CO2, CO3
	C	Programming Raspberry Pi with Python	CO1, CO2, CO3
	Unit 4	**IoT Physical Servers and Cloud Offerings**	
	A	Introduction to Cloud Storage models and communication APIs	CO1, CO2, CO4

	B	Webserver – Web server for IoT, Cloud for IoT			CO1, CO2, CO4
	C	Python web application framework, Amazon Web services for IoT			CO1, CO2, CO4
	Unit 5	**Data analytics for IoT**			
	A	Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis			CO5, CO6
	B	Apache Oozie, Apache Spark, Apache Storm			CO5, CO6
	C	Using Apache Storm for Real-time Data Analysis			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Arshdeep Bahga and Vijai Madisetti : A Hands-on Approach "Internet of Things", Universities Press 2015. 2. "Internet of Things with Python" Gastón C. Hillar,Published by Packt Publishing Ltd. Livery Place 35 Livery Street Birmingham B3 2PB, UK. ISBN 978-1-78588-138-1			
	Other References	1. Kamal, R., (2017), Internet of Things - Architecture and Design Principles, 1st Edition, Mcgraw Hill. 2. Misra, S., Introduction to Internet of Things, NPTEL Course Material, Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur, https://nptel.ac.in/courses/106105166/ 3. Samuel Greengard, " The Internet of Things", The MIT press, 2015. 4. Adrian McEwen and Hakim Cassimally "Designing the Internet of Things "Wiley,2014.			

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: IV**		
Course Code	ECP068	
Course Title	IoT: Architecture and Programming Lab	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Core	
Course Objective	This course provides a preliminary view on Logical and Physical Design of IoT systems and gives an overview of Data analytics for IoT.	
Course Outcomes	The students will be able to: CO1: Demonstrate the concepts of IoT for home automation andsecurity. CO2: Develop of logical design of IoT System using Python. CO3: Construct the Raspberry Pi interfaces with Python CO4: Interpret the IoT Physical Servers and Cloud Offerings CO5: Evaluate data analytics for IoT using Apache Hadoop CO6: Utilize the IoT reference architecture required in building IoTbased solutions.	
Course Description	The course focuses on understanding the vision of IoT from a global perspective, understand its applications, and determine its market perspective, using gateways, devices and data management, building a state of art architecture in IoT and its applications in commercial building automation and real world design constraints.	
Outline syllabus		CO Mapping
Unit 1	**Introduction to IoT**	
A	Sending e-mail from IoT kit.	CO1
B	Internet based home automation system	CO1
C	Internet based home securitysystem	CO1
Unit 2	**IoT Systems- Logical Design using Python**	
A	Python-Based Multicolored-LED control	CO1, CO2
B	Water level monitoring using Python	CO1, CO2
C	Water level monitoring Moisture sensing and logging using python.	CO1, CO2
Unit 3	**IoT Physical Devices and Endpoints**	
A	Touchscreen photo-booth with a Raspberry Pi	CO1, CO2, CO3
B	Raspberry Pi weather forecast display and.	CO1, CO2, CO3
C	Programming Raspberry Pi for Home automation system	CO1, CO2, CO3
Unit 4	**IoT Physical Servers and Cloud Offerings**	
A	Internet or intranet-controlled motor	CO1, CO2, CO4
B	Design IoT-Enabled Embedded Web Server and Server-less based web application.	CO1, CO2, CO4
C	Design IoT-Enabled Server-less based web application.	CO1, CO2, CO4
Unit 5	**Data analytics for IoT**	

	A	Improvement of smart city technologies to reduce pollutionlevels	CO5, CO6

B	Enhance traffic conditions using IoT			CO5, CO6
C	Enhance Internet-based street light control using IoT			CO5, CO6
Mode of examination	Practical/Viva			
Weightage Distribution	CA	CE	ETE	
	25%	25%	50%	
Text book/s*	1. Arshdeep Bahga and Vijai Madisetti : A Hands-on Approach "Internet of Things", Universities Press 2015. 2. "Internet of Things with Python" Gastón C. Hillar,Published by Packt Publishing Ltd. Livery Place 35 Livery Street Birmingham B3 2PB, UK. ISBN 978-1-78588-138-1			
Other References	1. Kamal, R., (2017), Internet of Things - Architecture and Design Principles, 1st Edition, Mcgraw Hill. 2. Misra, S., Introduction to Internet of Things, NPTEL Course Material, Department of Computer Science and Engineering, Indian Institute of Technology Kharagpur, https://nptel.ac.in/courses/106105166/ 3. Samuel Greengard, " The Internet of Things", The MIT press, 2015. 4. Adrian McEwen and Hakim Cassimally "Designing the Internet of Things "Wiley,2014.			

