COURSE STRUCTURE
AND
DETAILED SYLLABUS

FOR

B.Tech - ECE

(Applicable for the Batches admitted from 2018-2019)

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING
SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY
(An Autonomous Institution approved by UGC and affiliated to JNTUH)
Yamnampet, Ghatkesar, Hyderabad - 501 301

June, 2019

A-18 Curriculum (Course Structure) for B. Tech (I Year to IV Year) - ECE under autonomous

I Year I Semester ECE

Sl. No	Course Type	Course code	Name of the Course	L	T	P	C	Marks	
								CIE	SEE
1.	BS	7HC05	Engineering Physics	3	1	0	4	30	70
2.	ES	7AC02	Network Analysis	3	0	0	3	30	70
3.	BS	7HC06	Engineering Mathematics – I	3	1	0	4	30	70
4.	ES	7BC02	Engineering Graphics & Design	1	0	4	3	30	70
5.	HS	7HC02	English (Oral communication skills)	1	0	0	1	30	70
6.	MC	7HC20	Human Values and Professional Ethics in Higher Education	3	0	0	0	30	70
								Grade Evaluation	
7.	BS	7HC65	Engineering Physics lab	0	0	3	1.5	30	70
8.	ES	7AC61	Electrical Circuits and Network Analysis lab	0	0	2	1	30	70
9	HS	7HC62	English (Oral communication skills) Lab	0	0	2	1	30	70
10	PW	7C191	Technical Seminar-I	0	0	2	1	100	-
			Total	11	2	11	19.5	370	630

I Year II Semester ECE

Sl.No	Course Type	Course code	Name of the Course	L	T	P	C	Marks	
								CIE	SEE
1.	BS	7HC03	Chemistry	3	1	0	4	30	70
2.	ES	7FC01	Problem Solving using C	3	0	0	3	30	70
3.	BS	7HC08	Engineering Mathematics – II	3	1	0	4	30	70
4.	ES	7BC01	Workshop/ Manufacturing practices	1	0	0	1	30	70
5.	HS	7HC01	English (Reading, Listening and Writing)	1	0	0	1	30	70
6.	BS	7HC63	Chemistry Lab	0	0	3	1.5	30	70
7.	ES	7FC71	Problem Solving using C Lab	0	0	3	1.5	30	70
8.	ES	7BC61	Workshop/ Manufacturing practices lab	0	0	3	1.5	30	70
9.	HS	7HC61	English (Reading, Listening and Writing) Lab	0	0	2	1	30	70
10.	PW	7C292	Technical Seminar - II	0	0	2	1	100	-
			Total	11	2	14	19.5	370	630

A-18 Curriculum (Course Structure) for B. Tech (I Year to IV Year) - ECE under autonomous

		II Year I Semester (III-Semester)								
S. No	Course Type	Code	Course Title	L	T	P	Credits	Marks		
								CIE	SEE	
1	PC	7C301	Electronic Devices and Circuits	3	-	-	3	30	70	
2	PC	7C302	Digital Logic Design	3	-	-	3	30	70	
3	PC	7C303	Signals and Systems	2	1	-	3	30	70	
4	ES	7C304	Probability Theory and Stochastic Process	2	1	-	3	30	70	
5	BS	7HC13	Transform Techniques	2	-	-	2	30	70	
6	ES	7AC43	Electrical Technology	2	-	-	2	30	70	
7	ES	7BC04	Elements of Mechanical Engineering	2	-	-	2	30	70	
8	MC	7HC21	Environmental Science and Ecology	3	-	-	-	30	70	
								Grade Evaluation		
9	PC	7C371	Electronic Devices and Circuits Lab	-	-	2	1	30	70	
10	ES	7AC94	Electrical Technology Lab	-	-	2/2	0.5	30	70	
11	PC	7C372	Digital Logic Design Lab	-	-	2/2	0.5	30	70	
12	PW	7C393	Technical Seminar-III	-	-	2	1	100	-	
			Total	19	2	7	21	430	770	
		II Year II Semester (IV-Semester)								
1	PC	7C405	Analog Circuits	3	-	-	3	30	70	
2	PC	7CC06	Electromagnetic Waves and Transmission Lines	2	1	-	3	30	70	
3	PC	**7CC07**	**Analog Communications**	3	-	-	3	30	70	
4	PC	7DC11	Computer Organization and Architecture	3	-	-	3	30	70	
5	ES	7EC01	Data Structures	3	-	-	3	30	70	
6	HS	7ZC01	Management Science and Financial Accounting	2	-	-	2	30	70	
7	PC	7C473	Basic Simulation Lab	-	-	2	1	30	70	
8	PC	7C474	Analog Circuits Lab	-	-	2	1	30	70	
9	**PC**	**7CC75**	**Analog Communications lab**	-	-	2	1	30	70	
10	PC	7C494	Technical Seminar-IV	-	-	2	1	100	-	
11	PW	7C496	Comprehensive Viva-Voce-I	-	-	-	1	30	70	
12	PW	7C461	Summer Industry Internship-I*	-	-	-	-	-	100	
			Total	15	1	9	22	300	700	
		*Evaluation will be done along with III-I Subjects								

