Program and Course Structure

School of Engineering & Technology

B. Tech in

Electronics and Communication Engineering

Programme Code: SET0501

Batch: 2018-2022

Vision of the University

To serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship.

Mission of the University

1. Transformative educational experience.
2. Enrichment by educational initiatives that encourage global outlook.
3. Develop research, support disruptive innovations and accelerate entrepreneurship.
4. Seeking beyond boundaries.

Core Values

- Integrity
- Leadership
- Diversity
- Community

Vision of the School

To become a globally acclaimed institution of higher learning in engineering and technology promoting excellence in research, innovation and entrepreneurship to provide sustainable solution to the needs of the society

Mission of the School

To impart quality education with strong industry & academic connectivity in the expanding fields of Engineering and Technology in a conducive and enriching learning environment.

To produce technocrats equipped with technical & soft skills and experiential learning required to stay current with the modern tools in emerging technologies to fulfill professional responsibilities and uphold ethical values.

To inculcate a culture of interdisciplinary research, innovation and entrepreneurship to provide sustainable solutions to meet the growing challenges and societal needs.

To foster collaborative learning and to play adaptive leadership role in professional career and pursuit of higher education through effective mentoring and counseling.

Vision and Mission of the Department of ECE

Vision of the Department

To become an internationally acclaimed destination of academic excellence in the discipline of Electrical, Electronics, and Communication Engineering by promoting research, innovation, and entrepreneurship to serve society.

Mission of the Department

M1-To provide comprehensive technical knowledge in Electrical, Electronics and Communication Engineering.

M2- To facilitate and foster the industry-academia collaboration to enhance technical skills and employability.

M3- To promote interdisciplinary and multi-disciplinary research, innovations and entrepreneurship to serve society.

M4- To develop core values, professional ethics and lifelong learning skills through interactive support systems.

Program Educational Objectives (PEO)

PEO1: The graduates will demonstrate sound engineering and managerial decisions based on ethical and professional standards.

PEO2: The graduates will work on global technological and environmental issues as asuccessful entrepreneur.

PEO3: The graduates will achieve a reputation as a source of innovative solutions to complex engineering problems.

PEO4: The graduates will pursue higher studies to become successful academicians and lead researchers.

Program Outcomes (PO's)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineer ing fundamentals, and an engineering specialization to the solution of complex engineer ing problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environment a l considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineer ing activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineer ing solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance : Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‟s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Ability to adapt the emerging embedded system technologies for designing and prototyping

PSO2: learning recent technologies as Internet of Things (IoT) and Mobile Communication to provide technical solutions to societal needs.

PSO3: Develop hardware, and firmware for automated solutions to solve Industrial problems

Sharda University

School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-ECE Session:2018-22, Term-1

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	AECC
2.	HMM111	Value and Ethics	2	0	0	2	Science	AECC
3.	MTH141	Calculus, Analysis and linear Algebra	3	1	0	4	Maths	AECC
4.	PHY117	Engineering Physics (Semiconductor Physics)	2	1	0	3	Intermediate Physics	AECC
5.	CHY111	Engineering Chemistry	3	0	0	3	Intermediate Chemistry	AECC
6.	FEN101/FEN103	Functional English Beginners-I/Functional English Intermediate-I	0	0	2	1	English	AECC
Practical/Viva-Voce								
7.	CSP113	Programming for Problem Solving	0	0	2	1	Computer operations	CC
8.	MEP106	Computer Aided Design & Drafting	0	0	3	1.5	Mechanics	SEC
9.	ECP106	Introduction to Engineering	0	0	2	1	Physics	SECC
10.	CHY161	Engineering Chemistry Lab	0	0	2	1	Intermediate Chemistry	AECC
11.	ENP102	Functional English Lab-I	0	0	2	1	English	AECC
12.	PHY162	Physics Lab	0	0	2	1	Intermediate Physics	AECC
TOTAL CREDITS						22.5		

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

Sharda University

School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-ECE Batch: 2018-2022, TERM: II

S. No.	Course Code	Course	Teaching Load			Credits DSE	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	Basics of Computers	AECC
2.	MTH143	Differential Equations, Special Transforms and Complex variable	3	1	0	4	Maths	AECC
3.	PHY118	Advanced Physics (Electricity and Magnetism)	2	1	0	3	Intermediate Physics	AECC
4.	EVS103	Engineering Chemistry	2	0	0	2	Intermediate Chemistry	AECC
5.	FEN104	Functional English- Int-II	1	0	0	1	English	AECC
6.	EEE112	Principal of Electrical and Electronics Engineering	2	1	0	3	Intermediate Physics	AECC
Practical/Viva-Voce								
7.	ECP107	Tinkering Lab	0	0	2	1	Intermediate Physics	AECC
8.	CSP114	Application based Programming in Python Lab	0	0	2	1	Basics of Computers	AECC
9.	MEP105	Mechanical Workshop	0	0	3	1.5	Physics	SECC
10.	ENP103	Functional English Lab II	0	0	2	1	English	AECC
11.	PHY161	Physics Lab I	0	0	2	1	Intermediate Physics	AECC
12.	EEP112	Principal of Electrical and Electronics Engineering Lab	0	0	2	1	Intermediate Physics	AECC
TOTAL CREDITS						**22.5**		

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

Sharda University

School of Engineering & Technology
Department of Electrical Electronics and Communication Engineering
B.Tech-ECE
Batch: 2018-2022
TERM: III

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	Type of Course[3]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	HMM305	Management for Engineers	3	0	0	3	-	AECC
2.	MTH145	Probability & Statistics (with MATLAB &Sci Lab)	3	1	0	4	Math's	AECC
3.	ECE237	Analog Circuits –I	3	0	0	3	Electronics	AECC
4.	ECE238	Network Theory	3	0	0	3	Electrical	AECC
5.	ECE240	Digital System Design	3	0	0	3	Electronics	AECC
Practical/Viva-Voce								
6.	ARP203	Aptitude Reasoning and Business Communication Skills-Basic	0	0	4	2		
7.	ECP237	Analog Circuit-I lab	0	0	2	1	Basics Circuits	CC
8.	ECP238	Network Theory Lab	0	0	2	1	Basics Circuits	SEC
9.	ECP240	Digital System Design Lab	0	0	2	1	Electronics	SECC
10.	ECP251	Project Based Learning (PBL) -1	0	0	2	1	-	AECC
11.	ECP294	Summer Internship	-	-	-	1	-	AECC
TOTAL CREDITS						**23**		

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

Sharda University

School of Engineering & Technology
Department of Electrical Electronics and Communication Engineering
B.Tech-ECE

Batch: 2018-2022
TERM: IV

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	Type of Course[4]: 5. CC 6. AECC 7. SEC 8. DSE
			L	T	P			
Theory Subjects								
13.	ECE242	Signals and Systems	3	1	0	4	Engineering Math	AECC
14.	ECE243	Analog Circuits-II	3	1	0	4	Analog Circuit-I	AECC
15.	ECE244	Communication Engineering	3	0	0	3	Basic Electronics	AECC
16.	ECE245	Microprocessor and Microcontroller with Interfacing	3	0	0	3	Digital Electronics	AECC
17.	BTY223	Introduction to Biology for Engineers	2	0	0	2	Basic Sciences	AECC
18.	MOO1/ MOO2/ MOO3	Economic Growth & Development / Managing Change In Organization / Road Map For Patent Creation - (OE)	2	0	0	2	-	
Practical/Viva-Voce								
19.	ECP289	Project Based Learning (PBL) -2	0	0	2	1	-	CC
20.	ECP244	Communication Engineering Lab	0	0	2	1	Basic Electronics	SEC
21.	ECP245	Microprocessor and Microcontroller with Interfacing	0	0	2	1	Digital Electronics	SECC
22.	ARP204	Aptitude Reasoning and Business Communication Skills-Intermediate	0	0	4	2	-	AECC
TOTAL CREDITS						**23**		

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

Sharda University
School of Engineering & Technology
Department of Electrical Electronics and Communication Engineering
B.Tech-ECE ,Batch-2018-22,TERM: V

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	Type of Course[5]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	ECE356	Control systems	3	0	0	3	Network Theory	AECC
2.	ECE357	Digital Communication	3	0	0	3	Communication Engineering	AECC
3.	ECE358	Computer Architecture	3	0	0	3	Digital Electronics	AECC
4.	ECE931 (PE1)	Antennas and Wave Propagation	3	0	0	3	-	AECC
5.	(O.E-2	Open Elective – 2	3	0	0	3	-	AECC
Practical/Viva-Voce								
6.	ECP356	Control systems Lab	0	0	2	**1**		
7.	ECP357	Digital Communication Lab	0	0	2	1	Communication Engineering	CC
8.	ECP351	Technical Skill Enhancement Course-1	0	0	2	1	-	SEC
9.	ECP392	Project Based Learning (PBL) -3	0	0	2	1	-	SECC
10.	ARP301	Quantitative Aptitude Behavioral and Interpersonal Skills	0	0	4	2	-	AECC
11.	ECP394	Summer Internship-II	-	-	-	1	-	AECC
12.	ECC301	Community Connect	-	-	-	2	-	
TOTAL CREDITS							**24**	

Sharda University

School of Engineering & Technology

Department of Electrical Electronics and Communication Engineering

B.Tech-ECE Batch: 2018-2022TERM: VI

S. No.	Course Code	Course	Teaching Load			Credits DSE	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	AECC
2.	ECE362	Computer Network	3	0	0	3	Computer Architecture	AECC
3.	ECE933	CMOS Design	3	0	0	3	-	AECC
4.	ECE934	Wireless Sensor Networks	3	0	0	3	-	AECC
5.	MOO307/ MOO308	Computer Vision and Image Processing - Fundamentals and Applications/ Introduction to Robotics	3	0	0	3	-	AECC
Practical/Viva-Voce								
6.	ARP302	Higher Order Mathematics and Advanced People Skills	0	0	4	2		
7.	ECP361	Digital Signal Processing Lab	0	0	2	1	Signals & Systems	CC
8.	ECP362	Computer Network Lab	0	0	2	1	Computer Architecture	SEC
9.	ECP393	Project Based Learning (PBL) -4	0	0	2	1	-	SECC
10.	ECP352	Technical Skill Enhancement Course-2	0	0	2	1	-	AECC
TOTAL CREDITS						**21**		
Note: Industrial Internship after completion of 6th semester and will be evaluated in 7th Semester.								

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

Sharda University

School of Engineering & Technology
Department of Electrical Electronics and Communication Engineering
B.Tech-ECE
Batch: 2018-2022
TERM: VII

S. No.	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	Type of Course[7]: 1. CC 2. AECC 3. SEC 4. DSE
			L	T	P			
Theory Subjects								
1.	ECE941 / ECE943 (PE-4)	Fibre Optic Communication/Speech and Audio Processing	3	0	0	3	-	AECC
2.	ECE942 / ECE944(PE-5)	Introduction to MEMS/ Adaptive Signal Processing	3	0	0	3	-	AECC
3.	ECE943/ ECE945-PE-6(PE-6)	Information Theory and Coding/Nano electronics	3	0	0	3	-	AECC
4.	MOO401	Introduction to IoT	3	0	0	3	-	AECC
Practical/Viva-Voce								
6.	ECE491	Major Project- 1	-	-	-	3	-	CC
7.	SC22	Comprehensive Examination	0	0	0	0		CC
8.	SC28	Professional Ethics and Values	0	0	0	0	-	CC
9.	ECP481	Industrial Internship	-	-	-	1	-	SEC
TOTAL CREDITS						**16**	-	

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

Sharda University

School of Engineering & Technology
Department of Electrical Electronics and Communication Engineering
B.Tech-ECE
Batch: 2018-2022
TERM: VIII

S. No.	Paper ID	Course Code	Course	Teaching Load			Credits DSE	Pre-Requisite/Co Requisite	Type of Course[8]: 1. CC 2. AECC 3. SEC 4. DSE
				L	T	P			
Practical/Viva-Voce/Jury									
3.		ECE492	Major Project – 2	0	0	16	8	-	AECC
TOTAL CREDITS							**8**	-	

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

SYLLABUS TERM-I

Programming for problem solving

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester:1**		
1	Course Code	**CSE113** Course Name: Programming for problem solving
2	Course Title	Programming for problem solving
3	Credits	4
4	Contact Hours (L-T-P)	3-0-2
	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 for the given problem. CO2: develop better understanding of basic concepts of C programming. CO3: create and implement logic using array and function. CO4: construct and implement the logic based on the concept of strings and pointers. CO5: apply user-defined data types and I/O operations in file. CO6: design and develop solutions to real world problems using
7	Course Description	Programming for problem solving gives the Understanding of C programming andimplement code from flowchart or algorithm
8	Outline syllabus	
	Unit 1	**Logic Building**
	A	Flowchart: Elements, Identifying and understanding input/ output, Branching and iteration in flowchart
	B	Algorithm design: Problem solving approach(top down/bottom up approach)
	C	Pseudo Code : Representation of different construct, writing pseudo-code from algorithm and flowchart
	Unit 2	**Introduction to C Programming**
	A	Introduction to C programming language, Data types, Variables, Constants, Identifiers and keywords, Storageclasses
	B	Operators and expressions, Types of Statements: Assignment, Control, jumping.
	C	Control statements: Decisions, Loops, break, continue
	Unit 3	**Arrays and Functions**
	A	Arrays: One dimensional and multi-dimensional arrays: Declaration, Initialization and array manipulation (sorting,

		searching).		
	B	Functions: Definition, Declaration/Prototyping and Calling, Types of functions, Parameter passing: Call byvalue, Call by reference.		
	C	Passing and Returning Arrays from Functions, Recursive Functions.		
	Unit 4	**Pre-processors and Pointers**		
	A	Pre-processors: Types, Directives, Pre-processors Operators (#,##,\) , Macros: Types, Use, predefined Macros		
	B	Pointer: Introduction, declaration of pointer variables, Operations on pointers: Pointer arithmetic, Arrays and pointers, Dynamic memory allocation.		
	C	String: Introduction, predefined string functions, Manipulation of text data, Command Line Arguments.		
	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.		
	B	Files: Introduction, concept of record, I/O Streaming and Buffering, Types of Files: Indexed file, sequential file andrandom file,		
	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.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/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: SET		**Batch:**
Program: B.TECH .		**Current Academic Year:**
Branch: CSE/EC/EEE		**Semester: II**
1	Course Code	PHY 117
2	Course Title	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, CO1: Students will learn the various fundamental theory of materials and concept of solid classification. CO2: Students will learn the fundamental concepts of mobility, conductivity, electrons and holes in an intrinsic semiconductors, Donor and Acceptor impurities (n-type and p-type semiconductor), Fermi levels etc. CO3: Students will gain knowledge about the formation of depletion region, barrier potential, Zener diode, Characteristics of Zener diode etc. CO4: Students will have a clear understanding of Coherent sources, interactionof radiation with matter (spontaneous and stimulated emission), Einstein‟s relation, population inversion and pumping, etc. CO5: Students will learn the concept of optical sources: Light emitting diode (construction, basic working principle), semiconductor laser (construction, basic working principle), and optical detectors. CO6: Student will be familiar with 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	
	Unit 1	**Physics ofSemiconductor**
	A	Introduction, classical free electron theory (Lorentz-Drude theoryand limitations), Quantum theory of free electron
	B	(Fermi energy, effect of temperature on Fermi-Dirac distribution) (qualitative analysis)
	C	Energy bands, Classification of Solids on the basis of energy band.
	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)
	B	Fermi levels , carrier densities in semiconductor

	C	Concentration of electrons in conduction band and holes in valenceband, Drift and diffusion current, Hall effect.
	Unit 3	**p-n Junction**
	A	p-n junction, types of p-n junction (step-graded and Linearly-graded junction)
	B	formation of depletion region, barrier potential, Zener diode, Characteristics of Zener diode
	C	Avalanche and Zener breakdown, comparison of Zener diode andpn junction diode, concept of tunneling, I-V characteristics of tunnel diode.
	Unit 4	**Laser Physics**
	A	Coherent sources, interaction of radiation with matter (spontaneousand stimulated emission), Einstein‟s relation
	B	population inversion and pumping, active components of laser,optical amplification or gain
	C	threshold condition for laser action, three and four level lasers,Ruby and He-Ne lasers.
	Unit 5	**Optoelectronic Devices**
	A	optical sources: Light emitting diode (construction, basic working principle), semiconductor laser (construction, basic working principle)
	B	optical detectors: photodiode (working principle), p-i-n photodiode
		(working principle),
	C	Photovoltaic effect, p-n junction solar cell (basic working idea).
	Mode of Examination	Theory

Weightage Distribution	CA	MTE	ETE
	30%	20%	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 2. Semiconductor Device Fundamentals- Robert F. PierretAddison Wesley Longman –ISBN:0201543931

School: SET		**Batch :**
Program: B.Tech.		**Current Academic Year:**
Branch: ME, EC, EE, CE		**Semester: I**
1	Course Code	MTH 141
2	Course Title	CALCULUS, ANALYSIS AND LINEAR ALGEBRA
3	Credits	4
4	Contact Hours (L-T-P)	3-1-0
	Course Status	Compulsory
5	Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
6	Course Outcomes	CO1: Explain the concept of differential calculus, illustrate thecurvature and Maxima, minima and saddle point by using Method of Lagrange. (K2,K3, K4) CO2: Explain the concept of integral calculus,describe Beta and Gamma function, calculatemultiple integration and evaluate area and volume. (K1, K2, K3, K4, K5) CO3:Describe the concept of sequence and series;discuss the test of convergence to evaluate convergence of series. (K1, K2,K3, K5) CO4: Discuss the basic of vector calculus; illustrate gradient, curl and divergence. (K1, K3) CO5: Describe and use the concepts line and surface integral for scalar and vector, explain the Green theorem. (K1,K2,K3, K4) 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.(K2,K 3,K4, K5)
7	Course Description	This course is an introduction to the fundamental of Mathematics. The primary objective of the course is to develop the basic understanding of differential and integral calculus, sequence and series, vector calculus and linear algebra.
8	**Outline Syllabus**	**Calculus, Analysis And Linear Algebra**
	Unit 1	**Differential Calculus**
	A	Differentiation, Taylor‟s and Maclaurin‟s theorems with remainders; indeterminate forms and L' Hospital's rule;
	B	Limits and continuity for multivariable and Partial derivatives, Euler‟s theorem total derivative; Tangentplane and normal line (basic concepts);
	C	Expansion of functions of several variables, Maxima,

		minima and saddle points; Method of Lagrange multipliers.		
	Unit 2	**Integral Calculus**		
	A	Beta and Gamma functions and their properties; Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals,		
	B	Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass		
	C	Triple integrals (Cartesian), Simple applications of triple integration.		
	Unit 3	**Sequences and series**		
	A	Convergence of sequence and series,		
	B	tests for convergence: comparison test, D‟ Alembert‟s ratio test,		
	C	Raabe‟s test, Cauchy root test; Power series.		
	Unit 4	**Vector Calculus**		
	A	Gradient, curl and divergence, Scalar line integrals,		
	B	vector line integrals, scalar surface integrals,		
	C	vector surface integrals, Theorems of Green‟s theorem.		
	Unit 5	**Matrices**		
	A	Inverse and rank of a matrix, System of linear equations,		
	B	Symmetric, skew-symmetric and orthogonal matrices; Determinants		
	C	Eigen values and Eigen vectors; Diagonalization of matrices; Cayley - Hamilton Theorem.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. Kreyszig, E., “Advanced Engineering Mathematics”, John Wiley & Sons Inc. - ISBN 978-0-470-45836-5 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		