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**		
Course Code	ECP067	
Course Title	IoT: Sensing & Actuator Devices Lab	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Compulsory	
Course Objective	The objective of this course is to introduce the students the fundamental principles of sensing technology. Also to explain the characteristics and interfacing techniques with different types of sensors and actuators.	
Course Outcomes	The students will be able to: CO1: Demonstrate the use of general sensors in IoT CO2: Illustrate the use of electrical, proximity and distance sensors. CO3: Experiment with various ultrasound and motion sensors CO4: Examine the use of various environmental sensors and optical devices. CO5: Design the IoT application using mechanical drivers, DC motor and servo motor actuators. CO6: Develop the small IoT projects based on sensors & actuators.	
Course Description	This course gives an overview of sensors used in IoT with sampling frequency and bandwidth requirements for different sensors. The course also describes the interface common sensors and actuators to IoT development kits.	
Outline syllabus		CO Mapping
Unit 1	**Introduction to Sensors and Sensing**	
A	Touch sensors: Button, Force sensor Capacitive sensor	CO1, CO6
B	Light sensors: Photoresistor,	CO1, CO6
C	Photodiode,Phototransistor	CO1, CO6
Unit 2	**Sensors and Sensing-I**	
A	Electrical characteristic sensors: Voltage sensorCurrent sensor	CO2, CO6
B	Proximity and distance sensors	CO2, CO6
C	Optocoupler, Infraredsensor	CO2, CO6
Unit 3	**Sensors and Sensing-II**	
A	Ultrasound sensor, Motion detector	CO3, CO6
B	Angle sensors: Potentiometer, The inertial measurement unit (IMU),	CO3, CO6
C	Hall sensor, Globalpositioning system	CO3, CO6
Unit 4	**Actuator-I**	
A	Implementation of Environment sensors	CO4, CO6
B	Implementation of LCD	CO4, CO6
C	Implementation of LED, OLED	CO4, CO6
Unit 5	**Actuators-II**	
A	Mechanical drivers, Relay, Solenoid, Speaker	CO5, CO6
B	DC motor (one direction)	CO5, CO6
C	Stepper motor, Servomotor	CO5, CO6

	Mode of examination	Practical/Viva	

Weightage Distribution	CA	CE	ETE	
	25%	25%	50%	
Text book/s*	1. Internet of Things, by the IOT-OPEN.EU consortium: 2016–2019, Erasmus+ 2. Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies &Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024',Yole Development Copyrights ,2014. 3. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015			
Other References	1. Editors OvidiuVermesan Peter Friess,'Internet of Things – From Research and Innovation to Market.Deployment', River Publishers, 2014. 2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.			

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**			
Course Code	ECE067		
Course Title	IoT: Sensing & Actuator Devices		
Credits	3		
Contact Hours (L-T-P)	3-0-0		
Course Status	Core		
Course Objective	The objective of this course is to introduce the students the fundamental principles of sensing technology. Also to explain the characteristics and interfacing techniques with different types of sensors and actuators.		
Course Outcomes	The students will be able to: CO1: Define the general concepts of sensors used in IoT CO2: Classify proximity, ultrasound and motion sensors based on knowledgeand principles of working. CO3: Compare various environmental sensors. CO4: List the various optical device drivers and displays actuators for IoT. CO5: Examine the mechanical drivers, DC motor and servo motor actuatorsfor IoT. CO6: Develop the small IoT projects based on sensors & actuators.		
Course Description	This course gives an overview of sensors used in IoT with sampling frequency and bandwidth requirements for different sensors. The course also describes the interface common sensors and actuators to IoT development kits.		
Outline syllabus			CO Mapping
Unit 1	**Introduction to Sensors and Sensing**		
A	Understanding and classification of sensors and actuators, Characteristics of Sensors, Touch sensors: Button, Force sensor Capacitive sensor		CO1
B	Light sensors: Photoresistor, Photodiode, Phototransistor		CO1
C	Electrical characteristic sensors: Voltage sensor Current sensor		CO1
Unit 2	**Sensors and Sensing-I**		
A	Proximity and distance sensors: Optocoupler, Infrared sensor		CO1, CO2, CO6
B	Ultrasound sensor, Motion detector		CO1, CO2, CO6
C	Angle sensors: Potentiometer, The inertial measurement unit (IMU), Hall sensor, Global positioning system		CO1, CO2, CO6
Unit 3	**Sensors and Sensing-II**		
A	Environment sensors: Temperature sensor		CO1, CO3, CO6
B	Humidity sensor, Sound sensor		CO1, CO3, CO6
C	Chemical/smoke and gas sensor Level sensor		CO1, CO3, CO6
Unit 4	**Actuator-I**		
A	Optical device drivers and their devices: Light-emitting diode		CO1, CO4, CO6
B	Displays: Liquid-crystal display (LCD),		CO1, CO4, CO6