S. No		Code	Course Title	L	T	P	Credits	Marks	
								CIE	SEE
III Year I Semester (V-Semester)									
1	PC	7CC08	IC Applications	3	-	-	3	30	70
2	PC	7CC09	Digital Communications	3	-	-	3	30	70
3	PC	7DC05	Microprocessors and Microcontrollers	3	-	-	3	30	70
4	PC	7AC07	Control Systems	3	-	-	3	30	70
5	OE		Open Elective – I	3	-	-	3	30	70
6	BS	7H518	Quantative Analysis	1	1	-	2	30	70
7	PC	7DC71	Microprocessors and Micro Controllers Lab	-	-	4	2	30	70
8	PC	**7CC76**	**IC Applications Lab**	-	-	4	2	30	70
9	PC	7C577	Digital Communications Lab	-	-	4	2	30	70
10	PW	7C461	Summer Industry Internship – I	-	-	-	1	30	70
11	PW	7C595	Technical Seminar-V	-	-	2	1	100	-
12	MC	7FC20	Cyber Security	2	-	-	-	30	70
								Grade Evaluation	
			Total	16	1	14	25	430	770
	III Year II Semester (VI-Semester)								
1	PC	**7CC10**	**Digital Signal Processing**	3	-	-	3	30	70
2	PC	7C611	VLSI Technology and Design	3	-	-	3	30	70
3	PC	7C612	Internet of Things and Applications	3	-	-	3	30	70
4	PC	7CC13	Antennas and Wave Propagations	3	-	-	3	30	70
5	PE		Professional Elective – I	3	-	-	3	30	70
6	BS	7H619	Logical Reasoning	1	1	-	2	30	70
7	PC	**7CC78**	**Digital Signal Processing Lab**	-	-	4	2	30	70
8	PC	7C679	VLSI Design Lab	-	-	4/2*	1	30	70
9	PC	7C680	Internet of Things and Applications Lab	-	-	4/2*	1	30	70
10	HS	7HC74	Soft skills and Technical communication	-	-	2	1	30	70
11	PW	7C697	Comprehensive Viva-Voce-II	-	-	-	1	30	
12	PW	7C663	Group Project	-	-	4	2	30	70
13	PW	7C662	Summer Industry Internship-II*	-	-	-	-		
			Total	16	1	14	25	360	840
	*Evaluation will be done along with IV-I Subjects								

IV Year I Semester (VII-Semester)									
1	PC	7EC05	Computer Networks	3	-	-	3	30	70
2	PC	7C714	Microwave and Optical Communications	2	-	-	2	30	70
3	OE		Open Elective – II	3	-	-	3	30	70
4	PE		Professional Elective – II	3	-	-	3	30	70
5	PE		Professional Elective – III	3	-	-	3	30	70
6	PC	7EC75	Computer Networks Lab	-	-	4/2	1	30	70
7	PC	7C781	Antenna Simulation Lab	-	-	4/2	1	30	70
8	PC	7C782	Micro Wave and Optical Communications Lab	-	-	4/2	1	30	70
9	PW	7C764	Project – I	-	-	4	2	100	-
10	PW	7C662	Summer Industry Internship - II	-	-	-	1	30	70
11	MC	7EC20	Artificial Intelligence	2	-	-	-	30	70
								Grade Evaluation	
			Total	14	0	10	20	400	700
IV Year II Semester (VIII-Semester)									
1	OE		Open Elective – III	3	-	-	3	30	70
2	PE		Professional Elective – IV	3	-	-	3	30	70
3	PE		Professional Elective – V	3	-	-	3	30	70
4	PW	7C865	Project – II	-	-	10	5	50	150
			Total	9		10	14	140	360

Professional Electives

S. No	Code	Stream	Course Title
Professional Elective-I			
1	7C615	VLSI	Digital Design through Verilog
2	7C616	Embedded System	Embedded C Programming
3	7C617	Signal Processing	Digital Image and Video Processing
4	7CC18	Communications	Cellular and Mobile communications
	SWAYAM MOOCS Course*		
*The department will identify the MOOCS Course from the available courses in SWAYAM portal for the semester.			
Professional Elective-II			
5	7C719	VLSI	CMOS Digital IC Design
6	7C720	Embedded System	Embedded Python Programming
7	7C721	Signal Processing	DSP Processors and Architectures
8	7CC22	Communications	Wireless Communications and Networks
Professional Elective-III			
9	7C723	VLSI	Digital Design Verification with System Verilog
10	7C724	Embedded System	Embedded System Design
11	7C725	Signal processing	Artificial Neural Networks
12	7C726	Communications	Software defined radio
Professional Elective-IV			
13	7C827	VLSI	Digital Design and Verification with Universal Verification Methodology
14	7C828	Embedded System	Embedded Real Time Operating Systems
15	7CC29	Signal Processing	Machine Learning
16 17	7C830 7C831	Communications	1. Satellite Communications 2. Radar Communications
Professional Elective-V			
18	7C832	VLSI	Mixed Signal Design
19	7C833	Embedded System	System-on-Chip Architecture
20	7C834	Signal Processing	Deep Learning
21	7C835	Communications	5G Communications