FEN101:		**FUNCTIONAL ENGLISH**		
BEGINNER – I		**First Year (Odd**		
Semester) SYLLABUS				
1	Course number	**FEN101**		
2	Course Title	**Functional English Beginner-1**		
3	Credits	1		
4	Contact Hours (L-T-P)	0-0-2		
	Course Pre-requisite	A skill-based course designed for undergraduate students with basic understanding of English language		
6	Course Objective	To guide students to hone the basic communication skills: listening, speaking, reading and writing. To equip students to minimize the linguistic and socio-cultural barriers emerging in a different environment. To help students to understand different accents and standardise their existing English.		
7	Course Outcomes	**CO1 : Students will able to recognise stress patterns in pronunciation of the English sentences.** **C02 : Students will be able to understand the grammatical concepts and use new words.** **C03 : Students will be able to speak confidently in the English language.** **C04 : Students will be able to analyse the paragraphs and identify parts of speech. C05 : Students will be able to evaluate and interpret main ideas to differentiate between opinions and facts.** **C06 : Students will be able to construct correct sentences and punctuation.**		
8	Outline syllabus: **Functional English Beginner-1 (FEN103)**			
		TOPICS	**Ref. & Chapter**	
	FEN101.A	**UNIT A**	**Sentence Structure**	
8.01	FEN101.A1	Topic1	Activities based on Subject Verb Agreement	Ref 1, Ref 2
8.02	FEN101.A2	Topic2	Activities based on parts of speech	Ref 1, Ref 2
8.03	FEN101.A3	Topic3	Writing sentences well-formed	Ref 1, Ref 2
	FEN101.B	**UNIT B**	**VocabularyBuilding and Punctuation**	
8.04	FEN101.B1	Topic1	Homonyms/ homophones	Ref 1, Ref 2
8.05	FEN101.B2	Topic2	Synonyms/Antonyms	Ref 1, Ref 2
8.06	FEN101.B3	Topic3	Punctuation	Ref 1, Ref 2
	FEN101.C	**UNIT C**	**ReadingComprehension**	
8.07	FEN101.C1	Topic1	Scanning based passages	Ref 4

8.08	FEN101.C2	Topic2	Skimming passages based	Ref 4
8.09	FEN101.C3	Topic3	Comprehension and Vocabulary based exercises	Ref 4
	FEN101.D	**UNIT D**	**Speaking Skills**	
8.10	FEN101.D1	Topic1	Presentation	Ref 1
8.11	FEN101.D2	Topic2	Extempore	
8.12	FEN101.D3	Topic3	Role-play of differentsituations	
	FEN101.E	**UNIT E**	**Reading texts**	
8.13	FEN101.E1	Topic1	The Thief by Ruskin Bond(short story)	
8.14	FEN101.E2	Topic2	The Hack Driver By Sinclair Lewis (short story)	
8.15	FEN101.E3	Topic3	Texts based discussions	
9	**Course Evaluation**			
9.1	Course work: 30%			
9.2	Attendance	None		
9.3	Homework	10 assignments, no weight		
9.4	Quizzes	6 best quizzes (based on assignments); 20 marks		
9.5	Lab	Separate		
9.6	Presentations	None		
9.7	Any other	None		
9.9	MTE	One, 20%		
9.10	End-term Examination: One, 50%			
10	Reference Books, Videos and Internet:			
	Text book	1. Communication Skills by Sanjay Kumar and PushpLata, OUP Publications. 2. Professional Communication by Meenakshi Raman and Sangeeta Sharma, OUP Publications. 3. Functional English Workbook Beginner I		
	ReferenceBooks	• Wren, P.C.&Martin H. High English Grammar and Composition, S.Chand& Company Ltd,New Delhi. • Murphy's English Grammar with CD, Cambridge University Press.		

Programming for problem solving lab

School: SET Batch: **Program: B.Tech.** **Current Academic Year: Branch:** **ECE** **Semester: I**		
1	Course Code	CSP113
2	Course Title	Programming for problem solving lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	1. Learn basic programming constructs –data types, decision structures, control structures in C 2. learning logic aptitude programming in c language 3. Developing software in c programming
6	Course Outcomes	After Completion of Course Students will be able to: CO1: demonstrate the algorithm, Pseudo-code and flow chart for the given problem. CO2: develop better understanding of basic concepts of C programming. CO3: create and implement logic using array and function. CO4: construct and implement the logic based on the concept 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.
7	Course Description	Programming for problem solving gives the Understanding of C programming and implement code from flowchart or algorithm
8	Outline syllabus	
	Unit 1	**Logic Building**
		Draw flowchart for finding leap year
		Write a c Program to Add Two Integers
		Write a program to create a calculator
	Unit 2	**Introduction to C Programming**
		Write a c program to convert length meter to cm
		Write a c program to convert temp

	Write a c program to swap two numbers
Unit 3	**Arrays and Functions**
	Write a c program to calculate the average using arrays
	Write a c program to find the largest element of the array
Unit 4	**Pre-processors and Pointers**
	Write a c program to swap two values using pointers
	Write a c program to find largest number from array using pointers
Unit 5	**User Defined Data Types and File Handling**
	Write a c program to store information of a student using structure
	Write a c program to store information of a student using union
Mode of examination	Practical
Weightage Distribution	CA: 60% / MTE: 0% / ETE: 40%
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

Computer Aided Design & Drafting Lab

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch:ECE** **Semester: I**		
1	Course Code	MEP 106
2	Course Title	Computer Aided Design & Drafting Lab
3	Credits	1.5
4	Contact Hours (L-T-P)	0-0-3
	Course Status	Compulsory
5	Course Objective	The objective of this introductory course is to make students familiar with computer-aided drafting/ design, introduce them about the basic commands, tools and dimension techniques for creation and presentation of various engineering drawing by using AutoCAD software which helps in visualization and problem solving in engineering disciplines.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Understand the fundamental features of AutoCAD workspace and user interface. CO2: Apply the fundamental tools such as draw, edit, and view for creating two dimensional engineering drawings in AutoCAD. CO3: Choose advance features to present an engineering drawing in AutoCAD CO4: Apply text and dimension features in the engineering drawing CO5: Create different orthographic projections from a pictorial view. CO6: Analyze an engineering drawing and use the software packages for drafting and modeling.
7	Course Description	This introductory course is offered to students to make them proficient in design, layout, product development, and other careers that require technical drawing. Using the current version of the AutoCAD software, students will learn a variety of drawing techniques and be able to replicate specific drawings in multiple perspectives. The pinnacle of the class is to empower and enable students to create using the software provided. Career opportunities and 3-D modelling, manufacturing, and engineering will also be explored. No drafting or computer experience is necessary.
8	Outline syllabus	
	List of Experiments	
	Experiment 1	Introduction to AutoCAD and its interface with assignment 1

	Experiment 2	Working with coordinates, Drawing ofline, circle, arc, polygon and creating sketches by using them assignment2		
	Experiment 3	Editing of drawing by using editing Tools and Power tools with assignment 3		
	Experiment 4	Creating of advanced feature like fillet, chamfer, hatch and using of reusable items with assignment 4		
	Experiment 5	Representing text and dimensioning in AutoCADwith assignment 5		
	Experiment 6	Creating the drawing of the given assignment 6 by using AutoCAD features.		
	Experiment 7	Creating the drawing of the given assignment 7 in AutoCAD.		
	Experiment 8	Creating the drawing of the given diagram and giving dimensions in AutoCAD.		
	Experiment 9	Creating the drawing of TajMahal in Autocad 2D		
	Experiment 10	Creating of orthographic projections from a 3D figure		
	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	1. Ibrahim Zaid,"CAD/CAM- Theory and Practice", McGraw Hill, International Edition. ISBN 0–07–072857–7		
	Software	AutoCAD		

Introduction to Electronics Engineering

School: SET **Batch: Program:** **B.Tech** **Current Academic Year:** **Branch:ECE** **Semester:1**		
1	Course Code	ECP109
2	Course Title	Introduction to Electronics Engineering
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	To be acquainted with few recent technologies in the field of Engineering.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Explain and classify few sensors CO2: Understand the importance of AI CO3: Describe the working of basic IoT system CO4: Demonstrate and Identify the components of drone and practice of indoor pilot CO5: Interpret the working of basic robot CO6: Apply the concept in various hardware based applications
7	Course Description	This course is an active introduction to developing an engineering mindset by teaching the necessary skills to be added to your engineering toolbox. You will learn to identify opportunities, imagine new solutions, model your creations, make decisions, build prototypes, and showcase your ideas that impact the world.
8	Outline syllabus	
	Unit 1	**Sensors**
	A	Different type of Sensors
	B	Application of Sensors
	C	Case study
	Unit 2	**Artificial Intelligence**
	A	What is Artificial Intelligence? History of Artificial Intelligence
	B	Applications
	C	Case study
	Unit 3	**IoT**

	A	Basics of IoT		
	B	Applications Of IoT		
	C	Case study		
	Unit 4	**Drone**		
	A	Basics of Drone Technology		
	B	Applications		
	C	Practicing of indoor pilot system/Case study		
	Unit 5	**Robotics**		
	A	Basics of Robotics		
	B	Applications		
	C	Case study of fire bird robot		
	Mode of examination	Practical & Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	Refer manuals		
	Other References			

TERM-II

Principles of Electrical and Electronics Engineering

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: II**		
1	Course Code	EEE112
2	Course Title	Principles of Electrical and Electronics Engineering
3	Credits	3
4	Contact Hours (L-T-P)	2-1-0
	Course Status	Compulsory
5	Course Objective	To provide the students with an introductory concept in the field of electrical and electronics engineering to facilitate better understanding of the devices, techniques and equipment‟s used in engineering applications.
6	Course Outcomes	After completion of Course Students will be able to: CO1: To analyze and solve basic electrical circuits CO3: To understand the working principle of transformer and identify its applications. CO3: To understand the working principle of dc and ac motors and identify the starting methods of single-phase induction motor CO4: To apply the basics of diode to describe the working of rectifier circuits such as half and full wave rectifiers CO5: To apply the concepts of basic electronic devices to design various circuits CO6:Apply the basic concepts in Electrical and Electronics Engineering for multi-disciplinary tasks
7	Course Description	This initial course introduces the concepts and fundamentals of electrical and electronic circuits and devices. Topics include basic circuit analysis, diode and transistor fundamentals and applications. This course also introduces working principle and applications of dc/ac motors and transformers.
8	Outline syllabus	
	Unit 1	**DC & AC Circuits (6 lectures)**
	A	Electrical circuit elements (R, L and C), series and parallel circuits, concept of equivalent resistance, Kirchhoff current and voltage laws, star-delta conversion
	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
	C	Introduction to three phase system, relationship between phase voltages and line voltages,

Unit 2	**Transformer(4 lectures)**		
A	Working principle and construction of transformer, EMF equation		
B	Efficiency of transformer, Power and distribution transformer and difference between them		
C	Transformer applications in transmission and distribution of electrical power		
Unit 4	**Electrical Motors (6 lectures)**		
A	Construction, working principle, torque-speed characteristic and applications of dc motor.		
B	Construction, working principle and applications of a three-phase induction motor, significance of torque-slip characteristic		
C	Working principle starting methods and applications of single phase induction motor		
Unit 4	**Semiconductor Diode and Rectifier (5 lectures)**		
A	PN junction and its biasing		
B	Semiconductor diode, ideal versus practical diode , VI characteristics of diode		
C	Half wave and full wave rectifiers with and without filters.		
Unit 5	**Transistors (5 lectures)**		
A	Bipolar Junction Transistor (BJT) –Construction, working principle and input-output characteristics		
B	BJT as CE amplifier and as a switch		
C	Introduction to JFET		
Mode of examination	Theory		
Weightage Distribution	CA	MTE	ETE
	30%	20%	50%
Text book/s*	1. D. P. Kothari and I. J. Nagrath, "Basic ElectricalEngineering", Tata McGraw Hill, 2010- ISBN: 1259081532, 9781259081538 2. S. K. Bhattacharya, "Basic Electrical and ElectronicsEngineering", Pearson Publication,2011 ISBN-8131754561, 9788131754566 3. Robert L Boylestad, "Electronic Devices and CircuitTheory" Pearson Education, 2013 11th editionISBN- 9780136064633		
Other References	1. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 2003ISBN-9789332551763		

Principles of Electrical and Electronics Engineering Lab

School: SET Batch: **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: II**		
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: To configure and analyze any given circuit. CO2: To inspect the working of transformer and calculate its efficiency CO3: To understand the working of dc and ac motors and measure its various operatingparameters. CO4: To design rectifier circuits such as half and full wave rectifiers and observe itsoutput waveforms. CO5: To obtain 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	
	Unit 1	**Practical based on DC & AC Circuits**
		To configure a dc circuit on breadboard, and measure voltage/current across/through each element
		To verify Kirchhoff‟s Laws
		To verify Superposition Theorem
		To find the real power, reactive power, apparent power and power factor of RL & RC load
	Unit 2	**Practical related to Transformers**
		To find the efficiency of transformer by obtaining its losses.
	Unit 3	**Practical related to Electrical Motors**
		To study cut-section of DC motor and induction motor.
		To start the DC motor and reverse its direction of rotation.
		To start an induction motor and reverse its direction of rotation.
	Unit 4	**Practical related to Diode and Rectifier**
		To determine voltage-current characteristic of diode
		To assemble and test half wave and full wave rectifier circuits for their

		input and output waveform		
	Unit 5	**Practical related to Transistors**		
		To determine input and output characteristics of BJT		
		Validation of BJT as a switch		
	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw 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" Pearson Education, 2009 ISBN: 9780131189058		
	Other References	4. V. D. Toro, "Electrical Engineering Fundamentals", PrenticeHall India, 1989. SBN:9780132471312		

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

	B	Anonymous functions, Global and local variables		
	C	**Exception Handling**: Definition Exception, Exceptionhandling Except clause, Try? finally clause		
	Unit 4	**OOP and File Handling**		
	A	**OOPs concept** : Class and object, Attributes, Abstraction,Encapsulation, Polymorphism and Inheritance		
	B	Static and Final Keyword, Access Modifiers and specifiers, scope of a class		
	C	User Defined Exceptions		
	Unit 5	**Module and Applications**		
	A	**Modules:** Importing module, Math module, Random module		
	B	Matplotlib, Packages		
	C	**Applications: Searching Linear Search, Binary Search. Sorting: Bubble Sort**		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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		

Application Based Programming in Python Lab

School: SET		**Batch:**
Program: B.Tech		**Current Academic Year:**
Branch:All		**Semester: II**
1	Course Code	CSP114
2	Course Title	Application Based Programming in Python Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	Emphasis is placed on procedural programming, algorithm design, and languageconstructs common to most high level languages through Python Programming.
6	Course Outcomes	Upon successful completion of this course, the student will be able to:CO1. Apply decision and repetition structures in program design. CO2. Demonstrate the use of Python lists, tuples and dictionaries CO3. Implement methods and functions to improve readability of programs.CO4. Describe and apply object-oriented programming methodology. CO5. Apply top-down concepts in algorithm design. CO6. Write Python programs to illustrate concise and efficient algorithms
7	Course Description	Python is a language with a simple syntax, and a powerful set of libraries. It iswidely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience. We cover data types, control flow, object-oriented programming.
8	Outline syllabus	
	Unit 1	**Practical based on conditional statements and control structures**
		1. Program to implement all conditionalstatements 2. Program to implement different controlstructures
	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
	Unit 3	**Practical related to Functions and Exception Handling**
		1. Program to implement Exception Handling 2. Program to use different functions
	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		
	Unit 5	**Practical related to Modules and Applications**		
		1. Program to use modules and package 2. Program to implement searching andsorting		
	Mode of examination	Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	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		

Calculus and Abstract Algebra

School: SET		**Batch :**
Program: B.Tech.		**Current Academic Year:**
Branch: ALL		**Semester: 1/2**
1	Course Code	**MTH 142**
2	Course Title	**Calculus and Abstract Algebra**
3	Credits	4
4	Contact Hours (L-T-P)	3-1-0
	Course Status	Compulsory
5	Course Objective	The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
6	Course Outcomes	CO1: Explain the concept of differential calculus, illustrate thecurvature and Maxima, minima and saddle point. (K2, K3, K4) CO2: Explain the basic concepts matrices and determinate, evaluate system of linear equation by using rank and inverse method. (K2, K3, K5) CO3: Explain the basic concept of sets, relation, functions, groupsRings and Field. (K2, K4) CO4: Discuss the basic of Vector spaces. (K1, K3) CO5: Describe and use the linear transformation and evaluate nullity and kernel. (K1, K2, K3, K5) CO6:Explain the concept of Eigen values and Eigen vectors; evaluate the diagonalization of matrices,explain the basic introduction of Inner product spaces.(K2, K3, K4, K5)
7	Course Description	This course is an introduction to the fundamental of Mathematics. The primary objective of the course is to develop the basic understanding of differential and integral calculus, linear Algebra and Abstract Algebra.
8	**Outline syllabus:Calculus and Abstract Algebra**	
	Unit 1	**Calculus**
	A	Differentiation, Taylor‟s and Maclaurin theorems withremainders; indeterminate forms, L' Hospital's rule.
	B	Maxima and minima, Partial derivatives, Euler‟stheorem.
	C	Total derivative. Evaluation of double integration.
		Applications of double integral (to calculate area).
	Unit 2	**Matrices**
	A	Matrices, vectors: addition and scalar multiplication, matrix multiplication.