C	Organic light-emitting diode display (OLED), Electronic ink display (E ink)			CO1, CO4, CO6
Unit 5	**Actuator-II**			
A	Mechanical drivers, Relay, Solenoid, Speaker			CO1, CO5, CO6
B	DC motor (one direction)			CO1, CO5, CO6
C	Stepper motor, Servomotor			CO1, CO5, CO6
Mode of examination	Theory			
Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Textbook/s*	4. Internet of Things, by the IOT-OPEN.EU consortium: 2016–2019, Erasmus+ 5. Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies &Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024',Yole Development Copyrights ,2014. 6. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015			
Other References	3. Editors OvidiuVermesan Peter Friess,'Internet of Things – From Research and Innovation to Market.Deployment', River Publishers, 2014. 4. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.			

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School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**		
Branch: ECE	**Semester: VI**	
Course Code	ECP066	
Course Title	Wireless Technologies for IoT Lab	
Credits	1	
Contact Hours (L-T-P)	0-0-2	
Course Status	Core	
Course Objective	Study the wireless channel characteristics and performance issues. • Discuss cellular communication and modulation schemes. • Review next generation cellular standards.	
Course Outcomes	The students will be able to: CO1: Utilize the path loss model to find the losses. CO2: Experiment with Communication Toolbox in MATLAB CO3: Inspect WLAN Multipath Channel CO4: Make use of Simulink in MATLAB CO5: Develop Spread spectrum schemes on Simulink. CO6: Utilize the wireless technologies for IoT based solutions.	
Course Description	This course reviews the various communication standards in wireless domain. This course will provide students an understanding about the wireless standards, modes of communication and efficiency criteria	
Outline syllabus		CO Mapping
Unit 1	**Free space Propagation**	
A	Path Loss model to determine the free space loss.	CO1,CO6
B	Path Loss model to determine the power received using Matlab program	CO1,CO6
Unit 2	**Introduction to the IEEE80211.a WLAN PHY Communication Toolbox in MATLAB**	
A	What is IEEE 802.11a WLAN PHY? Briefly explain the functions of each blue block in the model diagram.	CO2,CO6
B	What type of shadowing is IEEE802.11 WLAN based on.	CO2,CO6
Unit 3	**Investigation on WLAN Multipath Channel**	
A	Plot BER-SNR and Bit Rate-SNR graphs for different types of fading channel i. No Fading ii. Flat Fading iii. Dispersive Fading	CO3,CO6
B	Plot BER-SNR and Bit Rate-SNR graphs for different types of fading channel for Dispersive Fading	CO3,CO6
Unit 4	**Introduction to Simulink**	
A	Familiarize with the block components of Simulink in MATLAB	CO4,CO6
B	Setup a basic integrator for a square wave input and note the parameters like amplitude, frequency etc	CO4,CO6
Unit 5	**Implementation of Spread spectrum Simulink**	
A	Implement a Direct Sequence Spread Spectrum with Matlab Simulink	CO5,CO6

	B	Implement a simple steganography system which can send a hidden text message enveloped by a speech signal using DSSS			CO5,CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	Rappaport Theodore S “Wireless Communication, Principle and Practice”, Second Edition, Pearson, 2015.			
	Other References	Aditya K Jagannatham , Principles of Modern Wireless Communication Systems' .1st Edition, Mcgraw Hill.			