Open Electives

Code	Stream	Course Title
Open Elective-I		
7ZC05	Finance	Banking Operations, Insurance and Risk Management.
7EC65	Computer Science	JAVA Programming
7ZC22	Entrepreneurship	Basics of Entrepreneurship
7ZC25	Social Sciences Stream	Indian polity and Economy
7CC36	ECE Stream	Fundamentals of signal processing
7CC37		Fundamentals of digital circuits & Microprocessors
7AC47	EEE stream	Power Electronic Devices and Converters
7BC51	Mechanical Stream	Smart Materials
Open Elective-II		
7ZC19	Finance	Entrepreneurship, Project Management and Structured Finance
7FC23	Computer Science	Data Base Systems
7ZC30	Entrepreneurship	Advanced Entrepreneurship
7ZC26	Social Sciences Stream	Ecology and disaster management
7CC38	ECE Stream	Communication Theory
7AC44	EEE stream	Fundamentals of Measurements and Instruments.
7BC53	Mechanical Stream	Principles of operation Research
7BC52	Mechanical Stream	Principles of manufacturing process
	SWAYAM MOOCS Course*	
*The department will identify the MOOCS Course from the available courses in SWAYAM portal for the semester.		
Open Elective-III		
7ZC15	Finance	Financial Institutions , Markets and services
7EC67	Computer Science	Operating systems concepts
7ZC24	Entrepreneurship	Innovation and Design Thinking.
7ZC27	Social Sciences Stream	Indian History, culture and Geography
7CC39	ECE Stream	Introduction to VLSI and Embedded Systems
7AC45	EEE stream	Fundamentals of Renewable energy sources
7BC55	Mechanical Stream	Principles of Automation and Robotics

S. No	Course Type	Abbreviation
1	HS	Humanities and Social Science including Management Courses
2	BS	Basic Science Courses
3	ES	Engineering Science Courses
4	MC	Mandatory Courses
5	PC	Professional Core Courses
6	PW	Project Work, Seminar Internship in industry
7	PE	Professional Electives
8	OE	Open Electives

Syllabus for B.Tech. I year I Semester

Electronics and Communication and Engineering

ENGINEERING PHYSICS

		L	T	P	C
Code: 7HC05	**ENGINEERING PHYSICS**	**3**	**1**	**0**	**4**

Course Objectives

- To know about the semiconductors, types, carrier concentration, Thermistor, Hall effect and also to understand the concept of PN-junction, I-V Characteristics, LED, Solar Cell and Photo diode.
- Explain about the Quantum Mechanics to understand wave particle duality, necessity of quantum mechanics to explore the behavior of sub atomic particles. Schroedinger's Time Independent Wave Equation, Physical Significance of the Wave Function – Application of Schroedinger wave equation.
- To understand the basic concepts of normal light, Laser and its applications and to know about the fiber optics, principle (TIR), Numerical Aperture, Types of optical Fibers, Step index and graded index Fibers, attenuation in optical fibers. Applications: optical fiber communication system, fiber optic sensors, medical endoscopy.
- To study the concepts of magnetism and superconductivity, Bohr magneton, Hysteresis nature, domain structure, Meissner effect, types of superconductors, BCS theory and applications of superconductors.
- To understand the concepts of dielectrics, polarizations and its types, internal fields, Clausius-Mossitti equation, Frequency and temperature effect on dielectrics and its applications – Piezo-electricity, pyro-electricity and ferro-electricity.
- To discuss about the nano-technology, preparation techniques and characterization (XRD, SEM & TEM), CNTs and to know about the fundamentals of radioactivity and its applications.

Unit:1

Semiconductors

Fermi Level in Intrinsic and Extrinsic Semiconductors, calculation of carrier concentration of Intrinsic and Extrinsic Semiconductors, Direct & Indirect Band Gap Semiconductors, Thermistor, Hall Effect in semiconductors and applications.

Semiconductor devices

Formation of PN Junction and working of PN Junction. Energy Diagram of PN Diode, Diode equation (Quantitative treatment), I-V Characteristics of PN Junction, Application - LED, Solar Cell and Photo diode.

Unit:2

Wave nature of particles, Schroedinger equation and its application

Waves and Particles, de Broglie Hypothesis, Matter waves, Davisson and Germer's Experiment, G.P. Thomson Experiment, Heisenberg's Uncertainty Principle, Schroedinger's Time Independent Wave Equation – Physical Significance of the Wave Function – Application of Schroedinger wave equation - Particle in One Dimensional Potential Box.

Unit:3

Lasers

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them and significance, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

Fiber optics

Introduction, Principle of Optical Fiber, Acceptance Angle and Acceptance Cone, Numerical Aperture, Types of Optical Fibers, Step index and graded index Fibers Attenuation in Optical Fibers. Applications: Optical Fiber communication system, Fiber Optic Sensors, Medical Endoscopy.

Unit:4

Magnetic and Superconducting materials

Permeability, Field Intensity, Magnetic Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magneton. Hysteresis behavior of Ferro Magnetic materials based on Domain theory. Hard and Soft Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials and their applications,

Super conductivity, effect of Magnetic Field, Critical current density, Meissner effect, Type-I and Type-II superconductors, BCS theory, applications of superconductors.

Unit:5

Dielectric materials and their properties

Electric Dipole, Dipole Moment, Dielectric Constant, Electric Susceptibility, Electronic and Ionic polarizability (Quantitative) Orientation Polarization (Qualitative), Internal fields in Solids, Clausius - Mossotti equation, Frequency and temperature effect on Dielectrics (Qualitative), Applications - Piezo-electricity, Pyro-electricity and Ferro-electricity.