B	Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer‟s Rule		
C	Inverse of a matrix, Gauss elimination and Gauss-Jordanelimination.		
Unit 3	**Basic Algebra**		
A	Sets, relations and functions.		
B	Basics of groups, cyclic groups.		
C	Subgroups, basics of Rings and Field.		
Unit 4	**Vector spaces**		
A	Vector Space, linear dependence of vectors, basis, dimension.		
B	Linear transformations (maps), range and kernel of a linear map, rank and nullity.		
C	Inverse of a linear transformation, Matrix associated with a linear map.		
Unit 5	**Vector spaces (Prerequisite Module 2 –Matrices &Module-4 Vector spaces)**		
A	Eigenvalues, Eigenvectors		
B	Symmetric, skew-symmetric, and orthogonal Matrices, Diagonalization		
C	Basic introduction of Inner product spaces, Gram- Schmidt orthogonalization.		
Mode of examination	Theory		
Weightage	CA	MTE	ETE
	30%	20%	50%
Text book/s*	1. G.B. Thomas and R.L. Finney, Calculus and Analyticgeometry, 9th Edition, Pearson, Reprint, 2002- ISBN:9788177583250. 2. Erwin Kreyszig, Advanced Engineering Mathematics,10th Edition, John Wiley & Sons, 2011-ISBN: 9780470458365		
Other References	1. D. Poole, Linear Algebra: A Modern Introduction,2nd Edition, Brooks/Cole, 2011-ISBN: 9780538735452 2. Veerarajan T., Engineering Mathematics for first year,Tata McGraw-Hill, New Delhi, 2008- ISBN:9780070494824 Ramana B.V., Higher Engineering Mathematics,Tata McGraw Hill New Delhi, 11th Reprint, 2010- ISBN:9780230345980		

School: SET		**Batch:**
Program: B.TECH.		**Current Academic Year:**
Branch: CSE/EC/EEE		**Semester: II**
1	Course Code	PHY 118
2	Course Title	Electricity and Magnetism
3	Credits	3
4	Contact Hours (L-T-P)	2-1-0
	Course Status	Compulsory
5	Course Objective	To make students familiar with the concepts of electrostatics, magnetostatics and electromagnetism and to utilize the laws of electromagnetism on various problems.
6	Course Outcomes	At the end of the course, the student will be able to: CO1: learn the basic concepts of electrostatics. CO2: learn the fundamental concepts of electric potentials. CO3: gain knowledge about the principle of capacitor, dielectricsmaterials and electric polarization. CO4: have a clear understanding of fundamentals of magnetic effectsofcurrent and magnetism CO5: learn the concept of Maxwell‟s Equations in differential andintegral form and their physical significance. CO6: learn the fundamental concept of electricity and magnetism.
7	Course Descriptio n	Today, life without electromagnetic technologies is almost unthinkable. Forthis reason, it is critically significant to understand the basic fundamental ofthis paper. This course is able to explain the required basic knowledge.Both electricity and magnetism may be understood as forces that seekbalance and students learn to understand such concepts as charge, field, voltage, potential, current, resistance, and power within this framework.
7	Outline Syllabus	
	Unit 1	**Electrostatics**
	A	Introduction to the course and prerequisites required Coulomb‟s law–force between two point charges, forces between multiple charges; superposition principle andcontinuous charge distribution.
	B	Electric field, electric field due to a point charge, electric flux.
	C	Gauss‟s theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside), charged solid sphere.
	Unit 2	**Potential**
	A	Electric potential, potential difference, electric potentialdue to a point charge,
	B	a dipole and system of charges; equipotential surfaces,

	C	Electrical potential energy of a system of two pointcharges and of electric dipoles in an electrostatic field.		
	Unit 3	**Capacitance**		
	A	Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization.		
	B	Capacitors and capacitance, capacitance of a parallelplate, Cylindrical and spherical capacitors.		
	C	Capacitance with and without dielectric medium betweenthe plates of capacitor, energy stored in a capacitor.		
	Unit 4	**Magnetic Effects of Current and Magnetism**		
	A	Biot-Savart law and its application to current carryingcircular loop,		
	B	Ampere‟s law and its applications to infinitely longstraight wire.		
	C	Ampere‟s law and its applications to toroidal solenoids.		
	Unit 5	**Electromagnetism**		
	A	Electromagnetic induction; Faraday‟s law, induced emfand induced current,		
	B	Lenz‟s Law, displacement current.		
	C	Maxwell‟s Equations in differential and integral formand their physical significance.		
	Mode of Examination	Theory		
	Weightage	CA	MTE	ETE
	Distribution	30%	20%	50%
	Text books	1. Electricity and Magnetism, K.K. Tiwari, S. Chand&Co. New Delhi. ISBN:9788121906678		
	Other References	1. Fundamentals of Physics, Halliday, Resnick andWalker, John Wiley,2014. - ISBN: 9781118230749 2. Electricity and Magnetism, J. Yarwood and J. H.Fewkes. University Tutorial Press.		

School: SET		**Batch :**
Program: B.Tech.		**Current Academic Year:**
Branch: CS/EC/IT/EEE		**Semester:2**
1	Course Code	CHY 111
2	Course Title	**Chemistry for engineers**
3	Credits	4
4	Contact Hours (L-T-P)	3-1-0
	Course Status	Compulsory
5	Course Objective	1. Make it comprehended the importance of clean water. 2. Describe to the basic concepts of spectroscopy as described in the module content and is to teach getting of valuable information from the same to apply in various engineering applications. 3. To provide an introduction to the basic concepts in Electrochemistry and apply them to understand batteries and corrosion. 4. To equip the students with the knowledge of modern technologies i.e. nanotechnology and its various engineering applications.
6	Course Outcomes	Students will be able to understand : 1. Realize the importance of clean and healthy water bygiving knowledge about water quality parameters andcleaning measures. 2. In sighting the structural features of material by having the knowledge of spectroscopic techniques. 3. State the main cause of corrosion and prevention measures. Name the components of galvanic cell and applies these to theunderstand the batteries and corrosion of a metal.
		4. Able to apply the basic information of engineeringmaterials and their applications. 5. Able to have a basic knowledge of technology in moderndays i.e. Nanotechnology and its various applications. 6. Have a thorough grounding in chemistry and a working knowledge of advanced chemistry.
7	Course Description	• The course includes the fundamentals of Thermodynamics, Electrochemistry and batteries, corrosion, introduction to Chemistry of Materials, water technology and nanotechnology.This course satisfies the requirements of the Engineering program.
8	Outline syllabus	
	Unit 1	**Water: Analysis and its treatment**

	A	Water and water treatment: Drinking water standards, Water quality parameters and their measurement: pH (alkalinity and acidity –determination by titrimetry),Turbidity, Dissolved Oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), chloride, fluoride, oil and fats,
	B	hardness (definition and expression, estimation of hardness (EDTA method), nutrients (N, P, etc.), nitrate,dissolved metals.
	C	Municipal water treatment process - screening, sedimentation, flocculation;Coagulation, Filtration(Slow sand and rapid sand), disinfaction-chlorination.
	Unit 2	**Spectroscopic studies of materials**
	A	Principles of spectroscopy and selection rules.Electronic spectroscopy: basic principle, „Lamberts Beer‟s law,
	B	chromophore, effect of conjugation on chromophoreand applications, Fluorescence and its applications in medicine.
	C	Basic principle and applications of Nuclear magnetic
		resonance and magnetic resonance imagingspectroscopy.
	Unit 3	**Electrochemistry, energy storage devices andcorrosion**
	A	Electrochemistry: Redox reactions, Nernst Equation,relation of e.m.f. with thermodynamic functions (ΔH, ΔF and Δ S). Electrochemical cells-
	B	Galvanic cells and Concentration cell, electrode potentials and its relevance to oxidation and reduction, measurement of EMF under standard conditions, determination of pH using Hydrogen electrode,
	C	primary battery: dry cells, secondary battery: Lead acidaccumulator and Li Ion, fuel cells: H 2- O 2 .Corrosion:Types of corrosion, mechanism of Electrochemical corrosion, galvanic corrosion and protection against electrochemicalcorrosion.
	Unit 4	**Chemistry of materials**
	A	:Structure, properties and application of carbon materials such as diamond, graphite, fullerenes, graphene. Liquid crystals: classification, Molecular ordering, identification, polymeric liquid crystals, and application of liquid crystals: displays and thermography.
	B	Organic and inorganic semiconductors.Basic concepts of Conducting polymer, types,p-doping, n-doping,comparison with metallic conductors, examples and applications.
	C	Biodegradable polymers: Basic information with common examplesPolyglycolic acid (PGA), Polyhydroxybutyrate (PHB), Polyhydroxybutyrates-co-betahydroxyl valerate(PHBV), Polycaprolactone(pcl).
	Unit 5	**Nano science and technology**
	A	Introduction to nanoscience and technology, bio-nanoinformation,

	B	lithography, soft lithography, Dip pen nanolithography,CNT‟s		
	C	Application of nanotechnology in microelectronics andin memory devices.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	i. Puri, B.R., Sharma, L.R., and Pathania, M.S., “Principles of Physical Chemistry”, Vishalpublishing company- ISBN: 9780039000493 ii. BahlArun, Bahl B.S. and G.D Tuli, “Essentials of Physical Chemistry”, S.Chand& Co.,2000 iii. University chemistry, by B. H. Mahan iv. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan v. Physical Chemistry, by P. W. Atkins vi. Introduction to nanotechnology: C.P poole,Jr. F.J. Owens, willeyinterscience 2003. vii. Nanotechnology, science, innovation andopportunity, LE foster, Pearson education 2007.		
	Other References	i. Collings, P.J., “Liquid Crystals”, PrincetonUniversity Press.-ISBN:9781439811450 ii. O.P. Vermani, A.K. Narula, “Industrial chemistry”, Galgotia Publications		

FEN104:		**FUNCTIONAL ENGLISH**		
Intermediate-2		**First Year (Odd**		
Semester) SYLLABUS				
1	Course number	**FEN101**		
2	Course Title	**Functional English Beginner-1**		
3	Credits	1		
4	Contact Hours (L-T-P)	0-0-2		
	Course Pre-requisite	A skill-based course designed for undergraduate students with basic understanding of English language		
6	Course Objective	To guide students to hone the basic communication skills: listening, speaking, reading and writing. To equip students to minimize the linguistic and socio-cultural barriers emerging in a different environment. To help students to understand different accents and standardise their existing English.		
7	Course Outcomes	**Students would be able to:** **CO1: Utilize receptive language skills in order to comprehend complex factual/literary text** **CO2: Understand long complex speeches and lectures** **CO3: Compose clear and well-structured text to inform/express view point** **CO4: Express opinions about complex subjects by developing arguments through productive language skills** **CO5: Critically evaluate arguments in terms of the strength of evidence and reasoning; draw conclusions through discussion** **CO6: Recognize and apply vocabulary and grammatical knowledge to express thought and action;**		
8	Outline syllabus: **Functional English Intermediate-2 (FEN104)**			
		TOPICS	**LISTENING & DISCUSSION**	
	FEN101.A	**UNIT A**	**Sentence Structure**	
8.01	FEN101.A1	Topic1	Commencement Speech at Harvard Informative listening (Comprehension): Lecture	Ref 5, Ref 2
8.02	FEN101.A2	Topic2	by Johan Rockstrom: Let the Environment Guide our Development "Inspirational Speech for Students by Dr. APJ	
8.03	FEN101.A3	Topic3	Writing sentences well-formed	
	FEN101.B	**UNIT B**	**READING TEXT & DISCUSSION**	
8.04	FEN101.B1	Topic1	Short Stories: "The Tiger in The Tunnel" by Ruskin	Ref 6, Ref 2
8.05	FEN101.B2	Topic2	Bond (Comprehension & Critical Analysis)	
8.06	FEN101.B3	Topic3	Poetry: "Where the Mind is Without Fear" by	

			Rabindranath Tagore (Critical Appreciation and	
	FEN101.C	**UNIT C**	**CREATIVE WRITING & DISCUSSION**	
8.07	FEN101.C1	Topic1	Short Story Writing	Ref 4
8.08	FEN101.C2	Topic2	Picture Interpretation	Ref 4
8.09	FEN101.C3	Topic3	Review Writing	Ref 4
	FEN101.D	**UNIT D**	**TECHNICAL WRITING**	
8.10	FEN101.D1	Topic1	Emails & formal Letters	Ref 1
8.11	FEN101.D2	Topic2	Technical Reports (Informative & Routine based)	
8.12	FEN101.D3	Topic3	Technical Proposal	
	FEN101.E	**UNIT E**	**VOCABULARY BUILDING AND GRAMMAR (THROUGH READING AND LISTENING THE TEXTS)**	
8.13	FEN101.E1	Topic1	Phrasal Verbs; Idioms and Phrases; Proverbs; Functional Vocabulary; Notional Concepts; Connectors and Linkers	
8.14	FEN101.E2	Topic2	Text based activities on: Non-finite verbs; Reported Speech (Dialogue Writing); Passives (Imperative sentences); Process description;	
8.15	FEN101.E3	Topic3	Spotting error; Relative clauses. Spellings and Punctuations	
9	**Course Evaluation**			
9.1	Course work: 30%			
9.2	Attendance	None		
9.3	Homework	10 assignments, no weight		
9.4	Quizzes	6 best quizzes (based on assignments); 20 marks		
9.5	Lab	Separate		
9.6	Presentations	None		
9.7	Any other	None		
9.9	MTE	One, 20%		
9.10	End-term Examination: One, 50%			
10	Reference Books, Videos and Internet:			

School: SET		**Batch:**
Program: B.Tech		**Current Academic Year:**
Branch: All		**Semester: II**
1	Course Code	CHY-161 Course Name: Engineering Chemistry Lab
2	Course Title	Engineering Chemistry Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Basic Engineering
5	Course Objective	1. To learn methods for preparation of solution of different concentration, their standardization 2. To learn quantitative estimation of different chemical species by various volumetric methods. 3. To understand the practical concepts of reaction kinetics 4. To understand the procedure for testing of COD of water samples.
6	Course Outcomes	CO1.Prepare solutions of different strength and standardize them. CO2.Estimate water alkalinity and hardness and hence water quality, the chloride ion/residual chlorine after disinfection CO3.Understand the different order of reactions like Zero, First and Second order. CO4.Prepare simple thermosetting polymers at small scale in laboratory. CO5.Understand the importance of microbial free water by testing for COD. CO6.Understand the basics of analytical chemistry which may be helpful to perform major engineering applications.
7	Course Description	This course include various titration methods like acid-base titration, complexometric titration, precipitation titration etc. It also describe various calculations and units frequently used in analytical chemistry.
8	Outline syllabus	
	Unit 1	**Preparation of standard solution**
	A	To prepare N/10 normality solution of sodiumcarbonate and use it to standardize the given hydrochloric acid solution.
	B	To prepare N/30 normality solution of potassiumdichromate and use it to standardize the given hypo solution.
	C	To determine the strength of given HCl solution bytitrating with standard NaOH solution by (a)Indicator method (b) pH metrically
	Unit 2	**Analysis of water**
	A	To determine the amount and constituents of alkalinity of given water sample.

	B	To determine the hardness of water by EDTA method.		
	C	To determine the chloride content in water by Mohr‟s Method.		
	D	To determine the residual chlorine in the given water sample.		
	Unit 3	**Synthesis of polymer**		
	A	Preparation of Bakelite and Urea formaldehyde resin.		
	Unit-4	**Determination of kinetic parameters**		
		To determine the rate constant and order of the reaction of hydrolysis of an ester catalyzed by an acid.		
		To determine the rate constant of hydrolysis of ethylacetate with NaOH and show that the reaction is of second order.		
	Unit-5	**Determination of COD**		
		To determine the chemical oxygen demand (COD) in the given water sample.		
	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	None	40%
	Text book/s*	Text book, Lab Manuals		
	Other References	Other References		

School: SET
Batch :
Program: B.Tech
Current Academic Year:
Branch: ECE
Semester: II

1	Course Code	ECP 120
2	Course Title	**Mechanical Workshop**
3	Credits	1.5
4	Contact Hours (L-T-P)	0-0-3
	Course Status	Compulsory
5	Course Objective	The objective of this course is to make the students, familiar with the modern day manufacturing processes, introduce them to various hand tools and equipment, acclimatize with the measuring devices, and perform basic machine tool operations in various machine tools.
6	Course Outcomes	On successful completion of this course, students will be able to CO1: Apply 5S (Seiri,Seiton, Seiso,Seiketsu and Shitsuke) methodology atworkplace. CO2: Select the various hand tools used in the basic mechanical engineeringworkshop sections-smithy, carpentry, assembling, welding etc. CO3: Choose different measuring devices according to the job CO4: Differentiate between various machine tools and their operation CO5: Classify and select suitable tools for machining processes includingturning, facing, thread cutting and tapping, milling, drilling and shaping. CO6: Apply the knowledge for advanced manufacturing experiments.
7	Course Description	**Black Smithy Shop:** Simple exercises based on black smithy operations such as upsetting, practice of S -Hook from circular bar using hand forging operations. **Carpentry Shop :** Study of different types of wood , Carpentry Tools, Equipment and different joints, Practice of T joint, cross lap joint, Mortise and Tenon T joint, Bridle T joint **Fitting Shop:** Preparation of Square joint, V joint, half round joint, dovetail jointas per the given specifications, which contains: Sawing, Filing, Grinding, and Practice marking operations. **Sheet Metal Shop:** Study of galvanized Iron (G.I.) Sheet material properties, hand tools and sheet metal machines, and projective geometry, demonstrationof different sheet metal operations and practice of development of Tray, cylinder, hopper, funnel etc. **Welding Shop:** Introduction, Study of Tools and welding Equipment (Gas and Arc welding), Selection of welding electrode and current, Bead practice and Practice of Butt Joint, Lap Joint.