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**			
Course Code	ECE066		
Course Title	Wireless Technologies for IoT		
Credits	3		
Contact Hours (L-T-P)	3-0-0		
Course Status	Core		
Course Objective	This aim of this course is to introduce relevant concepts and emerging trendsin wireless technology and its applications.		
Course Outcomes	The students will be able to: CO1: Develop the basic concept of RF signals and wireless communication. CO2: Identify the concepts of cellular network and generations of mobile communication. CO3: List the various organization protocols of WLAN. CO4: Interpret Wi-Fi hardware and software for appropriate functions. CO5: Explain the functions of wireless PAN with Bluetooth, wifi and 6LoPAN. CO6: Design IoT based solutions using the wireless technologies.		
Course Description	Wireless and mobile systems have become ubiquitous, playing a significantrole in our everyday life. However, the increasing demand for wireless connectivity and the emergence of new areas such as the Internet of Things present new research challenges.		
Outline syllabus			CO Mapping
Unit 1	**RF Basics: Radio Frequency (RF) Fundamentals:**		
A	Introduction to RF & Wireless Communications Systems, RF and Microwave Spectral Analysis, Communication Standards		CO1
B	Understanding RF & Microwave Specifications. Spectrum Analysis of RF Environment, Protocol Analysis of RF Environment, Units of RF measurements		CO1
C	Factors affecting network range and speed, Environment, Line-of-sight, Interference, Defining differences between physical layers- OFDM.		CO1
Unit 2	**Cellular Standards**		
A	Cellular carriers and Frequencies, Channel allocation, Cell coverage, Cell Splitting, Microcells, Picocells		CO1, CO2
B	Handoff, 1st, 2nd, 3rd and 4th Generation Cellular Systems (GSM, CDMA, GPRS, EDGE,UMTS),		CO1, CO2
C	Mobile IP, WCDMA, Data Protocols (MQTT, CoAP)		CO1, CO2
Unit 3	**WLAN**		
A	Wi-Fi Organizations and Standards: IEEE, Wi-Fi Alliance, WLAN Connectivity		CO1, CO2, CO3
B	WLAN QoS & Power-Save, IEEE 802.11 Standards		CO1, CO2, CO3

C	IEEE 802.11 Standards: 802.11- 2007, 802.11a/b/g, IEEE 802.11e/h/i,802.11n			CO1, CO2, CO3
Unit 4	**Wi-Fi Hardware & Software**			
A	Access Points, WLAN Routers, WLAN Bridges, WLAN Repeaters,			CO1, CO2, CO4
B	Direct-connect Aps, distributed connect Aps, PoE Infrastructure			CO1, CO2, CO4
C	Endpoint, Client hardware and software, Wi-Fi Applications			CO1, CO2, CO4
Unit 5	**WSN & WPN**			
A	Wireless Personal Area Networks, Bluetooth, Bluetooth Standards, Bluetooth Protocol Architecture,			CO5, CO6
B	UWB, IEEE 802.15.4 standards, ZigBee, 6LoWPAN, Sub GHz, Sensor Networks,			CO5, CO6
C	Coexistence strategies in Sensor Networks, Routing protocols in Wireless Sensor Networks.			CO5, CO6
Mode of examination	Theory			
Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Text book/s*	1. Rappaport Theodore S “Wireless Communication, Principle and Practice”, Second Edition, Pearson, 2015.			
Other References	1. Aditya K Jagannatham , Principles of Modern Wireless Communication Systems' .1st Edition, Mcgraw Hill.			

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**				
Course Code	ECP061			
Course Title	Android with IoT Lab			
Credits	1			
Contact Hours (L-T-P)	0-0-2			
Course Status	Elective			
Course Objective	This course aim to give an overview of Android with IoT, its architecture, challenges, and applications in different context.			
Course Outcomes	The students will be able to: CO1: Demonstrate the basics of Android Things on Raspberry CO2: Build the Android Things project. CO3: Construction of connecting control peripherals with Android Things CO4: Experiment with GPIO pins and PIR sensors using Android Things CO5: Develop a small Android App with IoT CO6: Build IoT application using Android Things			
Course Description	The course is intended to know fundamentals of Android Platform, Android application components; integration of Android with IoT, the main focus is on implementing IoT projects using Android Things.			
Outline syllabus				CO Mapping
Unit 1	**Introduction**			
A	Install Android Things on Raspberry			CO1, CO6
B	Testing the installation: Connect Raspberry Pi to a video using the HDMI, Connect Raspberry Pi to your network using the LAN connection,			CO1, CO6
C	Connect Raspberry Pi to your Mac/PC using a USB cable			CO1, CO6
Unit 2	**Android Things Project**			
A	Creating the first Android Things project			CO2, CO6
B	Cloning the template project			CO2, CO6
C	Create the project manually			CO2, CO6
Unit 3	**Connecting Control peripherals with Android Things**			
A	Study the Android Things and how it works			CO3, CO6
B	Create your first Android Things app			CO3, CO6
Unit 4	**Android Things with IoT-I**			
A	Creating an Alarm System Using Android Things			CO4, CO6
B	Use GPIO pins and PIR sensors			CO4, CO6
C	Handle events from aGPIO pin			CO4, CO6
Unit 5	**Android Things with IoT-II**			
A	Build an app that is independent of the board			CO5, CO6
B	Implementation of notifying events from Android Things to Android			CO5, CO6
Mode of examination	Practical/Viva			
	CA	CE	ETE	