Unit:5

Nanotechnology

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication, Sol-gel, Precipitation, Chemical vapor Deposition(CVD); Top-down Fabrication; Thermal evaporation, Ball Milling, Characterization of Nano materials (XRD&TEM), carbon nano tubes(CNTs), Applications of Nano Materials.

Nuclear Energy: Radioactivity, Nuclear binding energy, Nuclear fission, Nuclear fusion, □, β, γ rays decay, Geiger-Muller counter and practical applications of nuclear physics.

Text Books:

1.B.K. Pandey & S. Chaturvedi Engineering Physics, Cengage Learning

2.D.K. Bhattacharya and Poonam Tandon, OXFORD university press.

Reference Books:

1. Charles Kittel, Introduction to Solid State Physics, John Wiley Publisher

2. A.S. Vasudeva , Modern engineering Physics, S Chand

3. Dekker, Solid State Physics

4. Dr.M.N. Avadhanulu, Engineering Physics, S Chand

5. Dekker, Solid State Physics

6. Halliday and Resnick, Physics

7. S.O. Pillai, Solid State Physics

8. P K Palanisamy, Engineering Physics, Sitech Publications

9. A. Ghatak - Optics

Course Outcomes

After completing the course, students will be able to

- Explain semiconductor behaviour, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN-junction, I-V characteristics, LED, solar cell, photo diode and their applications.
- Differentiate the wave and particle, de-Broglie matter waves-its experimental evidence, Schroedinger's wave concept and its application for a particle in one dimension box.
- Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy)
- Reveals about the magnetism-its origin and types, Hysteresis, domain theory, Anti-ferro and ferri magnetism superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
- Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).
- Summarize nano & bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM, TEM and also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.

A	b	c	d	E	f	g	h	i	j	k	l
X	x	x									

Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)

NETWORKS ANALYSIS

Code: 7AC02

L	T	P	C
3	-	-	3

Course Objectives :

To make the students to understand:

1. *The fundamentals of the basic elements and their application in electrical circuits.*
2. *The importance of network topology in analysis of electrical networks.*
3. *The basic concepts of magnetic circuits and their applications.*
4. *The concept of single phase circuits and their analysis.*
5. *The significance of resonance and its use*
6. *Verify the network theorem and their application in electrical networks.*

Course Outcomes:

After completion of the course work the student will be able to

1. *Apply Kirchhoff's laws for solving electrical circuits.*
2. *Draw the network graph and solve the problems of electrical networks.*
3. *Analyze and solve the problems of composite magnetic circuits.*
4. *Understand the basic concepts of single phase AC circuits and ability to solve the problems related to steady state analysis.*
5. *Compute for parameters like Q factor and bandwidth for resonance circuits.*
6. *Apply and solve the problem associated with electrical networks using network theorems*

UNIT – I: INTRODUCTION TO ELECTRICAL CIRCUITS:

Circuit concept, R – L – C parameters, Voltage and current sources, Independent and dependent sources, Source transformation, Kirchhoff's Laws, Network reduction techniques, Series, Parallel, Series - parallel, Star – to – delta and Delta – to – star transformation, Mesh analysis, Nodal analysis, Concept of super mesh and super node. Voltage current relationship for passive elements (for different input signals – square, ramp, saw tooth, triangular)

UNIT – II: NETWORK TOPOLOGY:

Definitions, Graph, Tree, Basic cut-set and basic tie-set matrices for planar networks, Loop and Nodal methods of analysis of Networks using graph theory, Duality & dual networks

UNIT – III: MAGNETIC CIRCUITS:

Basic terms in Magnetic Circuits, Comparison between electric and magnetic circuits, Composite magnetic circuit, Analysis of series, parallel magnetic circuits, Faraday's Laws of electromagnetic induction, Concept of self and mutual inductance, Dot convention, Co-efficient of coupling.

UNIT - IV: SINGLE PHASE A.C. CIRCUITS:

R.M.S. and Average values, Form factor for different periodic wave forms, j Notation, Complex and polar forms of representation, Steady state analysis of R,L,C circuits (in series, parallel and series parallel combinations) with sinusoidal excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Phase angle, Concept of power factor, Real, Reactive powers and Complex power.

UNIT – V: LOCUS DIAGRAMS & RESONANCE:

Locus diagrams of R-L, R-C circuits with variation of various parameters (series and parallel), Resonance in series, parallel circuits, Concept of band width and Q factor.

UNIT – VI: NETWORK THEOREMS:
Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power transfer, Millman's and Compensation theorems with D.C.& A.C. excitations.

TEXT BOOKS:
1. Engineering circuit analysis - William Hayt and Jack E.Kemmerly, Tata McGraw - Hill Company, 6th edition.
2. Circuits & Networks - A.Sudhakar and Shyamamohan S.Palli, Tata Mc Graw Hill, 3rd edition.

REFERENCES:
1. Network Analysis - M.E. Vanvalkenberg, Printice Hall of India, 3rd edition
2. Circuit theory (Analysis & Synthesis) - A.Chakravarthy, Dhanpath Rai & Co., 6th edition.
3. Circuits & Networks – M.S. Sukhija, T.K. Nagasarkar, Oxford University Press, 2nd edition.