		Machine Shop: Study of machine tools in particular Lathe machine (different parts, different operations, study of cutting tools), Demonstration of different operations on Lathe machine, Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting and Study of Quick return mechanism of Shaper. **Foundry Shop:** Introduction to foundry, Patterns, pattern allowances, ingredients of moulding sand and melting furnaces. Foundry tools and their purposes, Demo of mould preparation and Practice – Preparation of mould by using split pattern.		
8	Outline syllabus			
	List of Experiments			
Unit 1	**Experiment 1**	To make a S-shaped hook from a given circular rod using hand forging technique.		
	Experiment 2	To make a dovetail lap joint in Carpentry shop.		
Unit 2	**Experiment 3**	To make a cross-half lap joint in Carpentry shop.		
	Experiment 4	To make a square fit from the given mild steel pieces in fitting shop.		
Unit 3	**Experiment 5**	To prepare a V-Fit from the given mild steel pieces in fitting shop.		
	Experiment 6	To make a rectangular tray of specified dimensions in sheet metal shop.		
Unit 4	**Experiment 7**	To make a Lap joint, using the given mild steel pieces using arc welding.		
	Experiment 8	To perform step turning and taper turning operations on the given work piece		
Unit5	**Experiment 9**	To prepare a sand mold, using the given single piece pattern		
	Experiment 10	To prepare a sand mold, using the given Split-piece pattern.		
	Mode of examination	Practical		
	Weight- age Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	1. Raghuwanshi B.S., Workshop Technology Vol. I & II, DhanpathRai& Sons. -ISBN:9788120340824 2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers. -ISBN:9788122419177,		

Tinkering Labs

School: SET **Batch: Program:** **B.TECH** **Current Academic Year:** **Branch: ECE** **Semester:2**				
1	Course Code	ECP107		
2	Course Title	Tinkering Labs		
3	Credits	1		
4	Contact Hours (L-T-P)	0-0-2		
	Course Status	Compulsory		
5	Course Objective	• To be acquainted with hardware‟s in Consumer Electronics goods		
6	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: Understand 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.		
7	Course Description	Justify and enhance their Knowledge on consumer products		
8	Outline syllabus			
	Unit 1	**Inside Cell phone Charger**		
	A	Unscrew		
	B	Identifying parts		
	C	Working		
	Unit 2	**Mobile phones**		
	A	Unscrew		
	B	Identifying parts		
	C	Working		
	Unit 3	**USB**		
	A	Basics		
	B	Inside USB cable/Port		
	C	Working		
	Unit 4	**Speakers**		
	A	Unscrew		
	B	Identifying parts		
	C	Working		
	Unit 5	**Computers**		
	A	Unscrew		
	B	Identifying parts ,Working		
	C	Screw up		
	Mode of examination	Practical & Viva		
	Weightage	CA	MTE	ETE

	Distribution	60%	0%	40%
	Text book/s*	Lab Manuals		
	Other References	https://www.youtube.com/watch?v=WNRzU5DLA0I https://www.youtube.com/watch?v=jghFENiUsBI		

School: School of Engineering and Technology		**Batch:**
Program: B.Tech.		**Current Academic Year:**
Branch: Physics		**Semester: I,II**
1	Course Code	PHY 161
2	Course Title	Physics Lab 1
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
6	Course Outcomes	On successful completion of the course the students will have: CO1: Knowledge and study of basic physics experiments based on simple harmonic motion CO2: Use the concept of stress, strain to calculate modulus of rigidity, Young's modulus. CO3: Understand how to determine moment of inertia of different bodies. CO4: Understand how to draw characteristic curves of different electronic components CO5: Understand how to calculate frequency using Melde's Experiment CO6: Apply the mathematical concepts/equations to obtain quantitative results and ability to conduct, analyze and interpret experiments
7	Outline Syllabus	
	Unit 1	
	A	1. To verify the relation of time period using simple pendulum.
	B	2. To determine the acceleration due to gravity and radius of Gyration of
	C	3. compound pendulum and compare with theoretical value.
	Unit 2	
	A	3. To measure the moment of inertia of a flywheel.
	B	4. To determine the Young"s modulus of a beam using cantilever beam experiment apparatus.
	C	5. To determine vertical distance between two points using sextant.
	Unit3	
	A	6. To determine the modulus of rigidity of a material of a given wire
	B	

	C	with an inertia table (torsion pendulum) by dynamical method. 7. To calculate Moment of inertia of different irregularshapes.
	Unit 4	
	A B C	8. To determine the frequency of an electrically maintainedtuning fork using Melde‟s Apparatus. (i) Transverse mode of vibration (ii) Longitudinal mode of vibration. 9. To determine the coefficient of viscosity of water by Poiseuille‟s method.
	Unit 5	
	A B C	10. To draw the characteristic curve of a PN junction diode. 11. To trace the circuit of a Half Wave Rectifier circuit anddetermine efficiencies and ripple factors with capacitor and inductor filters. 12. To trace the circuit of a Full Wave Rectifier circuit and determine efficiencies and ripple factors with capacitor and inductor filters.
	Mode of Examination	Practical/Viva
	Weightage Distribution	CA: 60% | MTE: 0% | ETE: 40%
	Text books	1. B.Sc. Practical Physics- Harnam Singh, S. Chand Publishing. 2. B.Sc. Practical Physics- C L Arora, S. Chand Publishing.
	Other References	1. GeetaSanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co. 2. B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New

TERM-III

School: SET		**Batch :**
Program: B.Tech.		**Current Academic Year:**
Branch: ECE		**Semester: III**
1	Course Code	**MTH 145**
2	Course Title	**Probability and Statistics**
3	Credits	4
4	Contact Hours (L-T-P)	3-1-0
	Course Status	Compulsory
5	Course Objective	The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
6	Course Outcomes	CO1: Explain the concept of probability and Random Variable. (K2,K3, K4) CO2: Explain the concept of distribution functions, densities andprobability distributions; illustrate discrete and continuous probability distributions. (K1, K2, K3, K4) CO3: Describe the concept of moments, skewness and Kurtosis; evaluate correlation and regression – Rank correlation; discuss bivariate distributions and their properties (K1, K2, K5) CO4: Discuss the basic of Curve fitting by the method of least squares; evaluate straight lines, second degree parabolas and more general curves. (K1, K2, K5) 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. (K1,K2,K3) 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. (K2, K4, K5)
7	Course Description	This course is an introduction to the fundamental of Mathematics. The primary objective of the course is to develop the basic understanding of statistics including measures of central tendency, correlation and regression, statistical methods of data sampling, probability and random variables and various discrete andcontinuous probability distributions and their properties.
8	**Outline syllabus :Probability and Statistics**	
	Unit 1	**Basic Probability**
	A	Probability spaces, conditional probability, Bayes' rule.
	B	Discrete random variables, Independent random variables

	C	Expectation of Discrete Random Variables,Chebyshev's Inequality		
	Unit 2	**Discrete and Continuous Probability Distributions**		
	A	Discrete Probability distributions: Binomial, Poisson.		
	B	Continuous random variables and their properties, distribution functions and densities.		
	C	Normal, exponential and gamma distribution.		
	Unit 3	**Statistics**		
	A	Moments, skewness and Kurtosis.		
	B	Correlation and regression – Rank correlation.		
	C	Bivariate distributions and their properties.		
	Unit 4	**Applied Statistics**		
	A	Curve fitting by the method of least squares- fitting ofstraight lines, second degree parabolas and more general curves.		
	B	Test of significance: Large sample test for single proportion,		
	C	Difference of proportions, single mean, difference of means, and difference of standard deviations.		
	Unit 5	**Testing Hypothesis**		
	A	Test for single mean, difference of means		
	B	test for ratio of variances		
	C	Chi-square test for goodness of fit and independence of attributes		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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.		

Analog Circuits-1

School: SET **Batch :** **Program: B.Tech.** **Current Academic Year:** **Branch: ECE** **Semester: III**		
1	**Course Code**	**ECE239**
2	**Course Title**	**Analog Devices and circuits**
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Compulsory
5	Course Objective	1. To develop a knowledge of special diodes. 2. To develop a knowledge of BJT and MOSFET devices. 3. Which can be used in the design and analysis of various useful circuits. 4. To study differential, multi-stage and operational amplifiers.
6	Course Outcomes	CO1: To study the various diodes as high speed switch for RF applications. CO2: Understand the functioning of BJT and design different circuits. CO3: Understand the functioning of J-FET and design different circuits. CO4: Understand the functioning of MOS-FET and operating in different modes. CO5: To acquire knowledge of amplifiers using BJT and FET. To analyze efficiency of variousAmplifiers. CO6: Design and analysis of differential, multi-stage and operational amplifier circuits usingBJT and MOSFET.
7	Course Description	After completing this course students will be able to design the different types of circuits with the help of E-CAD tools and compare the measured and simulated results.
8	Outline syllabus	
	Unit 1	**Types of Diodes (Special Diodes)**
	A	Zener diode: Equivalent circuit of Zener diode and V-I haracteristics. Principle of operation of Zener diode as voltage regulator.
	B	Light Emitting Diodes (LEDs): p-n Junction andgeneral structure of LED. Emission of light, characteristics and its applications.
	C	Varactor (Vari-cap) diodes:characteristics, and its

		applications. Schottky diodes:Structure of metal- semiconductor junction, characteristics.		
	Unit 2	**Bipolar Junction Transistor (BJT)**		
	A	Basics introduction of BJT, Modes of operation,Structure of actual transistor,Ebers-Moll(EM) Model.		
	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.		
	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.		
	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		
	B	Construction and characteristic of JFETs (n-channel and p-channel), Voltage controlled resister, Transfercharacteristics		
	C	J-FET Biasing Configuration:Fixed bias, Self bias, and Voltage-divider biasing.		
	Unit 4	**Metal Oxide Semiconductor Field EffectTransistors (MOS-FET)**		
	A	Metal Oxide Semiconductor (MOS) Structure, TheMOS system under external bias, Operation of MOS transistor, Formation of channel, Enhancement and Depletion MOSFET.		
	B	MOSFET current-voltage (I_D-V_{DS}) characteristics forn-MOS and p-MOS. Drain current (I_D) equation in linear and saturation mode.		
	C	Application of MOSFET as an amplifier and switch.		
	Unit 5	**Differential, multi-stage and operationalamplifiers**		
	A	Differential amplifier, power amplifier, direct coupled multi-stage amplifier.		
	B	Internal structure of an operational amplifier, ideal op-amp.		
	C	Non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product)		
	Mode of examination	Theory & Practical		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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

Signals & Systems

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch:ECE** **Semester:4**		
1	Course Code	ECE 242
2	Course Title	Signals & Systems
3	Credits	4
4	Contact Hours (L-T-P)	3-1-0
	Course Status	Compulsory
5	Course Objective	The main aim of this course is to make aware students with basics of signals and systems. • To explain the basic of systems that we use for communication and design purpose. • To basics of LTI system and their solutions. • To acquire knowledge about Fourier Transform and its significance in signal analysis. • To acquire knowledge about Z-Transform and its use to solve difference equations.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: To learn and analyze the concepts of continuous time and discrete time systems. CO2:Analyse systems in complex frequency domain. CO3:Understand sampling theorem and its implications. CO4: Analyze difference equations using Z-Transform. CO5: To Sampling and reconstruction of a signal. CO6: Analyse the real time systems by using various types of Transforms.
7	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.
8	Outline syllabus	
	Unit 1	**Introduction to signals and system**
	A	Introduction to signals, Types of signals, Transformation inIndependent variable.
	B	Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals.
	C	System properties: linearity, additivity and homogeneity, shift-

		invariance,causality, stability, realizability		
	Unit 2	**LTI System**		
	A	Continuous time and discrete time LTI systems Their properties.		
	B	Convolution Sum and convolution Integral. Characterization of causality and stability of linear shift-invariant systems.		
	C	System representation through differential equations and Difference equations.		
	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.		
	B	Convolution/multiplication and their effect in the frequencydomain, magnitude and phase response, Fourier domain duality		
	C	The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval‟s Theorem.Theidea of signal space and orthogonal		
	Unit 4	**Z-Transform**		
	A	Z-transform, ROC, Unit circle, with DTFT.		
	B	Properties, Inverse ZT.		
	C	Solving difference equation using ZT		
	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.		
	B	The Laplace Transform, notion of eigen functions of LSI systems, a basis of eigen functions, region of convergence,		
	C	Poles and zeros of system, Laplace domain analysis, solution to differential equations and system behaviour.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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		

Digital System Design

School: SET **Batch : 2018-22** **Program: B.Tech** **Current Academic Year: 2019-20** **Branch: ECE** **Semester:III**		
1	Course Code	ECE235
2	Course Title	Digital Electronics and 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: Design and analyse combinational logic circuits CO2: Design & analyse modular combinational circuits with MUX/DEMUX,Decoder, Encoder CO3: Design & analyse synchronous sequential logic circuits CO4: Use HDL & appropriate EDA tools for digital logic design and simulation CO5: Use of HDL for the functional verification of FSM. CO6: Analyze a given combinational circuit
7	Course Description	This course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, 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	
	Unit 1	**Logic Simplification**
	A	Review of Boolean Algebra and De-Morgan‟s Theorem, SOP & POS forms.
	B	Canonical forms, Karnaugh maps up to 5 variables
	C	Binary codes, Code Conversion.
	Unit 2	**Combinational Logic Design**
	A	Half and Full Adders, Subtractors, Serial and Parallel Adders
	B	Parity Generator-Even and Odd, ALU
	C	MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display

	Unit 3	**Sequential Logic Design**		
	A	Building blocks like S-R, D,JK,T and Master-Slave JK FF, Edge triggered FF		
	B	Ripple Counter, Synchronous counters, Shift registers		
	C	Finite state machines, Design of synchronous FSM, Designing synchronous circuits like Pulse train generator,Pseudo Random Binary Sequence generator, Clock generation		
	Unit 4	**Logic Families and Semiconductor Memories**		
	A	TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, ECL, CMOS families		
	B	Memory elements, Concept of Programmable logic devices like PLDs, FPGA.		
	C	Logic implementation using Programmable Devices.		
	Unit 5	**VLSI Design flow**		
	A	Design entry: Schematic, FSM & HDL, different modelling styles in HDL		
	B	Data types and objects, Dataflow, Behavioural and Structural Modelling.		
	C	Synthesis and Simulation HDL constructs and codes for combinational and sequential circuits.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	R.P. Jain, “Modern digital Electronics”, Tata McGraw Hill,4th edition,2009 ISBN: 9780070534766		
	Other References	1. Douglas Perry, “VHDL”, Tata McGraw Hill, 4th edition,2002- ISBN: 9780071400701 2. D.V. Hall, “Digital Circuits and Systems”, Tata McGrawHill, 1989- ISBN: 9780471301592 3.Digital Logic and Computer Design by Marris Mano- ISBN:9788120304178 1979		

Analog Electronics Lab

School: SET **Batch: 2018-22** **Program: B.Tech.** **Current Academic Year: 2019-20** **Branch: ECE** **Semester: III**		
1	Course Code	ECP237
2	Course Title	**Analog Electronics Lab**
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	1. To develop a knowledge of special diodes. 2. To develop a knowledge of BJT and MOSFET devices. 3. It can be used in the design and analysis of various useful circuits. 4. To study differential, multi-stage and operational amplifiers.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: To study the various diodes as high speed switch for RF applications. CO2: Understand the functioning of BJT and design different circuits. CO3: Understand the functioning of J-FET and design different circuits. CO4: Understand the functioning of MOS-FET and operating in different modes. CO5: To acquire knowledge of amplifiers using BJT and FET. To analyse efficiency of variousAmplifiers. CO6: Design and analysis of differential, multi-stage and operational amplifier circuits usingBJT and MOSFET.
7	Course Description	To design the different type of circuits with the help of E-CAD tools and compare the experimental and simulation results.
8	Outline syllabus	
	Unit 1	**Practical based on Diodes**
	1	Plot the V-I characteristics of junction diode under forward and reverse biased condition, and find its Knee voltage.
	2	Plot the V-I characteristics of Zener diode and compare with p-n junction diode.
	3	To design Zener diode as a voltage regulator.
	4	To design Zener diode as a wave shaping.
	Unit 2	**Practical related to BJT**
	5	To study the characteristics of BJT in CB configuration.
	6	To study the characteristics of BJT in CE configuration
	Unit ¾	**Practical related to FET**
	7	To plot the output characteristics of FET and measure pinch-

		off voltage.		
	8	Examine the relationship between the drain current (I_D) and terminal voltages (V_{DS}& V_{GS}) of n-channel MOS transistor.		
	9	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)		
	Unit 5	**Practical related to Differential and operational amplifiers**		
	10	Design and analysis of differential amplifiers.		
	11	Design and characterization of operational amplifiers.		
	Mode of examination	Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	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		

Digital System Design Lab

School: SET **Batch :** **Program:** **B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: 3**		
1	Course Code	ECP240
2	**Course Title**	**Digital System Design Lab**
3	Credits	2
4	Contact Hours (L-T-P)	0-0-4
	Course Status	Compulsory
5	Course Objective	1. To acquire the basic knowledge of digital logic levels and application ofknowledge to understand digital electronics circuits. 2. To prepare students to perform the analysis and design of various digitalelectronic circuits. 3.To be able to model and simulate digital circuits in verilog and VHDL
6	Course Outcomes	After successful completion of this course the student will be able to: CO1:To understand and examine the structure of various number systemsand its application in digital design. CO2:The ability to understand, analyze and design various combinational,sequential circuits and logic families CO3: Model circuits and systems in System Verilog or VHDL CO4:Describe sequential digital systems in a hardware description language.CO5: Use of HDL for the functional verification of FSM. CO6: analyze a given combinational circuit
7	Course Description	This course covers combinational and sequential logic circuits. Topics include number systems, Boolean algebra, logic families, multiplexer, demultiplexer, programmable logic circuits and other related topics. Upon completion, students should be able to construct, analyze, verify, and troubleshoot digital circuits using appropriate techniques and test equipment as well as can model and simulate using verilog and vhdl.
8	Outline syllabus	
	Unit 1	
	A	To verify and design AND, OR, NOT and XOR gates using NAND gates.
	B	To verify and design AND, OR, NOT and XOR gates using NOR gates.
	C	To convert a Boolean expression into logic gate circuit and assemble it using logic gate IC‟s.