Weightage Distribution	25%	25%	50%	
Textbook/s*	1. Android Things Projects by Francesco Azzola Publisher: Packt Publishing 2. Anubhav Pradhan and Anil V. Deshpande , Composing Mobile Apps: Learn, Explore, Apply Using Android , 1st Edition, Wiley India.			
Other References				

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VI**		
Course Code	ECE061	
Course Title	Android with IoT	
Credits	2	
Contact Hours (L-T-P)	2-0-0	
Course Status	Elective	
Course Objective	This course aim to give an overview of Android with IoT, its architecture, challenges, and applications in different context.	
Course Outcomes	The students will be able to: CO1: Define the basics of Android platform. CO2: Outline the Components of Android CO3: Identify IoT ecosystem and role of the Android Things CO4: Analyze Android Things with IoT cloud platforms. CO5: Evaluate Android Things in IoT projects. CO6: Develop an Android App with IoT	
Course Description	The course is intended to know fundamentals of Android Platform, Android application components; integration of Android with IoT, The main focus is on implementing IoT projects using Android Things.	
Outline syllabus		CO Mapping
Unit 1	**Introduction to Android Platform**	
A	Features of Android, Architecture of Android	CO1
B	Configuration of android SDK	CO1
C	Android application structure, Generation of APK Files for Android Projects	CO1
Unit 2	**Components of Android**	
A	Components of Android architecture	CO1, CO2
B	Activity, Activity life cycle	CO1, CO2
C	Service, Service life cycle, Concept of Intent	CO1, CO2
Unit 3	**Android and IoT**	
A	Internet of Things overview & its components	CO3
B	Android Things overview, Android Things board compatibility	CO3
C	Installation of Android Things	CO3
Unit 4	**Integrate Android Things with IoT Cloud Platforms**	
A	IoT cloud architecture & IoT cloud platform overview	CO3, CO4
B	IoT cloud architecture overview	CO3, CO4
C	Android with Android Things	CO3, CO4
Unit 5	**Android Things**	
A	Creating the first Android Things project	CO5, CO6
B	Streaming data to the IoT cloud platform	CO5, CO6
C	Developing an Android app to retrieves data from Android Things	CO5, CO6
Mode of examination	Theory/Jury/Practical/Viva	

Weightage Distribution	CA	MTE	ETE	
	25%	25%	50%	
Text book/s*	1. Android Things Projects by Francesco Azzola Publisher: Packt Publishing 2. Anubhav Pradhan and Anil V. Deshpande , Composing Mobile Apps: Learn, Explore, Apply Using Android , 1st Edition, Wiley India.			

School: SSET
Batch: 2023-2027
Department: EECE
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
Semester: VI