Syllabus for B. Tech I Year I semester

Electronics and Communication Engineering (ECE)

ENGINEERING MATHEMATICS -1
(Common to EEE, ECE, ME, CE)

	L	T	P/D	C
Code: 7HC06	3	1	0	4

***Pre Requisites**: Mathematics Knowledge at Pre-University Level*
***Course Objectives:** To make the students to understand and expected to learn*

1. *Special functions such as Beta & Gamma functions and their properties, evaluation of improper integrals and the applications of definite integrals.*
2. *Mean value theorems and their applications to the given functions, series expansions of a function.*
3. *To test the convergence of a series and expansion of a function in sine and cosine terms.*
4. *Basic concepts of multivariable differential calculus.*
5. *About the linear system and some analytical methods for solution.*
6. *Concept of Eigen values and Eigen vectors their properties and applications.*

Module 1: Calculus
Evolutes and involutes; Beta and Gamma functions and their properties; Evaluation of improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Module 2: Calculus
Rolle's Theorem and Mean value theorems (Statements and Geometrical Interpretations if any); Taylor's and Maclaurin's theorems with remainders (without proof); Taylor's and Maclaurin's series expansion.

Module 3: Sequences and series
Convergence of sequence and series, tests for convergence; Power series. Fourier series, Half range sine and cosine series, Parseval's theorem (without proof).

Module 4: Multivariable Calculus (Differentiation):
Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, Tangent plane; Concepts of divergence and curl with physical significance.

Module 5: Matrices:
Inverse of a matrix by Gauss Jordan method, rank of a matrix; System of linear equations- Rank method/Gauss Elimination method. Symmetric, skew-symmetric and orthogonal matrices;

Module 6: Matrices:
Eigenvalues and Eigenvectors; Cayley - Hamilton Theorem, Diagonalization of matrices and Orthogonal transformation.

Text Books:
(i) R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
(ii) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

Reference Books:
(i) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(ii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
(iii) B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
(iv) C Sankaraiah, A Text book of Engineering Mathematics – I, VGS Book Links

(v) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
(vi) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
(vii) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
(viii) Engineering mathematics, Ravish R.Singh, Mcgraw Hill Education.

Course Outcomes: *After the course completion the students will be able to*

1. *Solve the problems using special functions; evaluate surface areas and volumes of revolutions.*
2. *Verify the mean value theorems and also express the given function in series form using Taylor's theorem.*
3. *Determine the convergence, divergence or oscillating nature of a series and express the function as trigonometric series.*
4. *Compute the extreme values of a function defined with and without constraints.*
5. *Check the consistency or inconsistency of a linear system and ability to solve real time problems.*
6. *Calculate the Eigen values and Eigen vectors of a matrix and their application for orthogonal transformation.*

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Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)
ENGINEERING GRAPHICS & DESIGN

B.Tech I year I sem (EEE, ECE & ME) II sem (CSE, ECE, IT & CE)

	L	T	P/D	C
Code: 7BC02	**1**	0	**4**	**3**

Course objectives:

1: To teach students the basic principles of Engineering graphics and instruments used

2: To introduce the concept of projections in drawing and its applications for simple drawing entities

3: To impart the knowledge of various types of solids and their projections in different position wrt principle planes

4: To teach the concept of sections of solids and their applications

5: To develop a clear understanding of the basic principles involved in three dimensional Engineering drawings.

6: To train the students for the extraction of multiple views from a solid model using AutoCAD

Course outcomes

After completing this course, the student will able to:

1) Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
2) Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
3) Draw projections of different types of regular solids in various positions wrt principal planes of projection
4) Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
5) Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
6) Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software

UNIT – I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, Types and uses of pencils, Lettering, Rules of dimensioning.

Curves used in Engineering Practice and their Constructions: Conic Sections including Rectangular Hyperbola - General method, Cycloid, Epicyloid, and Involutes of circles.

UNIT – II

Orthographic Projection: Principles of Orthographic Projections – Conventions – First angle and third angle projections (however all drawing exercises must be in first angle only) - Projection of Points, Lines - Inclined to both planes, Projections of regular Plane, inclined planes - Auxiliary views.

UNIT –III

Projections of Regular Solids: Projections of Regular Solids: Prisms, Cylinders, Pyramids, Cones – Axis inclined to both planes, Auxiliary views.

UNIT –IV

Sections and sectional views of Solids: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Development of Surfaces: Development of Surfaces of Right Regular Solids – Prisms, Cylinders, Pyramids, Cones and their sections.

UNIT – V

Isometric Projections/views: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane, Simple Solids. Conversion of isometric views to orthographic views.

UNIT –VI

Overview of Computer Graphics : Demonstrating features of the CAD software - The Menu System, Toolbars, , Dialog boxes and windows, Drawing entities - lines, circles, arcs etc and editing commands, Dimensioning of objects,2D drawings-simple exercises , 3D wire-frame and shaded solids- Commands, Boolean operations.