	Unit 2			
	A	Design a Half and Full Adder.		
	B	Design a Half and Full Subtractor.		
	C	Design a seven segment display driver.		
	Unit 3			
	A	To build a Flip- Flop Circuits using elementary gates. (RS, Clocked RS, D-type).		
	B	Design a counter using D/T/JK Flip-Flop.		
	C	Design a 4 X 1 Multiplexer using gates.		
	Unit 4			
	A	To study basic Logic Families.		
	B	Half adder, Full Adder using basic and derived gates.		
	C	Half subtractor and Full Subtractor using basic and derived gates		
	Unit 5			
	A	Write code to realize basic and derived logic gates.		
	B	Clocked D FF, T FF and JK FF (with Reset inputs). Multiplexer (4x1, 8x1) and Demultiplexer using logicgates.		
	C	Code converters (Binary to Gray and vice versa). 2 bitMagnitude comparator. 3 bit Ripple counter.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	Refer Lab Manual		
	Other References			

PROJECT BASED LEARNING 1

School: SET		**Batch :**		
Program: B.Tech		**Current Academic Year:**		
Branch: ECE		**Semester: 3rd**		
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			
	Unit 1	Problem Definition, Team/Group formation and ProjectAssignment. Finalizing the problem statement, resource requirement, if any.		
	Unit 2	Develop a work flow or block diagram for the proposed system / software.		
	Unit 3	Design Flow Chart for the proposed problem.		
	Unit 4	Implementation of work under the guidance of a faculty member and obtain the appropriate results.		
	Unit 5	Demonstrate and execute Project with the team. Test the project modules.		
		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	Theory		
	Weightage Distribution	CA	MTE	ETE
		60%	NA	40%
	Text book/s*			
	Other References			

TERM-IV

Network Theory

School: SET **Batch :** **Program: B. Tech.** **Current Academic Year:** **Branch: ECE** **Semester: 04**		
1	Course Code	ECE246
2	Course Title	Network Analysis and Synthesis
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Compulsory
5	Course Objective	To develop problem solving skills and understanding of 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: Analyse signals and systems and its properties. CO2: Understand and design the circuits using Network Theorems CO3: Analyse various parameters of two port network. CO4: Know Laplace transforms and their significance in signal analysis. 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 andanalyze electrical circuits.
8	Outline syllabus	

	Unit 1	**Signals and Systems**
	A	Introduction to signals, Types of signals
	B	Signal analysis, Singularity functions and associated waveforms.
	C	Introduction to system. System classifications. Continuoustime and discrete time LTI systems. Their properties, Convolution Sum and convolution Integral
	Unit 2	**Network Theorem(DC Independent and dependent sources)**
	A	Review of KCL and KVL, Node and Mesh Analysis, Superposition Theorem, Source Transformation
	B	Thevenin and Norton‟s Theorem
	C	Max Power Transfer theorem, Millman‟sTheorem, Tellegen‟s theorem.
	Unit 3	**Two Port Networks**
	A	Z, Y, h & Transmission Parameter.

	B	Conversion of parameters from one to other.		
	C	Combination of two port network (Series, parallel, series-parallel, cascade).		
	Unit 4	**Circuit Analysis in S- domain**		
	A	Introduction to Laplace transform, Properties of Laplace Transform		
	B	Poles, Zeros & Transfer Functions.		
	C	Convolution, Natural Response and the s-plane.		
	Unit 5	**Network Synthesis**		
	A	Techniques for Synthesizing the Voltage Ratio H(s).		
	B	Network realization & synthesis		
	C	Foster I &II ,Cauer I & II.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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", PrenticeHall of India- ISBN: 9780471899914 2. Networks and Systems, D. Roy Chaudhary, New AgePublishers 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		

Network Systems Lab

School: SET **Batch:** **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: IV**		
1	Course Code	ECP246
2	Course Title	Network Systems Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	To understand network and systems through the application of techniquesand principles of signals and network analysis to practical circuit problems.
6	Course Outcomes	After successful completion of this course the student will be able to:CO1:Identify various signals and apply them to the systems CO2:Analyze various theorems applied in network theory CO3: Demonstrate various parameters of two port network CO4: Construct networks for analysis CO5: Design the network on the basis of analysisCO6: Design and analysis of various networks
7	Course Description	Students will learn and understand Network Systems through practical approach
8	Outline syllabus	
	Unit 1	**Signals & LTI Systems**
		To recognize various signals and show on CRO
		To apply the signal to the system and verify the output
	Unit 2	**Network Theorem (DC Independent and DependentSources)**
		To verify KCL and KVL of the given network
		To verify superposition theorem of the given network
		To verify Thevinin‟s and Norton‟s theorem of the given network
		To verify Maximum Power Transfer theorem of the given network
	Unit 3	**Two Port network**
		To find impedance parameters
		To find admittance parameters
		To find hybrid parameters
		To find transmission parameters
	Unit 4	**Circuit Analysis in S-domain**
		To calculate driving function and transfer function of the ladder network

		To calculate driving function and transfer function of the T- network
	Unit 5	**Network Synthesis**

	To design a network of a given transfer function		
	To design a network of a given driving function		
Mode of examination	Practical/Viva		
Weightage Distribution	CA	MTE	ETE
	60%	0%	40%
Text book/s*	1. Signals and Systems, Alan V. Oppenheim, PrenticeHall, 2nd Ed- ISBN: 9781292025902 2. Franklin F. Kuo,"Network Analysis and Synthesis",John Wiley & Sons- ISBN: 9780471511182		

Analog Circuits-2

School: SET **Batch:** **Program: B.Tech** **Current Academic Year:** **Branch: Electronics & Communication Engg.Semester:IV**		
1	Course Code	ECE-243
2	Course Title	Analog Circuits-2
3	Credits	4
4	Contact Hours (L-T-P)	3-1-0
	Course Status	Compulsory
5	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)..
6	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.
7	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 also deals with oscillators, waveform generators and data converters.
8		
	Unit 1	**Feedback Amplifier**
	A	The general feedback structure, properties of negative feedback
	B	The four basic feedback topologies: the series-shunt feedback amplifier
	C	The series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.
	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.
	B	Differential and Common-Mode Signals, Inverting and non-inverting configuration, the close loop gain, Input and output resistance and slew rate.

	C	Weighted Summer, Voltage follower, Difference Amplifier, Integrator and Differentiator.		
	Unit 3	**Opamp Applications**		
	A	An Overview of Op-Amp based circuits V-I and I-V converters.		
	B	Generalized impedance converter, simulation of inductors.		
	C	First and second order LP,HP,BP,BS and All pass active filters.		
	Unit 4	**Nonlinear Applications of Operational Amplifiers**		
	A	Log-Antilog Amplifiers, Instrumentation Amplifier, Isolation Amplifier.		
	B	Precision Rectifiers, Peak Detectors, Sample and HoldCircuits, Schmitt trigger, stable Multi-vibrator,Monostable Multi-vibrator, Generation of Triangular Waveforms.		
	C	Analog Multipliers and their applications, Op-Amp as a comparator, Zero Crossing detector.		
	Unit 5	**D/A and A/D Converters**		
	A	Basic circuits using Binary weighted Resistors, R-2R ladder D/A converters.		
	B	Dual Slop,Parallel,SAR A/D converters.		
	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).		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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 IntegratedCircuits", Tenth Reprint 2012, TMH Education Pvt. Ltd- ISBN:9780070648074		

Communication Engineering

School: SET **Batch:** **Program: B.TECH.** **Current Academic Year:** **Branch:ECE** **Semester:4**		
1	Course Code	ECE244
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 and receivers 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: Comprehend the fundamentals in explain the functionality ofmodulation and demodulation environment CO2: Analyze the concepts of AM and AM Demodulation process in Communication. CO3: Know the origin of FM and FM-Demodulation process in communication CO4: Analyse the behaviour of a communication system in presence of noise CO5: Investigate 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	
	Unit 1	**REVIEW OF SIGNALS**
	A	Types of signals, Fourier Transform
	B	Frequency domain representation of signals
	C	Elements of communication system
	Unit 2	**ANALOG MODULATION**
	A	Need of modulation, Types of modulation
	B	Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations
	C	Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

	Unit 3	**PROBABILITY THEORY AND NOISE**		
	A	Review of probability and random process		
	B	Types of Noises: Internal and External Noise, Noise Figure, Noise Calculation		
	C	Gaussian and white noise characteristics		
	Unit 4	**NOISE IN VARIOUS ANALOG MODULATION**		
	A	Noise in amplitude modulation systems		
	B	Noise in Frequency modulation systems		
	C	Pre-emphasis and Deemphasis, Threshold effect in angle modulation		
	Unit 5	**PULSE MODULATION**		
	A	Pulse modulation, Sampling process		
	B	Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Introduction to Pulse code modulation		
	C	Multiplexing- TDM and FDM		
	Mode of examination	Theory/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. Haykin S., "Communications Systems", John Wiley andSons, 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 CommunicationSystems", Tata McGraw Hill,2003- ISBN: 9780070629233 2. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering", John Wiley, 2009- ISBN:9780881335545		

Communication Engineering Lab

School: SET **Batch:** **Program: B.TECH.** **Current Academic Year:** **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	
	Unit 1	**Practical based on signals**
		To analyze given signal in time domain and frequency domain using MATLAB
	Unit 2	**Practical related to Amplitude and Frequency Modulation**
		To analyze and interpret amplitude modulation and demodulation
		To analyze and interpret DSB-SC modulation and demodulation
		To analyze and interpret SSB modulation and demodulation
		To analyze and interpret frequency modulation and demodulation
	Unit 3	**Practical related to probability**
		To analyze the given random process using MATLAB
	Unit 4	**Practical related to noise**
		To analyze and interpret noise in Amplitude Modulation
		To analyze and interpret noise in Frequency Modulation

	Unit 5	**Practical related to TDM**		
		To demonstrate Time Division Multiplexing using PAM signals		
	Mode of examination	Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	1. Haykin S., "Communications Systems", John Wileyand Sons, 2013-ISBN: 9781118476772. 2. 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 2. Wozencraft J. M. and Jacobs I. M., ``Principles ofCommunication Engineering", John Wiley, 2009- ISBN:9780881335545		

Project Based Learning -2

School: SET		**Batch :**	
Program: B.Tech		**Current Academic Year:**	
Branch: ECE		**Semester: 4th**	
1	Course Code	**ECP289**	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 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-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		
	Unit 1	Problem Definition, Team/Group formation and ProjectAssignment. Finalizing the problem statement, resource requirement, if any.	
	Unit 2	Develop a work flow or block diagram for the proposed system / software.	
	Unit 3	Design Flow Chart for the proposed problem.	
	Unit 4	Implementation of work under the guidance of a faculty member and obtain the appropriate results.	
	Unit 5	Demonstrate and execute Project with the team. Test the project modules.	
		Report should include Abstract, Hardware / SoftwareRequirement, Problem Statement, Design/Algorithm, Implementation Detail & Test Reports.	

		References if any. The presentation, report, work done during the termsupported by the documentation, forms the basis of assessment.		
	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	NA	40%
	Text book/s*			
	Other References			

TERM-V

Microprocessor and Microcontroller with Interfacing

School: SET **Batch :** **Program: BTECH** **Current Academic Year:** **Branch:ECE** **Semester: IV**		
1	Course Code	ECE245
2	Course Title	Microprocessor and Microcontroller with Interfacing
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	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, functioning of basic 8-bit microprocessor and comparison with microcontroller CO2: Understand CO3: Apply assembly language programming of microcontrollers using programming 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
7	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.
8	Outline syllabus	
	Unit 1	**Fundamentals of Microprocessors**
	A	Fundamentals of Microprocessor Architecture. 8-bit Microprocessor
	B	Addressing Modes and Instruction set of 8085
	C	Introduction to microcontroller; compare microcontroller and microprocessor, Overview of the 8051 family.
	Unit 2	**The 8051 Architecture**
	A	Internal Block Diagram, CPU, ALU, address, data and control bus, Working registers, SFRs

	B	Clock and RESET circuits, Stack and Stack Pointer, Program Counter, I/O ports,		
	C	Memory Structures, Data and Program Memory, Timing diagrams and Execution Cycles		
	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		
	B	8051 Instruction set, Instruction timings. Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bitmanipulation instruction		
	C	Assembly language programs, C language programs. Assemblers and compilers. Programming and debugging tools.		
	Unit 4	**Memory and I/O Interfacing**		
	A	Memory and I/O expansion buses, control signals, memory wait states		
	B	Interfacing of peripheral devices such as General Purpose I/O, ADC, DAC, timers, counters, memory devices.		
	C	LED, LCD and keyboard interfacing, Stepper motor interfacing, DC Motor interfacing, sensor interfacing.		
	Unit 5	**External Communication Interface**		
	A	Synchronous and Asynchronous Communication		
	B	RS232, SPI, I2C		
	C	Introduction and interfacing to protocols like Blue-tooth and Zig-bee.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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 CengageLearning,2004- ISBN:9780314772787 2. R. S. Gaonkar, ", Microprocessor Architecture: Programming and Applications with the 8085", Penram International Publishing, 2002- ISBN: 9780130340016		

Microprocessor and Microcontroller with Interfacings Lab

School: SET **Batch:** **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester:IV**		
1	Course Code	ECP245
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	
	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).
	B	Write a program using 8051 and verify- a) Multiplication and division of two 8-bitnumbers. b) Multiplication and division of two 16-bitnumbers.
	C	Write a program using 8085 for block transfer of 10 memory locations

	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		
	B	Write a program to create any pattern with LEDs connectedto any port(0 to 4) creating delay of 1ms with timers		
	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		
	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.		
	B	Write a Program to interface LCD to 8051 Microcontrollerand display "Sharda University" moving right and left as well.		
	C	Write a Program to interface LCD to 8051 Microcontroller and display the character typed by keyboard.		
	Unit 4	**Practical related to interfacing of ADC and sensors**		
	A	Interface ADC 0804 with 8051		
	B	Interface temperature sensor LM35D with ADC and display temperature on LCD		
	C	Interface DAC with 8051 and check output on CRO		
	Unit 5	**Practical related to interfacings of DC motor and stepper motor**		
	A	Write a Program to interface D.C. Motor to 8051 Microcontroller.		
	B	Write a Program to interface Stepper Motor to 8051 Microcontroller.		
	C	Design a project for robo arm		
	Mode of examination	Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	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 Cengage Learning,2004-ISBN:9780314772787 2.R. S. Gaonkar, ", Microprocessor Architecture: Programmingand Applications with the 8085", Penram International Publishing, 2002- ISBN: 9780130340016		

Control Systems

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: EEE** **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: Obtain 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	
	Unit 1	**Introduction to Control Problem**
	A	Feedback Control: open-loop and closed-loop systems, benefits of feedback, block diagram algebra
	B	Mathematical models of physical systems, signal flow graph
	C	Transfer function models of linear time-invariant systems
	Unit 2	**Time Response Analysis**
	A	Standard test signals, time response of first order systems

		for standard test inputs		
	B	Time response of second order systems for standard test inputs		
	C	Design specifications for second-order systems based on the time-response		
	Unit 3	**Frequency Response Analysis**		
	A	Introduction and frequency domain specifications		
	B	Correlation between frequency domain and time domain.		
	C	Polar plot and Bode plot		
	Unit 4	**Stability of Control Systems**		
	A	Concept of stability		
	B	Characteristic equation, location of roots in s plane for stability, Routh Hurwitz criterion.		
	C	Root-locus technique. Construction of root-loci		
	Unit 5	**Modern Control System**		
	A	Lag, lead, lag-lead compensator and their performance criteria		
	B	Concepts of state variables and state space model.		
	C	Solution of state equations, concept of controllability and observability.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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 SystemsEngineering”, New Age International, 2009- ISBN: 9781848290037 2. B. C. Kuo, “Automatic Control System”, PrenticeHall, 1995.IEEE Industry Applications Society, IEEE Inst of Electrical & Electronics		

Digital Communication

School: SET **Batch :** **Program: B.TECH** **Current Academic Year:** **Branch: ECE** **Semester: VI**		
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: Analyse the concept of digital communication.CO2: Know Intersymbol Interference. CO3:Apply the knowledge of signals and system to understand variousmodulation techniques. CO4:Apply and interpret entropy and channel capacity. CO5: Analyse various error detecting and correcting codes. CO6: Able to explain the techniques used for waveform coding viz. (ASK,FSK, PSK)
7	Course Description	This course give the basic structures and fundamental principles ofmodern digital communication systems, source coding, concepts of information, entropy, channel capacity, channel coding.
8	Outline syllabus	
	Unit 1	**DIGITAL TRANSMISSION SYSTEM**
	A	General concept of digital communication systems
	B	Sampling, quantization; Companding
	C	PCM, Delta modulation; Adaptive delta modulation; Differential PCM.
	Unit 2	**INTERSYMBOL INTERFERENCE**
	A	Intersymbol Interference, Non-ideal channel transmission, Eye diagram, pulse shaping
	B	Bit synchronization, word synchronization
	C	Optimal Receiver Design, Matched filter, bit error rate, coherent receiver
	Unit 3	**DIGITAL MODULATION TECHNIQUES**

	A	Coherent receivers: ASK, FSK, PSK modulation		
	B	Incoherent receivers: ASK, FSK, PSK modulation, Differential PSK modulation		
	C	Detection of M-ary signals		
	Unit 4	**INFORMATION THEORY**		
	A	Information, Entropy for discrete signals, Self information, mutual information, Entropy rate		
	B	Channel capacity: Entropy for continuous randomvariables; Channel capacity; Shannon's second theorem; Capacity of a band-limited Gaussian channel		
	C	Source coding: Huffman coding; Shannon-Fano coding; Shannon's first theorem		
	Unit 5	**CHANNEL CODING**		
	A	Error correcting codes, Linear block codes		
	B	Cyclic codes		
	C	Convolutional codes, Viterbi's decoding algorithm		
	Mode of examination	Theory/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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.		