1	Course Code	ECP062			
2	Course Title	Raspberry Pi and its Programming Lab			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Elective			
5	Course Objective	The primary objective of this course to provide a platform to get started with the Internet of Things with Raspberry Pi along with the basic knowledge of programming and interfacing of the input/output devices.			
6	Course Outcomes	CO1: List the basic components of Raspberry Pi CO2: Demonstrate the Face recognition and LED Blink using Raspberry Pi CO3: Demonstrate the Pull-Down and Pull-Up Configuration using Raspberry Pi CO4: Build Relay and DC Motor using Raspberry Pi CO5: Construct interfaces for LCD and ultrasonic sensor using Raspberry Pi CO6: Design and develop various applications using Raspberry Pi			
7	Course Description	This course provides a gradual pace of basic concepts to advanced interfacing and programming of Raspberry Pi for IoT based projects.			
8	Outline syllabus				CO Mapping
	Unit 1	**Basics of Raspberry Pi**			
	A	Installing the Remote Desktop Server			CO1, CO6
	B	Raspberry Pi Camera as a USB Video Device			CO1, CO6
	Unit 2	**Programming with Raspberry Pi-I**			
	A	Face Recognition Using Raspberry Pi			CO2, CO6
	B	LED Blink Using Function			CO2, CO6
	Unit 3	**Programming with Raspberry Pi-II**			
	A	Pull-Down Configuration			CO3, CO6
	B	Pull-Up Configuration			CO3, CO6
	Unit 4	**Interfacing with Raspberry Pi - I**			
	A	Interfacing of Relay with Raspberry Pi			CO4, CO6
	B	Interfacing of DC Motor with Raspberry Pi			CO4, CO6
	Unit 5	**Interfacing with Raspberry Pi - II**			
	A	Interfacing of LCD with Raspberry Pi			CO5, CO6
	B	Interfacing of Ultrasonic Sensor with Raspberry Pi			CO5, CO6
	Mode of examination	Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	1. Internet of Things with Raspberry Pi and Arduino, Anita Gehlot, Lovi Raj Gupta et.al, CRC Press			

	Other References	1. Programming the Raspberry Pi, Getting started with Python, Simon Monk, Mc Graw Hill 2. Python Programming for Raspberry Pi, Richard Blum, Christine Bresnahan, Pearson Education	

School: SSET
Batch: 2023-2027
Department: EECE
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
Semester: VI

1	Course Code	ECP063			
2	Course Title	Artificial Intelligence for IoT Lab			
3	Credits	1			
4	Contact Hours (L-T-P)	0-0-2			
	Course Status	Elective			
5	Course Objective	The aim of this course is to cover various aspects of artificial intelligence (AI) and its implementation to make IoT solutions smarter.			
6	Course Outcomes	The students will be able to: CO1: Illustrate the special DL libraries, Access and process data from various distributed sources CO2: Perform regression and logistic regressor machine learning technique for IoT data CO3: Perform SVM and Gausian Naive Bayes learning for IoT data CO4: Improving the model using various techniques CO5: Implementing AI from case study of Smart Cities CO6: Apply different AI techniques including machine learning using Tensor Flow and Keras			
7	Course Description	This course describes basic understanding of machine learning concepts. This course also involves the AI and ML techniques to develop smart systems for IoT.			
8	Outline syllabus				CO Mapping
	Unit 1	**Special DL libraries**			
		Installing Tensor Flow & Keras and download datasets			CO1, CO6
		Working with different dataset formats			CO1, CO6
	Unit 2	**Machine Learning for IoT-I**			
		Electrical power output prediction using regression			CO2, CO6
		Classifying wine using logistic regressor			CO2, CO6
	Unit 3	**Machine Learning for IoT-II**			
		Classifying wine using SVM			CO3, CO6
		Gaussian Naive Bayes for wine quality			CO3, CO6
	Unit 4	**Improving the model**			
		Feature scaling to resolve uneven data scale			CO4, CO6
		Hyperparameter tuning and grid search			CO4, CO6
	Unit 5	**AI for Smart Cities IoT**			
		Adapting IoT for smart cities and the necessary steps			CO5, CO6
		Detecting crime using city's crime data			CO5, CO6
	Mode of examination	-Practical/Viva			
	Weightage Distribution	CA	CE	ETE	
		25%	25%	50%	
	Text book/s*	1. Hands-On Artificial Intelligence for IoT, Amita Kapoor, Publisher: Packt Publishing			

School: SSET
Batch: 2023-2027
Department: EECE
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
Semester: VI

1	Course Code	ECE063		
2	Course Title	Artificial Intelligence for IoT		
3	Credits	2		
4	Contact Hours (L-T-P)	2-0-0		
	Course Status	Elective		
5	Course Objective	The aim of this course is to cover various aspects of artificial intelligence (AI) and its implementation to make IoT solutions smarter.		
6	Course Outcomes	The students will be able to: CO1: Apply the principles and foundations of IoT and AI CO2: Demonstrate different ML paradigms for IoT based applications. CO3: Construct IoT based applications with Naïve Bayes, Decision tree and ensemble learning. CO4: Improving the model using various techniques. CO5: Implementing AI from case study of Smart Cities CO6: Apply different AI techniques including machine learning using TensorFlow and Keras		
7	Course Description	This course describes basic understanding of machine learning concepts. This course also involves the AI and ML techniques to develop smart systems for IoT.		