Text/Reference Books:

(i) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

(ii) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

(iii) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

(v) AUTOCAD Software Theory and User Manuals

Syllabus for B.Tech. I year I Semester

Electronics and Communication Engineering

ENGLISH (ORAL COMMUNICATION SKILLS)

Branches: ECE, EEE and Mech (Sem-I) ECM, CSE, IT and Civil (Sem-II)

Course code: 7HC02 **L T P C**

1 0 0 1

Course Objectives: The course will develop the students' ability to

- integrate listening and speaking skills
- communicate effectively
- speak effectively on a given topic
- master the art of presentation
- interact with peers in a group discussion

Unit-I : Listening Skills

1.1 Importance of Listening;
1.2 Types of listening

1.3 Barriers to Listening

1.4 Benefits of Listening

Unit-II: Oral Communication Skills -I

2.1 Types of Sentences – Assertive, Interrogative, Imperative and Exclamatory

2.2 Difference between Pauses, Gaps

2.3 Question Tags

Unit-III: Inter personal Communication

3.1. Self introduction , introducing others and Greetings

3.2 Asking and Giving Directions

3.3 Role Plays & Situational Dialogues

Unit-IV: Oral Communication Skills -II

4.1 Speaking on a particular topic - JAM

4.2 Use of cohesive devices in speaking

4.3 Common Errors in Spoken English

Unit-V: Presentation skills

5.1 Presentation Skills

5.2 Information Transfer

Unit-VI: Group Discussion

6.1 Importance of Group Discussion

6.2 Do's and Don'ts of Group Discussion

Course Outcomes: After completing the course students will be able to

- understand, analyze and respond to the audience by listening effectively
- acquire the articulation of different types of sentences by practicing pause patterns and question tags.
- translate and demonstrate self, participate effectively in activities like JAM, extempore
- express and deliver a presentation on the given topic through role plays and situational dialogues
- implement English language to meet the standards of corporate and real world in a group.

Suggested Readings:

(i) *Step by step learning language and life skills* by Niruparani, Jayasree Mohanraj, Indira, Sailakshmi Pearson Publishers
(ii) *Communication skills for technical students* by TM Farhathullah, Orient Black swan Publications
(iii) *English for technical Communication* by K.R. Lakshmi Narayan , Scitech Publications
(iv) *Practical English Usage.* Michael Swan. OUP. 1995.
(v) *Communication Skills.* Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
(vi) *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Syllabus for B. Tech I Year I semester
Electronics and Communications Engineering (ECE)
HUMAN VALUES AND PROFESSIONAL ETHICS IN HIGHER EDUCATION
Common to All Branches

	L	T	P	C
Code: 7HC20	**3**	**-**	**-**	**-**

Orientation Programme for First Year B.Tech Students Syllabus

Course Duration: Three Weeks **Evaluation:** Is done based on the Grading.

Course Objectives This introductory course input is intended

1. To help the students appreciate the essential 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature. Thus, this course is intended to provide a much needed orientational input in value education to the young enquiring minds.

Course Outcomes: Student will be able to:

1. Learns Being a human, understands human values and purpose of education
2. Understands the importance of different harmony levels needed.
3. Understand self and being in the current moment are the sources of happiness.
4. Improves Learning capabilities and communication skills.
5. Understands and appreciate the importance of personality development and yoga for a holistic life.
6. Understands the essence of Morals, Ethics, Values and Social responsibilities for successful life.

UNIT – I: INTRODUCTION TO HUMAN VALUES: The current status of an individual, at the level of Individual, Family, Society and Nature. Basis of Human Beings' Conduct, Desire – Aim, Objective and Purpose. Rationale of Success. Role of Education - Sanskar. Definition of Human aspiration, Human Conduct, Human Being – Physical Facility and Relationships, Right Understanding for Human Being, Achievement of Prosperity.

UNIT – II: HARMONY AND HUMAN BEING: Understanding the co-existence of human being, Different Harmony levels –Harmony in the Human Being, Harmony in the Family, Harmony in the Society and Harmony in Nature / Existence. Understanding the Relationships, Harmony in the Family, Feelings in Relationship: Trust, Respect, Affection, Care Guidance, Reverence, Glory, Gratitude and Love.

UNIT – III: THE CYCLE OF HAPPINESS: Meaning of Happiness and Unhappiness, Sources of Happiness, Self Investigation, Five Dimensions of Human order – Education, Health, Production, Justice and Exchange. Harmony at the Individual Level and Family level, Concerns at Individual, Family and Nature level. Different approach of People behavior – Active, Reactive and Proactive. Resource depletion, Global Warming, Pollution, Harmony in Nature.

UNIT – IV: IMPROVING LEARNING CAPABILITIES: Principles of learning, Study skills and E- Learning, Listening skills, Soft skills and Employability skills, Effective Reading and Reviewing, Reading Comprehension, Textbook Reading strategies, Effective Communication in English, Test taking strategies.

UNIT – V: PERSONALITY DEVELOPMENT: Self Development, Goal Setting, Motivation, Time Management, Positive Attitude, Building Self Confidence, Decision Making, The Discovery Wheel, Some attributes of a good personality, Memory Management, Interpersonal Skills, Importance of Yoga and Meditation.

UNIT – VI: ROLES AND RESPONSIBILITIES OF STUDENTS: Responsibilities of the students in shaping themselves, Effective and Successful Habits, Difference between studying in a Professional college and High school / Junior college, Characteristics of a Successful Student, Morals, Ethics and Values, Some tips to students to do well in B.tech program and also later in Professional Career.