Computer Architecture

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

	C	Floating Point arithmetic, IEEE 754 floating point Formats		
	Unit 3	**Control Unit**		
	A	Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit		
	B	Microprogrammed Control - Basic concepts, minimizing micro instruction size, multiplier control unit		
	C	Microprogrammed computers - CPU control unit		
	Unit 4	**Memory organization**		
	A	Memory organization, device characteristics, RAM, ROM, Memory management		
	B	Concept of Cache & associative memories, Virtual memory		
	C	System organization, Input - Output systems, Interrupt, DMA,Standard I/O interfaces		
	Unit 5	**Parallel processing**		
	A	Concept of parallel processing		
	B	Pipelining, Forms of parallel processing		
	C	Interconnect network		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. V.CarlHammacher, “Computer Organisation”, FifthEdition- ISBN:9780070712928 2. M.M.Mano, “Computer System Architecture”, EditionSixth- ISBN: 9788131700709		
	Other References			

Control System Laboratory

School: SET **Batch:** **Program: B.Tech** **Current Academic Year** **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 domain and frequency domain analysis. 2. An understanding of the fundamental analytical methods and tools used in control system design. 3. Ability to design feedback controllers and compensators to meet Desired performance specifications.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1:Understand the modeling of linear-time-invariant systems using transfer function models, signal flow graphs and block diagram algebra CO2: Understand the concept of stability and its assessment for linear-time invariant systems. CO3: To obtain system response in both time domain and frequency domain CO4: Analyze dynamic systems for their stability and performance CO5: To obtain and analyze the state space representation of a system CO6: Apply the concept of time domain and frequency domain analysis for Industrial application.
7	Course Description	This course shall introduce the fundamentals of modeling and control of 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	
	Unit 1	**Practical based Feedback Systems**
		To determine the speed-torque characteristics of an ACServomotor
		To study synchro transmitter and receiver pair and obtainoutput versus input characteristics
		To control the speed of an AC motor using TRIAC
	Unit 2	**Practical related to time response analysis**
		Time domain analysis and error analysis of first order control system using MATLAB
		Time domain analysis analysis of second order control system

		using MATLAB		
		Error analysis of second order control system using MATLAB		
	Unit 3	**Practical related to frequency response analysis**		
		Frequency domain analysis and error analysis of first order control system using MATLAB		
		Frequency domain analysis analysis of second order control system using MATLAB		
		Error analysis of second order control system using MATLAB		
	Unit 4	**Practical related to Stability**		
		Stability analysis using Bode Plot of Linear Time Invariant system using MATLAB		
		Stability analysis using Root Locus Technique of Linear Time Invariant system using MATLAB		
	Unit 5	**Practical related to State Space Analysis**		
		To obtain state space representation of a given system using MATLAB.		
		To transform a given state space model to transfer function and vice versa using MATLAB		
	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	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	3. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International, 2009- ISBN: 9781848290037 4. B. C. Kuo, "Automatic Control System", PrenticeHall, 1995.IEEE Industry Applications Society, IEEE Inst of Electrical & Electronics		

School: SET		**Batch:**
Program: B.TECH.		**Current Academic Year:**
Branch: ECE		**Semester: VI**
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 ISI CO3: 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	
	Unit 1	**Practical based on Sampling and PCM**
		To analyse and prove sampling theorem
		To analyse and interpret PCM modulation and demodulation using MATLAB
		To analyse and interpret delta modulation and demodulation using MATLAB
	Unit 2	**Practical related to Intersymbol Interference**
		To analyze an Eye Diagram by introducing error
	Unit 3	**Practical related to Modulation Techniques**
		To analyze ASK modulation technique and interpret the modulated and demodulated waveforms
		To analyze ASK modulation technique and interpret the modulated and demodulated waveforms
		To analyze ASK modulation technique and interpret the modulated and demodulated waveforms
		To simulate BASK modulation technique using MATLAB
		To simulate BPSK modulation technique using MATLAB
		To simulate BFSK modulation technique using MATLAB
		To simulate QPSK modulation technique using MATLAB
		To simulate Differential PSK modulation technique using

		MATLAB		
	Unit 4	**Practical related to Source Coding and ChannelCapacity**		
		To find entropy and length of a given message using Huffman Coding(MATLAB)		
		To find entropy and length of a given message using Shannon Fano Coding(MATLAB)		
		To analyze channel capacity of a BSC channel using MATLAB		
	Unit 5	**Practical related to error detecting and correctingcodes**		
		To simulate Linear Block codes using MATLAB		
		To simulate Convolutional codes		
	Mode of examination	Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	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: SET		**Batch :**	
Program: B.Tech		**Current Academic Year:**	
Branch: ECE		**Semester: 5TH**	
1	Course Code	**ECP392**	Course Name: Project Based Learning -3
2	Course Title	Project Based Learning -3	
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 for presentation of project related activities CO5: Contribute as an individual or in a team indevelopment of technical projects CO6: Demonstrate effectively the module designed	
7	Course Description	In PBL-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		
	Unit 1	Problem Definition, Team/Group formation and Project Assignment. Finalizing the problem statement, resourcerequirement, if any.	
	Unit 2	Develop a work flow or block diagram for the proposed system / software.	
	Unit 3	Design Flow Chart for the proposed problem.	
	Unit 4	Implementation of work under the guidance of a faculty member and obtain the appropriate results.	
	Unit 5	Demonstrate and execute Project with the team. Test the project modules.	
		Report should include Abstract, Hardware / SoftwareRequirement, 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			
	Weightage Distribution	CA	MTE	ETE
		60%	NA	40%
	Text book/s*			
	Other References			

TERM-VI

Digital Signal Processing

School: SET **Batch :** **Programme: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: VI**		
1	Course Code	ECE361
2	Course Title	Digital Signal Processing
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Compulsory
5	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.
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, 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.
8	**Outline syllabus**	
	Unit 1	**Discrete Fourier Transforms:**
	A	Definitions and DFT as linear transform, Relationship of DFT with other transform
	B	Properties of the DFT- Periodicity, Linearity, Symmetry and Multiplication of two DFT
	C	Circular Convolution, Linear Convolution
	Unit 2	**Fast Fourier Transform Algorithms:**
	A	Introduction FFT Algorithm , Computational complexity of the direct computation of the DFT and FFT
	B	Decimation –In Time (DIT) Algorithm, Computational Efficiency
	C	Decimation in Frequency (DIF) Algorithm, IDFT using FFT graph

	Unit 3	**Realization of Digital Systems:**		
	A	Introduction to Digital Filter Structure: Block Diagram		
		representation, direct form realization of IIR systems, cascaderealization of an IIR systems, parallel form 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.		
	C	Basic FIR structures- Direct form, Cascade form.		
	Unit 4	**Design of Infinite Impulse Response Digital Filters:**		
	A	Introduction to Filters, Design by Impulse Invariant Transformation,		
	B	Design by Bi-Linear Transformation		
	C	All- Pole Analog Filters: Butterworth and Chebyshev, Designof Digital Butterworth and Chebyshev Filters.		
	Unit 5	**Finite Impulse Response Filter Design:**		
	A	Concept of Windowing and the Rectangular Window		
	B	Other Commonly Used Windows, Examples of Filter Designs using Windows		
	C	The Kaiser Window.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	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		

Computer Network

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: VI**		
1	Course Code	ECE362
2	Course Title	Computer Network
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Compulsory
5	Course Objective	1. To educate basic knowledge of networking technologies and network management concepts. 2. To interpret the layering concepts in computer networks. 3. To analyse the functions of each layer and gain knowledge in different applications that use computer networks. 4. To emphasize the hand-on experience of network topology in a laboratory environment. 5. To be familiar with contemporary issues in networking technologies.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Understand the concepts of networking thoroughly. CO2: Understand the data link layer functionality CO3: Analyse the performance of the network. CO4: Investigate Quality control mechanisms. CO5: Analyse the various switching technologies. CO6: Explain and identify performance issues in computer networking.
7	Course Description	The main emphasis of this course is on the organization and management of local area networks (LANs). The course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems. The course introduces computer communication network design and its operations. The course includes the following topics: Open Systems Interconnection (OSI) communication model; error detection and recovery; local area networks; bridges, routers and gateways; network naming and addressing; and local and remote procedures. On completion of the course, the student should be able in part to design, implement and maintain a typical computer network (LAN).
8	Outline syllabus	
	Unit 1	**Introduction to computer networks and the Internet**
	A	Goals and application of Networks, LAN,MAN,WAN
	B	Protocol Hierarchies, Layered architecture.

	C	The OSI reference model, TCP/IP reference model, Internet.		
	Unit 2	**Data Link Layer**		
	A	Data link layer design issues, Flow control, and Error control.		
	B	Data link layer protocols, stop-and-wait protocol, Sliding window protocol, Go-back-N protocol, HDLC, PPP.		
	C	Media access sub layer, MAC protocols-ALOHA, slotted ALOHA, Carrier sense multiple access protocol.		
	Unit 3	**Network layer and Transport layer**		
	A	Router, Internet Protocol, Routing algorithms, Broadcast and Multicast routing		
	B	Connectionless transport - User Datagram Protocol, Connection oriented transport – Transmission ControlProtocol		
	C	IP, sub-netting, subnet mask.		
	Unit 4	**Congestion Control and Resource Allocation**		
	A	Issues in Resource Allocation, Queuing Disciplines		
	B	TCP congestion Control, Congestion Avoidance Mechanisms		
	C	Quality of Service		
	Unit 5	**Switching in networks**		
	A	Classification and requirements of switches, a generic switch,		
	B	Circuit Switching, Time-division switching, Space-division switching		
	C	Packet switching, Blocking in packet switches, Three generations of packet switches		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	Andrew Tanenbaum, “Computer networks”, Prentice Hall, 2011- ISBN: 9780132553179		
	Other References	1. B. A. Forouzan, “Data Communications and Networking”,Tata McGraw Hill, 4th Edition,2006- ISBN: 9780073250328 2. T. Viswanathan, “Telecommunication Switching Systemand Networks”, Prentice Hall-ISBN:9788131764640 3. S. Keshav, “An Engineering Approach to Computer Networking” , Pearson Education-ISBN:9788131711453		

Digital Signal Processing Lab

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: EC** **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	
	Unit 1	a) To find out DFT and IDFT of asequence. b) To obtain linear convolution of asequence c) To obtain circular convolution
	Unit 2	To find FFT of a given sequence.
	Unit 3	To obtain direct realization of FIR and IIR filters.
	Unit 4	a) To design FIR using Rectangular Hanning,Hamming and Blackmann window. b) To design Low pass and High pass filter usingwindow technique. c) To design band pass and band reject filter usingwindows

	Unit 5	a) To design IIR filter using Bilinear Transformationmethod. b) To design IIR filter using impulse invariantmethod.		
	Value Added	a) Introduction to Simulink, Communication Toolbox and Digital processing tool box. b) To display and analyse multiple FIR filters, usingFV tool (Plot magnitude and phase response).		
	Mode of examination	Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	Lab Manuals		

School: SET		**Batch:**
Program: B.Tech		**Current Academic Year:**
Branch:EC		**Semester: 6**
1	Course Code	ECP362
2	Course Title	Computer Networks Lab
3	Credits	1
4	Contact Hours (L-T-P)	0-0-2
	Course Status	Compulsory
5	Course Objective	• To interpret the working principle of various communication protocols • To identify the working difference between different topologies • To describe the concept of data transfer between nodes
6	Course Outcomes	By the end of this course you will be able to: CO1: To interpret the working principle of various network topologies CO2: To analyze ALOHA, CSMA,CSMA/CD for packet communication betweennodes connected to common topology CO3: Investigate and explore fundamental issues in IP addressing andapplication layer. CO4: To distinguish different flow control mechanism over an unreliablenetwork CO5: To analyze protocols of all layers of OSI for the successfulcommunication. CO6: To understand different networking components and devices
7	Course Description	Familiarize the student with the basic taxonomy and terminology of the computer networking area. Encapsulate basic understanding of networking in a way to use and apply.
8	Outline syllabus	
	Unit 1	**Introduction**
		Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc. To implement the tokenpassing access in BUS-LAN, To implement the token passing access in RING-LAN.
	Unit 2	**Data link layer**
		Implement the ALOHA protocol for packet communication between a number of nodes connected to a common bus , Implement the CSMA protocol for packet communication between a number of nodes connected to a common bus
	Unit 3	**Network Layer**
		IP Addressing :sub netting, Super netting
	Unit 4	**Transport Layer**

		Provide reliable data transfer between two nodes over an unreliable network using the stop and- wait protocol, Provide reliable data transfer between two nodesover an unreliable network using the sliding window go back N protocol.		
	Unit 5	**Application Layer**		
		Implementation and study of Simple mail transfer protocol and		
		file transfer protocol.		
	Mode of examination	Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		60%	0%	40%
	Text book/s*	Andrew Tanenbaum, "Computer networks", Prentice Hall, 2011- ISBN: 9780132553179		
	Other Reference s	1. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition,2006- ISBN: 9780073250328 2. T. Viswanathan, "Telecommunication Switching System and Networks", Prentice Hall-ISBN:9788131764640 3. S. Keshav, "An Engineering Approach to Computer Networking" , Pearson Education-ISBN:9788131711453		

School: SET		**Batch :**
Program: B.Tech		**Current Academic Year:**
Branch: ECE		**Semester: 6TH**
1	Course Code	**ECP381** Course Name: Project Based Learning -4
2	Course Title	Project Based Learning -4
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: Acquire practical knowledge within the chosen area of technology for project development CO2: Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach CO3: Discuss and accumulate the background information CO4: Develop effective communication skills for presentation of project related activities CO5: Contribute as an individual or in a team indevelopment of technical projects CO6: Demonstrate effectively the module designed
7	Course Description	In PBL-1, the students will learn how to define the problem for 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	
	Unit 1	Problem Definition, Team/Group formation and ProjectAssignment. Finalizing the problem statement, resource requirement, if any.
	Unit 2	Develop a work flow or block diagram for the proposed system / software.
	Unit 3	Design Flow Chart for the proposed problem.
	Unit 4	Implementation of work under the guidance of a faculty member and obtain the appropriate results.
	Unit 5	Demonstrate and execute Project with the team. Test the
		project modules.
		Report should include Abstract, Hardware / SoftwareRequirement, Problem Statement, Design/Algorithm,Implementation Detail & Test Reports. References if any. The presentation, report, work done during the termsupported by the documentation, forms the basis of assessment.

	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	NA	40%
	Text book/s*			
	Other References			

TERM – VII

Management for Engineers

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

	A	Planning objectives and characteristics.		
	B	Hierarchies of planning.		
	C	The concept and techniques of forecasting.		
	Unit 3	Organizing		
	A	Meaning, Importance and Principles		
	B	Departmentalization, Span of Control		
	C	Types of Organization, Authority, Delegation of Authority		
	Unit 4	Staffing		
	A	Meaning, Job analysis		
	B	Manpower planning, Recruitment, Transfers and Promotions		
	C	Appraisals, Management Development, Job Rotation, Training, Rewards and Recognition,		
	Unit 5	Directing & Controlling		
	A	Motivation, Co-ordination, Communication,		
	B	Directing and Management Control, Decision Making,		
	C	Management by objectives (MBO) the concept and relevance. Objectives and Process of Management Control		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. Principles & practice of Mgmt., L.M. Prasad		
	Other References	1. Management Today, Burton & Thakur 2. Principles & Practices of Mgmt., C.B. Gupta 3. Understanding Management, Richard L.Daft 4. Management, Stoner, Freemand & Gilbert 5. Essential of Management, Koontz O' Donnel		

Syllabus: ECE 491, Major Project -1

School: SET		**Batch:**	
Program: B.tech		**Current Academic Year:**	
Branch: CSE		**Semester: 7th**	
1	Course Code	**ECE491**	Course Name: Major Project -1
2	Course Title	Major Project -1	
3	Credits	3	
4	Contact Hours (L-T-P)	0-0-0	
	Course Status	Compulsory	
5	Course Objective	Project being the student"s last activity at the institution, it fulfills a purpose of synthesis ofall the knowledge they have acquired throughout the different years. In addition, this knowledge must be used in a particular way, in order to solve a specific problem, which lets student demonstrate their aptitude by applying this knowledge.	
6	Course Outcomes	Students will be able to: CO1: Identify problem statement in engineering and technology in selected field of interest.CO2: Analyze the gathered information required to develop a project. CO3: Participate in different teams and to focus on getting a working project done on timewith each student being held accountable for their part of the project. CO4: Prepare the designs requirements, functional and conceptual design CO5: Initiate the actual implementation of the project work to produce the deliverables CO6: Communicate project work effectively with at large in written and oral forms,preferably research paper/patent/technical competitions, as a part of the project work.	
7	Course Description	The object of Major Project-I is to enable the student to take up investigative study in 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.	
8	Outline syllabus		
	Unit 1	Problem identification, Literature survey/Gather & analyze information from multiple sources	
	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)	
	Unit 3	Preparing Design: Circuit Diagrams, Use of appropriate tools and techniques for project design	
	Unit 4	Identify and Implement Project Modules.	
	Unit 5	Use of appropriate tools/technologies for coding the modules	

		Report on final problem statement, specifications, project schedule, final concept design and project schedule Report and Presentation - Project Modules development.Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.		
	Mode of examination	Practical		
	Weightage Distribution	CA	MTE	ETE
		60%	NA	40%

Syllabus: ECE 492, Major Project - 2

School: SET		**Batch:**	
Program: B.tech		**Current Academic Year:**	
Branch: CSE / IT		**Semester: VIII**	
1	Course Code	**ECE492**	Course Name: Major Project -2
2	Course Title	Major Project -2	
3	Credits	8	
4	Contact Hours (L-T-P)	0-0-16	
	Course Status	Compulsory	
5	Course Objective	1. To understand the concept of project design after thecompletion of project planning 2. Students making decisions within a framework 3. Continuous evaluation of the project 4. A final product to be evaluated for quality	
6	Course Outcomes	Students will be able to: CO1: Demonstrate the implementation of the project. CO2: Identify the test procedure for each implemented module. CO3: Deploy and evaluate the modules to verify the required need of the project. CO4: Use different tools for testing and report writing. CO5: Develop the attitude and ethics of a professional engineer. CO6:Communicate project work effectively with at large in written and oral forms, preferably research paper/patent/technical competitions, as a part of the project work.	
7	Course Description	The objective of Major Project-II is to enable the student to extend further the development of project till testing anddeployment under the guidance of a Supervisor.	
8	Outline syllabus		
	Unit 1	Complete the implementation of the project. Testing of the modules, Use of appropriate tools/techniques for testing	
	Unit 2	Deploy & demonstrate developed modules of the project	
	Unit 3	Preparing a Project Report in the standard format for being evaluated by the Supervisor	
	Unit 4	Submission of Project and Report to Departmental Committee	
	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.	
	Mode of examination	Practical	

	Weight age Distribution	CA		
	Text book/s*	60%	NA	ETE
				40%

PROGRAM ELECTIVE

Antennas and Propagation

School: SET **Batch:** **Program: B.Tech.** **Current Academic Year:** **Branch: ECE** **Semester: VI**		
1	Course Code	ECE931
2	Course Title	Antennas and Propagation
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Describe the basic principles of various types of antennas. 2. Analyse different types of antennas designed for various frequency ranges. 3. Become proficient with analytical skills for understanding practical use of antennas. 4. Design some practical antennas such as dipole, Yagi - uda, and horn antennas. 5. Determine the radiation patterns (in principal planes) of antennas through measurement setups.
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Uderstandthe properties of antennas. CO2: Analyse the properties of different types of antennas and their design. CO3: Operate antenna design and come up with the design of the antenna of required specifications. CO4: Able to explain structure and working of antenna types CO5: Design antenna patterns for different cases. CO6: Understand the various antenna parameters.
7	Course Description	This course is design to introduce the fundamental principles of antenna working and various types of antennas. The students can capable to analysis and measure the radiation from antennas.
8	Outline syllabus	
	Unit 1	**Fundamental Concepts of Radiations**
	A	Fundamental Concepts- Physical concept of radiation, Radiation pattern, near-and far-field regions,
	B	Reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency
	C	Friis transmission equation, radiation integrals and auxiliary potential functions.
	Unit 2	**Radiation Theory**
	A	Radiation from Wires and Loops- Infinitesimal dipole, finite- length dipole.
	B	Linear elements near conductors, dipoles for mobile communication, small circular loop.