8	Outline syllabus		CO Mapping
	Unit 1	**Principles and Foundations of IoT and AI**	
	A	IoT Reference Model, IoT platforms, IoT verticals	CO1
	B	Big data and IoT, Infusion of AI- data science in IoT	CO1
	C	Cross-industry standard process for data mining, AI platforms and IoT platforms	CO1
	Unit 2	**Machine Learning for IoT-I**	
	A	ML and IoT, Learning paradigms, Prediction using linear regression	CO2, CO6
	B	Logistic regression for classification: Cross-entropy loss function	CO2, CO6
	C	Classification using support vector machines, Maximum margin hyperplane, Kernel trick	CO2, CO6
	Unit 3	**Machine Learning for IoT-II**	
	A	Naive Bayes	CO3, CO6
	B	Decision trees: Decision trees in scikit, Decision trees in action	CO3, CO6
	C	Ensemble learning: Voting classifier, Bagging and pasting	CO3, CO6
	Unit 4	**Improving the model**	
	A	Feature scaling to resolve uneven data scale	CO4, CO6
	B	Overfitting: Regularization, Cross-validation	CO4, CO6
	C	No Free Lunch theorem	CO4, CO6

	Unit 5	**AI for Smart Cities IoT**			
	A	Need of smart cities, Components of a smart city			CO5, CO6
	B	Smart traffic management, Smart parking, Smart waste management			CO5, CO6
	C	Smart policing, Smart lighting, Smart governance			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Hands-On Artificial Intelligence for IoT, Amita Kapoor, Publisher: Packt Publishing			
	Other References				

School: SSET **Batch: 2023-2027** **Department: EECE** **Programme: B.Tech.** **Current Academic Year: 2023-24** **Branch: ECE** **Semester: VII**				
1	Course Code	ECE064		
2	Course Title	Internet of Things Security		
3	Credits	3		
4	Contact Hours (L-T-P)	3-0-0		
	Course Status	Core		
5	Course Objective	The aim of this course is to educate students on key areas in IoT security. This also discusses the security challenges and then provides answers on how to successfully manage IoT security and build a safe infrastructure for smart devices.		
6	Course Outcomes	The students will be able to CO1: Define the concepts to IoT security in enterprise. CO2: Outline IoT security and vulnerability threats. CO3: Compare different IoT protocols and their security measures. CO4: Examine how to secure an IoT development CO5: Explain the Identity and Access Management (IAM) Solutions for the IoT CO6: Choose individual components that can affect the security posture of the entire system		
7	Course Description	This course describes how to implement cybersecurity solutions, IoT design best practices, and risk mitigation methodologies to address device and infrastructure threats to IoT solutions.		
8	Outline syllabus			CO Mapping
	Unit 1	**IoT in the Enterprise**		
	A	Defining the IoT, Cybersecurity versus IoT security and cyber-physical systems, IoT uses today		CO1
	B	IoT device lifecycle, The hardware, Operating systems, IoT communications, Messaging protocols, Transport protocols, Network protocols		CO1
	C	Data link and physical protocols, IoT data collection, storage, and analytics, IoT integration platforms and solutions, need to secure IoT		CO1
	Unit 2	**Vulnerabilities, Attacks, and Countermeasures**		
	A	Primer on threats, vulnerability, and risks (TVR)		CO2, CO6
	B	Common IoT attacks, Today's IoT attacks		CO2, CO6
	C	Threat modeling an IoT system		CO2, CO6
	Unit 3	**Security Engineering for IoT Development**		
	A	Building security in to design and development, Security in agile developments, Focusing on the IoT device in operation		CO3, CO6
	B	Safety and security design, Processes, and agreements		CO3, CO6
	C	Technology selection – security products and services		CO3, CO6
	Unit 4	**Cryptography and its role in securing the IoT**		

	A	Types and uses of cryptographic primitives in the IoT, Encryption and decryption, Hashes, Digital Signatures, Random number generation, Cipher suites			CO4, CO6
	B	Cryptographic key management fundamentals			CO4, CO6
	C	Cryptographic controls built into IoT communication and messaging protocols			CO4, CO6
	Unit 5	**Identity and Access Management (IAM) Solutions for the IoT**			
	A	The identity lifecycle, Establish naming conventions and uniqueness requirements			CO5, CO6
	B	Authentication credentials: Passwords, Symmetric Keys, Certificates, Biometrics			CO5, CO6
	C	IoT IAM infrastructure, Authorization and access control			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Practical Internet of Things Security, Brian Russell, Drew Van DurenCopyright © 2016 Packt Publishing			
	Other References	1. A Beginner's Guide to Internet of Things Security, Attacks, Applications, Authentication, and Fundamentals, B. B. Gupta and Aakanksha Tewari, CRC Press 2. Internet of Things Security, Challenges, Advances, and Analytics, Chintan Patel and Nishant Doshi, CRC Press			