TEXT BOOK:

1. Improving Learning Capabilities and Personality Development – Manual prepared by SNIST for private circulation

Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)

ENGINEERING PHYSICS LAB
Common to I-Year I-Sem (EEE & ECE) and II-Sem (CSE, IT & ECM)

	L	T	P	C
Code: 7HC65	-	-	3	1.5

Course Objectives:

- *To study the concepts (numerical aperture) of a optical fiber,*
- *To explain about magnetic induction, Biot-Savart principle.*
- *To discuss the energy gap (E_g) of a semiconductor diode.*
- *To understand the rigidity modulus, periodicity.*
- *Understand the concept of photo electric effect using photo voltaic cell.*
- *To understand about the ionizing radiation by using the Geiger–Muller counter.*
- *Discuss the dispersive power of prism-minimum deviation method.*
- *Explain the formation of Newton's rings-interference*
- *Study the frequency of AC mains using Sonometer.*
- *To study the LED characteristics and forward resistance*
- *Explaining about the electrical resonance by using the LCR circuit*
- *To know the time constant of RC circuit*

List of Experiments

1. Determination of a Numerical Aperture (NA) of an optical fiber – Fiber optics.
2. Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee's experiment - Magnetism.
3. Determination of the energy gap (E_g) of a given semiconductor-Temperature/semiconductor
4. Determination of rigidity modulus of a given wire material using the Torsional pendulum - Vibrations
5. Determination the Planck's constant using the photo voltaic cell - Photo voltaic cell
6. Studying the characteristics of Geiger–Muller counter and verifying the inverse square law - Nuclear physics
7. Calculation of dispersive power of a given material of prism by using Spectrometer in minimum deviation method - Light.
8. Determination of wavelength of a monochromatic light source by using Newton's rings experiment - Light
9. Calculating the frequency of AC supply by using the Sonometer – Electromagnetic/ Electrical
10. Studying the characteristics and calculating the forward resistance of a LED – Semiconductor/devices.
11. Study of series and parallel resonance of an LCR circuit – Electrical devices
12. Determination of time constant of an RC-circuit – Electrical/ Electronics

NOTE: Any **TEN** of the above experiments are to be conducted.

Course Outcomes:

After completing the experiment, students will be able to

- *Analyze the concepts of fiber optics, fundamentals, numerical aperture its importance, attenuation in fiber and applications.*
- *Understand and search to apply the fundamentals of magnetic induction, Ampere's law, Oersted's law and the Biot-Savart law.*
- *Analyze the concept a semiconductors, types, calculation of energy gap of a semiconductor diode and importance.*
- *Summarize the fundamentals of modulus-types, stress, strain, elasticity, plasticity and Hook's law.*
- *Understand the concepts of photo electric effect, importance, photo current, colour filters, optical sensors (photo voltaic cell).*
- *Understand the concept of radiation, ionizing radiation, radiological protection and inverse square law.*
- *Know about the light properties-dispersion, prism, spectrometer and minimum deviation arrangement.*
- *Understand the concepts of interference, conditions, formation of Newton's rings-reason.*

- *Know the difference between AC and DC fundamentals, magnetostriction, resonance, air column vibrations.*
- *Analyze the difference between normal diode, LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.*
- *Analyze the LCR circuit combination, parallel, series electrical resonance, inductance, reactance, capacitance and electrical and electronic fundamentals.*
- *Characterize the RC network, time constant, capacitor functioning and its application.*

Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)
ELECTRICAL CIRCUITS AND NETWORKS ANALYSIS LAB
Common to (ECE I Year I Sem) (EEE & ECM I Year II Sem)

Code: 7AC61

L	T	P/D	C
-	-	2	1

Course Objectives:
To make the student to learn:

i. *Verification of network theorems experimentally.*
ii. *To measure frequency of RLC series and parallel circuits under resonance*
iii. *To determine self & mutual inductance and co-efficient of coupling for coupled circuits*
iv. *The construction of current locus diagram for a given parallel circuit.*
v. *Simulation for analysis of electrical networks*
vi. *Method for determining the parameters of a coil*

Course Outcomes:
At the end of the course, students will be able to

i. *Perform the test for verification of various network theorems*
ii. *Measure the frequency for a RLC series/parallel circuits under resonance.*
iii. *Conduct an experiment for determination of self & mutual inductance and coefficient of coupling*
iv. *Construct current locus diagram by performing a test on single phase parallel circuits*
v. *Simulate for analysis of electrical circuits.*
vi. *Determine the parameters of the coil*

List of Experiments (ANY 10 Experiments to be conducted)

1. Verification Thevenin's Theorem and Norton's Theorem
2. Verification of Maximum Power Transfer Theorem
3. Verification of Superposition Theorem
4. Verification of Compensation Theorem
5. Verification of Reciprocity Theorem and Millmann's Theorem
6. Finding resonant frequency in Series and Parallel circuits
7. Determination of Self Inductance, Mutual Inductance and Coefficient of coupling
8. Calculation of Z and Y Parameters
9. Construction of current locus diagram for RL and RC circuit
10. Mesh and Nodal Analysis by simulation
11. Determination of Average value and RMS value of a complex wave
12. Determination of parameters of a coil.
13. Determination of Time constant of RL and RC series circuit.

a	B	c	d	E	f	g	h	i	j	k	l
							X	X	X		X

Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)
ENGLISH LAB (Oral Communication Skills)
Common to I Year I Semester (ECE, EEE and MECH) & II Semester (ECM, CSE, IT and Civil)