	C	Aperture and Reflector Antennas- Huygens' principle,		
	Unit 3	**Radiation from Antenna**		
	A	Radiation from rectangular and circular apertures, design considerations,		
	B	Babinet's principle, Radiation from sectoral and pyramidal horns.		
	C	Design concepts, prime-focus parabolic reflector and case grain antennas.		
	Unit 4	**Various Antenna**		
	A	Broadband Antennas- Log-periodic and Yagi-Uda antennas,		
	B	Frequency independent antennas, broadcast antennas.		
	C	Antenna Array: Broad side array, endfire array		
	Unit 5	**Advanced Antennas**		
	A	Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods,		
	B	Methods of analysis, design of rectangular and circular patch antennas.		
	C	Basic Concepts of Smart Antennas- Concept and benefits of smart antennas		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. J.D. Kraus, Antennas, McGraw Hill, 1988-ISBN: 9780070354227 2. C.A. Balanis, Antenna Theory - Analysis and Design, JohnWiley, 2016-ISBN: 9781118642061.		
	Other References	1. R.E. Collin, Antennas and Radio Wave Propagation,McGraw Hill, 2000-ISBN:9780070118089 2. R.C. Johnson and H. Jasik, Antenna Engineering Handbook,McGrawhill, 1984-ISBN:9781596934429		

Introduction to MEMS

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch:ECE** **Semester: V/VI**		
1	Course Code	ECE932
2	Course Title	Introduction to MEMS
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Have a concept on the scope and recent development of the science and technology of MEMS. 2. Gain the physical knowledge underlying the operation principles and design of MEMS. 3.Learn some typical or potentially applicable micro and nano systems at the frontier of the development of the field
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Appreciate the underlying working principles of MEMS and NEMS devices. CO2: Design and model MEMS devices. CO3 : Gain a knowledge of basic approaches for various sensor design CO4 : Evaluate the basic approaches for various actuator design CO5: Compare the different MEMS characterisation techniques. CO6: Analyse new materials, science and technology for micro/nanosystem applications.
7	Course Description	The objective of this course is to make students to gain basic knowledge on overview of MEMS (Micro electro Mechanical System) and various fabrication techniques. This enables them to design, analysis, fabrication and testing the MEMS based components. And to introduce the students various opportunities in the emerging field of MEMS.
8	Outline syllabus	
	Unit 1	Introduction and Historical Background
	A	Introduction to Micro electro mechanical Systems (MEMS)
	B	Types of MEMS
	C	Micro/Nano Sensors, Actuators and Systems
	Unit 2	Review of Basic MEMS fabrication modules
	A	Conventional MEMS fabrication using VLSI technology, lithography.
	B	Oxidation, Deposition Techniques, Lithography (LIGA), and Etching
	C	Plasma etching, reactive ion etching (RIE), oxidation, chemical vapour deposition (CVD)
	Unit 3	MEMS: Design and Analysis
	A	Basic concepts of design of MEMS devices and processes
	B	Design for fabrication, Other design considerations,

	C	Analysis of MEMS devices, FEM and Multi physics analysis.		
	Unit 4	Mechanics of solids in MEMS/NEMS		
	A	Stresses, Strain, Hookes‟s law, Poisson effect, Linear Thermal Expansion		
	B	Bending; Energy methods, Overview of Finite Element Method		
	C	Modeling of Coupled Electromechanical Systems.		
	Unit 5	Thermal Expansion, Bending AND MEMS Characterization		
	A	MEMS Characterization: Technologies for MEMS characterization, Scanning Probe Microscopy (SPM)		
	B	Atomic Force Microscopy (AFM), Scanning tunnelingmicroscopy (STM		
	C	Thermal Expansion, Bending; Energy methods, Overview of Finite Element Method, Modeling of Coupled ElectromechanicalSystems.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhat, V. K. Aatre, Micro and Smart Systems, Wiley India, 2014-ISBN: 9788132219132. 2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems:Fundamentals of Nano-and Microengineering (Vol. 8). CRC press, (2005)-ISBN:9781351835176 3. S. D. Senturia, Microsystem Design, Kluwer AcademicPublishers, 2001-ISBN:9780306476013,		
	Other References	1. G. Kovacs, Micromachined Transducers Sourcebook,McGraw-Hill, Boston, 1998. 2. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York, 2000.		

Fiber Optic Communication

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

	A	Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod, Raymodel, wave model		
	B	Different types of optical fibers, Modal analysis of a step index fiber.		
	C	Signal degradation on optical fiber due to dispersion andattenuation. Fabrication of fibers and measurement techniques like OTDR		
	Unit 2	**Optical sources**		
	A	LEDs and Laser, Structures, Efficiency and Characteristics		
	B	Semiconductor injection Laser, External Quantum Efficiency.		
	C	Laser diode rate equations, resonant frequencies.		
	Unit 3	**Optical Detectors/Link Design**		
	A	Photo-detectors - pin-diodes, APDs,		
	B	detector responsively, noise, optical receivers.		
	C	Optical link design - BER calculation, quantum limit, power penalties.		
	Unit 4	**Optical switches and Amplifiers**		
	A	coupled mode analysis of directional couplers		
	B	electro-optic switches.		
	C	EDFA, Raman amplifier.		
	Unit 5	**Optical Networks**		
	A	WDM and DWDM systems. Principles of WDM networks.		
	B	Nonlinear effects in fiber optic links. Concept of self-phase modulation,		
	C	group velocity dispersion and solition based communication.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. Gerd. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 -ISBN: 9780073380711		
	Other References	1. John M. Senior, “Optical Fiber Communications”,PEARSON, 3rd Edition, 2010- ISBN: 9780136382485 2. Joseph C. Plais, “Fiber Optic Communication”,Pearson Education, 6th Ed, 2010- ISBN: 9780131989276 3. T. Tamir, Integrated optics, (Topics in AppliedPhysics Vol.7), Springer-Verlag, 1975		

Information Theory and Coding

School: SET **Batch :** **Program: B.Tech** **Current Academic Year: Branch:ECE** **Semester:**		
1	Course Code	ECE942
2	Course Title	**Information Theory and Coding**
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Introduce information theory, Probabilistic (stochastic) systems, Reasoning under uncertainty , Quantifying information, State and discuss coding theorems 2. Give an overview of coding theory and practice, Data compression, Error-control coding
6	Course Outcomes	After successful completion of this course the student will be able to: CO1: Understand the concept of information and entropy CO2: Illustrate Shannon‟s theorem for coding CO3: Analyse channel capacity and noise. CO4:Apply coding techniques CO5: Analyse the transmission error of a communication process CO6: Construct efficient codes for data on communication channels.
7	Course Description	The course aims at introducing information theory and the practical aspects of data compression and error-control coding. The theoretical concepts are illustrated using practical examples related to the effective storage and transmission of digital and analog.
8	Outline syllabus	
	Unit 1	
	A	Basics of information theory
	B	entropy for discrete ensembles
	C	Shannon's noiseless Coding theorem
	Unit 2	
	A	Encoding of discrete sources
	B	Markov sources; Shannon's noisy coding theorem
	C	converse for discrete channels
	Unit 3	
	A	Calculation of channel capacity
	B	bounds for discrete channels
	C	Application to continuous channels
	Unit 4	
	A	Techniques of coding
	B	Techniques of decoding
	C	Huffman codes
	Unit 5	

	A	uniquely detectable codes		
	B	Cyclic codes		
	C	convolutional arithmetic codes		
	Mode of examination	Theory/Jury/		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	N. Abramson, Information and Coding, McGraw Hill, 1963-ISBN:9780070001459		
	Other References	1. M. Mansurpur, Introduction to Information Theory,McGraw Hill, 2012-ISBN:9780486158440. 2. R.B. Ash, Information Theory, Prentice Hall, 1980-ISBN:9780486665214		

Speech and Audio Processing

School: SET **Program: B.Tech.** **Current Academic Year:** **Branch: ECE**		
1	Course Code	ECE943
2	Course Title	Speech and Audio Processing
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Demonstrate the basic concepts and methodologies for the analysis and modelling of speech signal. 2.Evaluate the speech signal as generated by a speech production model 4.Analyse speech signal using LPC 5.Extract the information of the speech or audio signals in terms of cepstral features 6. Provide a foundation for developing applications in this field.
6	Course Outcomes	At the end of the course, students will demonstrate the ability to: CO1:Understand the Mathematical model of the speech signal CO2: Analyse the quality and properties of speech signal. CO3: Illustrate and enhance the speech and audio signals. CO4: Compare different speech signal using LPC CO5: Evaluate the LPC used for audio signal processing. CO6: Apply MATLAB tools to analyse speech signals in the time and frequency domains
7	Course Description	The course is to develop an understanding of how speech signals are processed in three general areas: Analysis, Synthesis, and Recognition. Speech must also be understood in the context of its creation (anatomy, classification of sounds, etc.) as well as in its perception (psychology & neuroscience). Analytical tools are needed for analysis and synthesis, which draw on the areas of digital signal processing and time-frequency analysis. Pattern recognition concepts are needed for speech recognition. Finally, since computers cannot process and understand speech as well as humans do, we will look to biology for inspiration since the brain does an amazing job in all these tasks.
8	Outline syllabus	
	Unit 1	**Fundamentals of speech production**
	A	Introduction- Speech production and modelling - Human Auditory System; General structure of speech coders;
	B	Classification of speech coding techniques – parametric, waveform and hybrid;
	C	Requirements of speech codecs –quality, coding delays, robustness.
	Unit 2	**Time and frequency domain methods for audio processing**
	A	Speech Signal Processing- Pitch-period estimation,
	B	All-pole and all-zero filters, convolution; Power spectral density

	C	Periodogram, autoregressive model, autocorrelation estimation.		
	Unit 3	**Linear Prediction of Speech**		
	A	Linear Prediction of Speech- Basic concepts of linear prediction;		
	B	Linear Prediction Analysis of non-stationary signals –predictiongain, examples; Levinson-Durbin algorithm;		
	C	Long term and short-term linear prediction models; Movingaverage prediction.		
	Unit 4	**Quantization**		
	A	Speech Quantization- Scalar quantization–uniform quantizer,optimum quantizer,		
	B	Logarithmic quantizer, Adaptive quantizer, differential quantizers;		
	C	Vector quantization – distortion measures, Codebook design, codebook types.		
	Unit 5	**Linear prediction analysis**		
	A	Scalar Quantization of LPC- Spectral distortion measures, Quantization based on reflection coefficient and log area ratio, bit allocation;		
	B	Line spectral frequency – LPC to LSF conversions,Quantization based on LSF.		
	C	Linear Prediction Coding- LPC model of speech production; Structures of LPC encoders and decoders; Limitations of the LPC model.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. “Digital Speech” by A.M.Kondoz, Second Edition (WileyStudents_ Edition), 2004-ISBN:9780470870099 2. “Speech Coding Algorithms: Foundation and Evolution ofStandardized Coders”, W.C.Chu, WileyInter science, 2003- ISBN:9780471668879 3. Ben Gold and Nelson Morgan, “Speech and audio signalprocessing” Wiley,2011-ISBN:9780470195369		
	Other References	1. L. R. Rabiner and S.W. Schafer, “Digital processing of speechsignals” Pearson Education.-ISBN:9788129702722 2. L. R. Rabiner and B. H. Juang, “Fundamentals of speechrecognition- ISBN: 9788129701381		

Adaptive Signal Processing

School: SET **Batch:** **Program: B.Tech.** **Current Academic Year:** **Branch: ECE** **Semester: VII/VIII**		
1	Course Code	ECE944
2	Course Title	Adaptive Signal Processing
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Examine and derive the FIR Wiener filter 2. Explain and use the LMS algorithm 3. Apply the RLS algorithm 4. Recognise the prediction filter formulation and applications 5. Solve the Wiener filter weights for the prediction filter using theLevinson-Durbinalgorithm 6. Apply the Lattice filter architecture from the Levinson-Durbin algorithm 7. LMS and RLS algorithms and apply to selected applications.
6	Course Outcomes	At the end of the course, students will demonstrate the ability to: CO1: Demonstrate the non-linear control and the need and significance ofchanging the control parameters w.r.t. real-time situation. CO2: Explain mathematically the „adaptability requirement". CO3: Illustrate the mathematical treatment for design of the signal processing systems. CO4: Define formulation of RLS estimation. CO5: Comprehend the estimation theory for linear systems and modelingalgorithms CO6: Evaluate various practical aspects of signal processing
7	Course Description	Introductory and Preliminary material - Introduction to the concepts, key issues and motivating examples for adaptive filters; Random variables and random processes. Optimum Linear Systems - Error surfaces and minimum mean square error; Optimum discrete time Wiener filter; Principle of orthogonality and canonical forms; Constrained optimisation; Method of steepest descent - convergence issues; Stochastic gradient descent LMS - convergence in the mean and mis-adjustment Case study. Least squares and recursive least squares. Linear Prediction - Forward and backward linear prediction; Levinson Durbin; Lattice filters.
8	Outline syllabus	
	Unit 1	**Introduction to Adaptive Signal Processing**
	A	General concept of adaptive filtering and estimation, applications and motivation
	B	Review of probability, random variables and stationary randomprocesses
	C	Correlation structures, properties of correlation matrices.

	Unit 2	**The filter and LMS algorithm**		
	A	Optimal FIR (Wiener) filter, Method of steepest descent, extension to complex valued		
	B	The LMS algorithm (real, complex), convergence analysis,		
	C	Weight error correlation matrix, excess mean square error andmis-adjustment		
	Unit 3	**LMS Algorithm**		
	A	Variants of the LMS algorithm: the sign LMS family, normalized LMS algorithm,		
	B	Block LMS and FFT based realization, Frequency domain adaptive filters, Sub-band adaptive filtering.		
	C	Signal space concepts - introduction to finite dimensional vector space theory, subspace, basis, dimension, linear operators, rankand nullity, inner product space, orthogonality.		
	Unit 4	**Explanation of Vector Space**		
	A	Gram-Schmidt orthogonalization, concepts of orthogonal projection, orthogonal decomposition of vector spaces.		
	B	Vector space of random variables, correlation as inner product, forward and backward projections,		
	C	Stochastic lattice filters, recursive updating of forward and backward prediction errors, relationship with ARmodelling.		
	Unit 5	**Introduction to recursive least squares (RLS) method**		
	A	Introduction to recursive least squares (RLS), vector space formulation of RLS estimation, pseudo-inverse of a matrix.		
	B	time updating of inner products, development of RLS lattice filters, RLS transversal adaptive filters		
	C	Advanced topics: affine projection and subspace based adaptive filters, partial update algorithms, QR decomposition and systolic array.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. S. Haykin, Adaptive filter theory, Prentice Hall, 2005- ISBN: 9780130901262 2. C.Widrow and S.D. Stearns, Adaptive signal processing,Prentice Hall, 2004- ISBN: 9798178083635.		
	Other References	1.G. Proakis and D.G. Manolakis, “Digital Signal Processing, Principals, Algorithms, and Applications”, Pearson Education,4th ed., 2007- ISBN: 9780131873742 2. BehrouzFarhang-Boroujeny, Adaptive Filters: Theory andApplications, 2nd Edition, 2013-ISBN:9781118591338		

Nano Electronics

School: SET **Batch:** **Program: B.Tech.** **Current Academic Year:** **Branch: ECE** **Semester: VII/VIII**		
1	Course Code	ECE945
2	Course Title	Nano electronics
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1.Demonstrate the need of nanotechnology in electronics 2.Explain the use of quantum mechanics in nano-electronic devices 3.Describe the difficulties innano scaling of electronic devices 4. An overview of various fabrication techniques
6	Course Outcomes	At the end of the course, students will demonstrate the ability to: CO1:Explain fundamentals of technology at nano level CO2: Discuss the processes involved in making nano components and material. CO3: Describe the advantages of the nano-electronic devices. CO4: Classify the effects of nano-scale over physical properties.CO5: Differentiate various fabrication techniques according toapplications. CO6: Able to explain how nano-devices are fabricated.
7	Course Description	In this course, fundamental knowledge of nanotechnology; preparation, fabrication and characterization techniques of nanomaterials and nano-devices are discussed. Recent research progresses in nanotechnology-related topics are also briefly covered in the class.
8	Outline syllabus	
	Unit 1	**Introduction to nanotechnology**
	A	Introduction to nanotechnology, meso structures.
	B	Basics of Quantum Mechanics: Schrodinger Equation
	C	Density of States, Particle in a box Concepts, Degeneracy.
	Unit 2	**Nanoscaling**
	A	Band Theory of Solids, Kronig-Penny Model,Brillouin Zones
	B	Top down and bottom up technique, CMOS Scaling,
	C	The nanoscale MOSFET, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.).
	Unit 3	**Nanodevices**
	A	Resonant Tunneling Diode, Coulomb dots, Quantum blockade
	B	Single electron transistors, Carbon nanotube electronics,
	C	Band structure and transport, devices, applications,

	Unit 4	**Properties at nano scale**		
	A	Nano-scale 1D to 3D structures,2D semiconductors(Graphene) and electronic devices		
	B	Size dependent properties: Electrical, Mechanical		
	C	Size dependent properties:Optical, Thermal		
	Unit 5	**Fabrication Techniques**		
	A	Lithographic, nanolithographic, E-beam sputtering		
	B	Magnetron sputtering, Plused laser deposition,		
	C	Solgel, Electrodeposition, Chemical vapour deposition.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson,2009- ISBN:9788131726792 2. W. Ranier, Nanoelectronics and Information Technology(Advanced Electronic Materialand Novel Devices), Wiley-VCH, 2003.		
	Other References	1. K.E. Drexler, Nanosystems, Wiley, 2010- ISBN:9788126525737 2. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, 2003,Springer		