School: SSET
Batch: 2023-2027
Department: EECE
Programme: B.Tech.
Current Academic Year: 2023-24
Branch: ECE
Semester: VII

1	Course Code	ECE069	
2	Course Title	IoT in Healthcare	
3	Credits	3	
4	Contact Hours (L-T-P)	3-0-0	
	Course Status	Elective	
5	Course Objective	The objective of this course is to give an overview of a people-focused view on IoT by providing an outline of the components that may be included in an IoT-based smart health ecosystem and introduced a set of dimensions to consider in smart health applications. This course also discusses many challenges facing the widespread adoption of smart IoT health care applications.	
6	Course Outcomes	The students will be able to: CO1: Outline the elements of IoT-based health care ecosystems. CO2: Explain the different types of applications that utilize IoT in Healthcare CO3: Discuss the IoT that enables the realization of smart ambulance CO4: Assesses the adoption of this model for diagnosis and prognosis of chronic obstructive pulmonary disease. CO5: Elaborate security, privacy and ethical issues in smart sensor health and well-being application CO6: Discuss the integration of the IoT in patient-focused health applications.	
7	Course Description	IoT can automate patient care workflow with the help healthcare mobility solution and other new technologies, and next-gen healthcare facilities. IoT in healthcare enables interoperability, machine-to-machine communication, information exchange, and data movement that makes healthcare service delivery effective.	
8	Outline syllabus		CO Mapping
	Unit 1	**IoT and People in Health Care**	
	A	Introduction to Smart Health Care Ecosystem, The patient at the centre, Health care providers	CO1
	B	Devices and sensors, Applications and Interfaces	CO1
	C	Other Stakeholders: Social Support, Connecting the components	CO1
	Unit 2	**Dimensions of IoT Applications in Health Care**	
	A	Well-being-Illness, Physical, Temporary-Cure, Prevent-Cure, Monitor-Manage , Internal-External Measures, Health Care Provider-Individual Dimensions	CO1, CO2
	B	Examples of IoT Related Health Care Applications and Their Dimensions	CO1, CO2
	C	Challenges, Lack of Standards,Data Issues, Changing the Health Care Provider-Patient Roles	CO1, CO2
	Unit 3	**Internet of Things in Smart Ambulance and Emergency Medicine**	
	A	IoT in Emergency Medicine, Point-of-CareEnvironment	CO3, CO6
	B	Biosensing Network, Hierarchical Cloud Architecture,	CO3, CO6

		Weather Observation for Remote Rescue			
	C	Integration and Compatibility, Operational Consistency and Reliability Assurance, Electronic Patient Record Retrieval in Multihop Communication			CO3, CO6
	Unit 4	**Case Study: Chronic Obstructive Pulmonary Disease**			
	A	On-scene Diagnosis and Prognosis, Data Acquisition and Analytics			CO4, CO6
	B	Decision and Selection Process, Patient and the Ambient Environment, Smart Ambulance Challenges, Reliability			CO4, CO6
	C	Standards, Staff Training and Operating Procedures, Security and Privacy			CO4, CO6
	Unit 5	**Security, Privacy and Ethical Issues**			
	A	Smart Health and well-being Applications Risk Analysis			CO5, CO6
	B	Cyber-Physical-Social Systems, Machine Ethics, Physical Safety			CO5, CO6
	C	Software Quality, IT Security, Privacy, Risk of Technology Misuse			CO5, CO6
	Mode of examination	Theory			
	Weightage Distribution	CA	MTE	ETE	
		25%	25%	50%	
	Text book/s*	1. Internet of Things A to Z Technologies and Applications, Qusay F. Hassan 2. Intelligent Data Sensing and Processing for Health and Well-being Applications, Miguel Antonio Wister Ovando, Pablo Pancardo Garcia, Francisco Diego Acosta Escalante, Jose Adan Hernandez Nolasco			
	Other References				