Biomedical Instrumentation

School: SET Batch : **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: VII/VIII**		
1	Course Code	ECE946
2	Course Title	Biomedical Instrumentation
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1.Getting knowledge electronics engineering applications in biomedical 2.Getting knowledge of interdisciplinary 3.Exploring ideas on biomedical electronics and instrumentation
6	Course Outcomes	CO1:Discussing of biomedical of sensors and engineering analogies in humananatomy CO2: Discussing different techniques of instruments for recording diagnosticsystems CO3:Discussing different techniques of instruments for patient monitoring systems CO4:Discussing different techniques of instruments for imaging systems CO5:Discussing different techniques of instruments for therapeutic systems CO6:Identify, explain and judge patient safety issues related to biomedical instrumentation.
7	Course Description	The Biomedical Instrumentation subject gives knowledge about electronics equipments which are used in medical field. It is also give details about how touse these equipments to diagnose the problems of human body. It is a theoretical subject and very interesting also. Since we have lot of developmentin technologies, there are lots of developments in medical field also. So, this subject leads you to become an entrepreneur in the field of biomedical equipments marketing or service or distribution.
8	Outline syllabus	
	Unit 1	**Introduction to BMI and its sensors**
	A	Brief description of human body; Engineering in human body
	B	Silver-silver chloride electrode; microelectrodes; Jellies and Creams
	C	Sensors and electrodes of BMI
	Unit 2	**Biomedical Recorder Systems**
	A	Electrocardiograph; Vectorcardiograph;

	B	Electroencephalograph; Electromyograph;		
	C	Spirometry		
	Unit 3	**Patient Monitoring Systems**		
	A	Cardiac Monitor; Heart rate and pulse monitor;		
	B	BP & Temperature Monitor		
	C	Respiration rate, blood flow measurement		
	Unit 4	**Medical Imaging, Patient Care and Monitoring**		
	A	Diagnostic X-rays and CAT		
	B	MRI		
	C	Medical		
	Unit 5	**Biomedical Therapetic Equipment**		
	A	Pace makers; Defibrillators		
	B	Ultrasonic therapy unit;		
	C	Pain relief system		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	Khandpur R. S., "Handbook on Biomedical Instrumentation", 2nd Ed., Tata McGraw-Hill, 2015- ISBN: 9781119068013		
	Other References	1. Cromwell L., Weibell F. J. and Pfeifer E. A., "Biomedical Instrumentation and Measurements", Prentice Hall of India, 2003 2. Geddes L. A. and Baker L. E., "Principles of Applied Biomedical Instrumentation", John Wiley & Sons,1989-ISBN:9780471608998		

CMOS Design

School: SET **Batch : 2018-2022** **Program: B.Tech** **Current Academic Year: 2018-2019** **Branch: ECE** **Semester:**		
1	Course Code	ECE947
2	Course Title	CMOS Design
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. To understand the concept of MOS transistors 2. To design different circuits using CMOS transistors 3. To understand and analyze delays in CMOS. 4. To understand the differences between different logic families.
6	Course Outcomes	After completion of this course student will able to: CO1:Basics of (MOSFET) device operation and device physics CO2: Understanding of MOS transistor models CO3: Design different CMOS circuits using various logic families along with their circuit layout. CO4:Analyse delays and power of a CMOS circuit is calculated CO5: Compare the different of logic design approaches. CO6: Analyse the physical design process of VLSI design flow.
7	Course Description	This course provides the student with the analytical skills required for the analysis, design and physical layout of digital integrated circuits. The course is preparatory for study in the field of Very Large Scale Integrated (VLSI) digital circuits and engineering practice.
8	Outline syllabus	
	Unit 1	**Introduction to MOSFETs**
	A	Review of MOS transistor models
	B	Non-ideal behaviour of the MOS Transistor
	C	Transistor as a switch
	Unit 2	**CMOS Inverter**
	A	Inverter characteristics
	B	Integrated Circuit Layout: Design Rules
	C	Parasitic
	Unit 3	**Delay Calculation**
	A	Delay: RC Delay model
	B	linear delay model
	C	logical path efforts
	Unit 4	**Layout and other Calculations**
	A	Power in CMOS circuit layout

	B	Interconnect in CMOS circuit layout		
	C	Robustness in CMOS circuit layout		
	Unit 5	**CMOS Combinational and Sequential Circuits**		
	A	CMOS logic families static		
	B	dynamic and dual rail logic		
	C	Sequential Circuit Design: Static circuits. Design of latches and Flip-flops.		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1.N.H.E. Weste and D.M. Harris, CMOS VLSI design: ACircuits and Systems Perspective, 4thEdition, Pearson Education India, 2011- ISBN: 9780321547743		
	Other References	2.C.Mead and L. Conway, Introduction to VLSI Systems,Addison Wesley, 1983- ISBN: 9788820443993 3.J. Rabaey, Digital Integrated Circuits: A Design Perspective,Prentice Hall India, 2008- ISBN: 9780132219105. 4.L. Glaser and D. Dobberpuhl, The Design and Analysis ofVLSI Circuits, Addison Wesley, 2007-ISBN:9780395370681		

Digital Image & Video Processing

School: SET **Batch :** **Program: B.Tech** **Current Academic** **Year:Branch:ECE** **Semester:**		
1	Course Code	ECE948
2	Course Title	**Digital Image & Video Processing**
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Cover the basic theory and algorithms that are widely used in digital imageprocessing 2. Expose students to current technologies and issues that are specific to imageprocessing systems 3. Develop hands-on experience in using computers to process images4.Familiarize with MATLAB Image Processing Toolbox 5. Develop critical thinking about shortcomings of the state of the art in imageprocessing
6	Course Outcomes	After Completion of this course student will able to: CO1: Mathematically represent the various types of images and analyzethem. CO2: Process these images for the enhancement of certain properties or for optimized use of the resources. CO3: Develop algorithms for image compression and coding CO4: Analyse the features of images by image processing tool box CO5: Compare different techniques employed for the enhancement ofimages. CO6: Evaluate different feature extraction techniques for image analysisand recognition
7	Course Description	Visual information plays an important role in many aspects of our life. Much of this information is represented by digital images. Digital image processing is ubiquitous, with applications including television, tomography, photography, printing, robot perception, and remote sensing.It emphasizes general principles of image processing, rather than specific applications.
8	Outline syllabus	
	Unit 1	**Digital Image Fundamentals**
	A	Elements of visual perception, image sensing and acquisition, image sampling and quantization
	B	basic relationships between pixels – neighbourhood, adjacency,

		connectivity, distance measures.		
	C	Image Enhancements and Filtering-Gray level transformations, histogram equalization and specifications		
	Unit 2	**Pixel-domain smoothing filters**		
	A	linear and order-statistics, pixel-domain sharpening filters – first and second derivative		
	B	two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.		
	C	Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation,color complements, color slicing,tone and color corrections; Color image smoothing and sharpening; Color Segmentation		
	Unit 3	**Image Segmentation**		
	A	Detection of discontinuities, edge linking and boundary detection, thresholding		
	B	global and adaptive, region-based segmentation.Wavelets and Multi-resolution image processing- Uncertaintyprinciples of Fourier Transform		
	C	Time-frequency localization, continuous wavelet transforms, wavelet bases and multi-resolution analysis, wavelets and Sub-band filter banks, wavelet packets.		
	Unit 4	**Image Compression-Redundancy**		
	A	Inter-pixel and psycho-visual; Lossless compression – predictive, entropy; Lossy compression- predictive and transform coding		
	B	Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.		
	C	Fundamentals of Video Coding- Inter-frame redundancy,motion estimation techniques – full search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B		
	Unit 5	**Video sequence hierarchy**		
	A	Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder;		
	B	Video coding standards – MPEG and H.26X.Video Segmentation-Temporal segmentation–shot boundarydetection		
	C	hard-cutsand soft-cuts; spatial segmentation – motion-based;Video object detection and tracking.		
	Mode of examination	Theory/Jury/Practical/Viva		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	R.C. Gonzalez and R.E. Woods, Digital Image Processing,Second Edition, Pearson Education 3rd edition 2008- ISBN: 9780131687288		
	Other References	1. Anil Kumar Jain, Fundamentals of Digital ImageProcessing, Prentice Hall of India,2009- ISBN: 9788945000200		
		2. Murat Tekalp , Digital Video Processing" Prentice Hall,2nd edition 2015- ISBN: 9780133991000		

Mixed Signal Design

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: ECE** **Semester: VII/VIII**		
1	Course Code	ECE949
2	Course Title	Mixed Signal Design
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. To know mixed signal circuits like DAC, ADC, PLL etc. 2. To gain knowledge on filter design in mixed signal mode. 3. To acquire knowledge on design different architectures in mixed signal mode.
6	Course Outcomes	At the end of the course, students will demonstrate the ability to: CO1: Understand the practical situations where mixed signal analysis is required. CO2: Analyze and handle the inter-conversions between signals. CO3: Design systems involving mixed signals CO4: Understand the concept of PLLs. CO5: Analyse analogue and digital microelectronic circuits CO6: Design analogue, digital and mixed microelectronic circuits
7	Course Description	As many real life applications involve both analog and digital circuits, this course aims to introduce the problems in implementing both in a single silicon wafer.
8	Outline syllabus	
	Unit 1	**Introduction to Signal Processing**
	A	Analog and discrete-time signal processing, introduction to sampling theory
	B	Analog continuous time filters: passive and active filters
	C	Basics of analog discrete-time filters and Z-transform
	Unit 2	**Switched Capacitor Filters**
	A	Switched-capacitor filters- Non idealities in switched-capacitor filters
	B	Switched-capacitor filter Architectures
	C	Switched-capacitor filter applications
	Unit 3	**Data Converters**
	A	Basics of data converters; Successive approximation ADCs
	B	Dual slope ADCs, Flash ADCs, Pipeline ADCs
	C	Hybrid ADC structures, High-resolution ADCs, DACs
	Unit 4	**Signal Transmission**
	A	Mixed-signal layout, Interconnects and data transmission

	B	Voltage-mode signaling and data transmission		
	C	Current-mode signaling and data transmission		
	Unit 5	**Phase Locked Loops**		
	A	Introduction to frequency synthesizers and synchronization		
	B	Basics of PLL, Analog PLLs		
	C	Digital PLLs; DLLs		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	1. R. Jacob Baker, CMOS mixed-signal circuit design,Wiley India, IEEE press, reprint 2019- ISBN: 9781119481515 2. BehzadRazavi , Design of analog CMOS integrated circuits, McGraw-Hill, 2016- ISBN: 9781259255090.		
	Other References	1. R. Jacob Baker, CMOS circuit design, layout and simulation, Revisedsecond edition, IEEE press, 2019-ISBN: 9781119481515. 2. Rudy V. dePlassche, CMOS Integrated ADCs andDACs, Springer, Indian edition, 2015- ISBN:9783662470206		

Principles of Internet of Things

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: ECE Engineering** **Semester: VI**		
B	Smart Medication &emergency handling, Smart	CO1, CO4
1	Course Code	ECE940
2	Course Title	Principles of Internet of Things
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Program Elective
5	Course Objective	1. Able to understand the application areas of IoT 2.Introduction to core technologies-rfid ,sensor & communication networks 3. Able to realize the revolution of internet in mobile devices, cloud & sensor networks 4. Able to understand building blocks of internet of things 5-understanding of prototype and business model .
6	Course Outcomes	After completion of this course student will able to: CO1: Able to define key components of existing IoT solutions CO2: Understand the acceptable, evolving guidelines/models for IoT solutions from a global context CO3: Able to understand the Market perspective of IoT solutions, using existing internet and it‟s use CO4: Able to demonstrate Key application areas CO5: Able to understand fundamental business model for basic IoT solutions CO6: Evaluate IoT protocols and software.
7	Course Description	The explosive growth of the “Internet of Things” is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products. In this basic course you will learn the importance of IoT in society, the current components of typical IoT devices and trends for the future. IoT design considerations, constraints and interfacing between the physical world and your device will also be covered. Introduction to business models for IoT-based applications is also present.
8	Outline syllabus	
	Unit 1	Internet of things
	A	Overview with application examples
	B	Design Principles for connected devices
	C	Physical & logical Design,M2M Communication
S	SET/B.ECH-ECE	Illustrative application Scenarios‟ & concepts(2-Ref)
U	**Unit 2**	
	A	Smart Waste management, Smart energy conservation

		product management, Home automation.		
	C	Smart Urban planning, Sustainable urban Environment		
	Unit 3	**Internet principles**		
	A	Internet communication- TCP/IP,UDP		
	B	IP &Mac Addresses, TCP &UDP port		
	C	Application layer protocols-HTTP,HTTPS etc.		
	Unit 4	Enabling Technologies & Introduction to embedded devices(ch-5-TB)		
	A	Basics of RFID + NFC ,Wireless networks + WSN ,RTLS + GPS		
	B	Basics of Sensors, actuators, Embedded computing basics-Arduino, Node MCU basics		
	C	Rasberrypi basics		
	Unit 5	Usage in Industry-business models & Deployment		
	A	Basic prototype development –case study		
	B	Business models		
	C	Manufacturing & ethics-discussion		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	WaltenegusDargie , Christian Poellabauer, “Fundamentals Of Wireless Sensor Networks-ISBN:9780470975688 Theory And Practice”, By John Wiley & Sons Publications ,2011		
	Other References	1. SabrieSoloman, “Sensors Handbook" by McGraw Hill publication. 2009-ISBN:9780071605717 2. Feng Zhao, Leonidas Guibas, “Wireless SensorNetworks”, Elsevier Publications,2004 3. KazemSohrby, Daniel Minoli, “Wireless SensorNetworks”: Technology, Protocols and Applications, Wiley-Inter science 4. Philip Levis, And David Gay "TinyOS Programming”by Cambridge University Press 2009-ISBN:9780521896061		

OPEN ELECTIVES

8	Outline syllabus	
	Unit 1	**Introduction to Sensor Networks**
	A	Introduction to Sensor Networks, unique constraints andchallenges
	B	Advantage of Sensor Networks, Applications of Sensor Networks,
	C	Types of wireless sensor networks
	Unit 2	**Issues and challenges in wireless sensor networks**
	A	Mobile Ad-hocNetworks (MANETs) and Wireless SensorNetworks
	B	Enabling technologies for Wireless Sensor Networks
	C	Issues and challenges in wireless sensor networks
	Unit 3	**Routing protocols**
	A	Routing protocols, MAC protocols: Classification ofMAC Protocols,
	B	S-MAC Protocol, B-MACprotocol,
	C	IEEE 802.15.4 standard and ZigBee,
	Unit 4	**Dissemination protocol for large sensor network**
	A	Dissemination protocol for large sensor network.Quality of a sensor network
	B	Data dissemination, data gathering, and datafusion;
	C	Real-time traffic support and security protocols.
	Unit 5	**Design Principles for WSNs**
	A	Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet Communication, and Internet toWSN Communication
	B	Single-node architecture, Hardware components & designconstraints,
	C	Operating systems and execution environments,introduction to TinyOS and nesC.

Internet of Things

School: SET **Batch :** **Program: B.Tech** **Current Academic Year:** **Branch: ECE Engineering (Semester: VII)**		
1	Course Code	ECE022
2	Course Title	Internet of Things
3	Credits	3
4	Contact Hours (L-T-P)	3-0-0
	Course Status	Open Elective
5	Course Objective	1. Able to understand the application areas of IoT 2.Introduction to core technologies-rfid ,sensor & communication networks 3. Able to realize the revolution of internet in mobile devices, cloud & sensor networks 4. Able to understand building blocks of internet of things 5-understanding of prototype and business model
6	Course Outcomes	After completion of this course student will able to: CO1: Able to define key components of existing IoT solutions CO2: Understand the acceptable, evolving guidelines/models for IoT solutions from a global context CO3: Illustrate the Market perspective of IoT solutions, using existing internet and it‟s use CO4: Demonstrate Key application areas of IoT. CO5: Apply fundamental business model for basic IoT solutions CO6: Evaluate the different IoT protocols.
7	Course Description	**The explosive growth** of the “Internet of Things” is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products. In this basic course you will learn the importance of IoT in society, the current components of typical IoT devices and trends for the future. IoT design considerations, constraints and interfacing between the physical world and your device will also be covered. Introduction to business models for IoT-based applications is also present.
8	Outline syllabus	
	Unit 1	Internet of things
	A	Overview with application examples
	B	Design Principles for connected devices
	C	Physical & logical Design,M2M Communication
	Unit 2	Illustrative application Scenarios‟ & concepts(2-Ref)
	A	Smart Waste management, Smart energy conservation

	B	Smart Medication &emergency handling, Smart		
		product management, Home automation.		
	C	Smart Urban planning, Sustainable urban Environment		
	Unit 3	**Internet principles**		
	A	Internet communication- TCP/IP,UDP		
	B	IP &Mac Addresses, TCP &UDP port		
	C	Application layer protocols-HTTP,HTTPS etc.		
	Unit 4	Enabling Technologies & Introduction to embedded devices(ch-5-TB)		
	A	Basics of RFID + NFC ,Wireless networks + WSN ,RTLS + GPS		
	B	Basics of Sensors, actuators, Embedded computing basics-Arduino, Node MCU basics		
	C	Rasberrypi basics		
	Unit 5	Usage in Industry-business models & Deployment		
	A	Basic prototype development –case study		
	B	Business models		
	C	Manufacturing & ethics-discussion		
	Mode of examination	Theory		
	Weightage Distribution	CA	MTE	ETE
		30%	20%	50%
	Text book/s*	**Text Books** 1.Ebook-Designing of Internet of things by- AdrianMcEwen, Hakim Cassimally ,Wiley- ISBN:9781118430651 2.Internet of Things by-ABahga&VijayMadisetti,University Press,2014-ISBN:9780996025515		
	Other References	1-Free E book-Enabling Things to talk-by Alessandro Bassi • Martin Bauer • Martin Fiedler •Thorsten Kramp • Rob van Kranenburg • SebastianLange • Stefan Meissner,Springer 2-Ebook(Business edition)-Internet of Things byMirko Presser ,The Alexandra Institute You tubevideo‟s-IoT tutorials for beginners- ISBN:9783319165462,.		