Course code: 7HC62 **L T P C**
0 0 2 1

Course Objectives: The course will develop the students' ability to

- *integrate listening and speaking skills*
- *communicate effectively*
- *speak effectively on a given topic*
- *master the art of presentation*
- *interact with peers in a group discussion*
- *get exposed to face interviews*

Course Outcomes: After completing the course students will be able to

- *understand, analyze and respond to the audience by listening effectively*
- *acquire the articulation of different types of sentences by practicing pause patterns and question tags.*
- *translate and demonstrate self, participate effectively in activities like JAM, extempore*
- *express and deliver a presentation on the given topic through role plays and situational dialogues*
- *implement English language to meet the standards of corporate and real world in a group.*
- *present and communicate effectively by facing mock interviews by experts from industry and academy.*

Unit-I : Practice sessions on
Listen & Speak
Listen, Read, and Speak

Unit-II: Practice sessions on
Articulation of types of Sentences
Question Tags
Introduction and greeting
Asking for and Giving
Directions

Unit-III: Practice sessions on
JAM/Extempore/
Impromptu
Prepared talk on given topics

Unit-IV: Practice sessions on
Formal Presentation
Role Plays & Situational Dialogues

Unit-V : Practice sessions on
Group Discussion

Unit-VI: Practice sessions on
Mock Interviews

Suggested Readings:

(i) *Step by step learning language and life skills* by Niruparani, Jayasree Mohanraj, Indira, Sailakshmi Pearson Publishers
(ii) *Communication skills for technical students* by TM Farhathullah, Orient Black swan Publications
(iii) *English for technical Communication* by K.R. Lakshmi Narayan , Scitech Publications
(iv) *Practical English Usage*. Michael Swan. OUP. 1995.
(v) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
(vi) *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

1	2	3	4	5	6	7	8	9	10	11	12
					M				H	M	M

Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)

TECHNICAL SEMINAR -I

Code: 7C191

L	T	P	C
-	-	2	1

Course Objective :

Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.

Course Outcomes: After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

Procedure

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

Distribution of marks

There shall be a Technical Paper writing and seminar evaluated for 100 marks in First Year First Semester. The evaluation is purely internal and will be conducted as follows:

Literature survey, topic and Content : 10 marks

Presentation including PPT : 15 marks

Seminar Notes : 10 marks

Interaction : 5 marks

Report : 10 marks

Attendance in the seminar class : 10 marks

Punctuality in giving seminar as per schedule time and date	: 10 marks
Mid semester viva (on the seminar topics completed up to the end of 9th week	: 10 marks
End semester Viva	: 20 marks
Total	100 marks

Syllabus for B. Tech I Year II semester
Electronics and Communication Engineering (ECE)

CHEMISTRY
(Common to EEE, ME, ECE)

Code: 7HC03

L	T	P	C
3	1	0	4

Course Objectives:

1. *To understand microscopic chemistry in terms of atomic and molecular orbitals*
2. *To learn the preparation and applications of commercial and conducting polymers and lubricant materials*
3. *To learn the industrial problems caused by water and municipal water treatment*
4. *To acquire knowledge about different types of batteries and their working mechanism*
5. *To develop the concepts and types of corrosion and the factors influence corrosion and to understand the control methods and protective coatings for metals*
6. *To learn the chemical reactions of drugs that are used in the synthesis of drug molecules*

UNIT – I: ATOMIC AND MOLECULAR STRUCTURE (6L)

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT – II: ENGINEERING MATERIALS (8L)

Plastics – Thermosetting and Thermoplastics, preparation, properties and engineering applications of plastics: PVC, Teflon, Bakelite. **Fibers:** Nylon 6,6 and Dacron.

Rubbers – natural and artificial rubber, vulcanization of natural rubber, Buna-S, Buna-N and their **engineering applications.**

Lubricants

Definition, classification and function of lubricants, Types of lubrication and mechanisms – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire point, cloud and pour point and acid value. **Engineering applications:**

UNIT - III: WATER TECHNOLOGY (8L)

(a) **Introduction**:- Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.

(b) **Water for Industrial purpose**: Food, sugar, textile, paper and pharma industries, water for steam making characteristics of boiler feed water, boiler troubles- scale and sludge & Carry over (priming &foaming), boiler corrosion, caustic embrittlement.

(c) **Water Treatment**: Internal conditioning- phosphate, carbonate & calgon conditioning. External Treatment: Ion-exchange process. Desalination-reverse osmosis. Municipal water treatment-sedimentation, coagulation, filtration, disinfection-chlorination, ozonization. **Engineering applications: Methodology and working of mineral water plant for drinking purpose.**

UNIT – IV: ELECTROCHEMISTRY (8L)

Conductance – conductors (metallic and electrolytic), types of conductance – specific, equivalent and molar conductance – effect of dilution on conductance.

Free energy and emf, cell potentials, electrode potential (oxidation and reduction). Types of electrodes - redox electrode (quinhydrode electrode), metal – metal insoluble salt electrode and Ion selective electrode.

Cell notation and cell reaction –Nernst equation and applications. **Engineering Applications: Batteries** : Types of batteries

(a) Primary batteries – Lechalanche cell (dry cell), Lithium cell

(b) Secondary batteries(Accumulators) – Lead acid battery, Lithium-ion battery

(c) Fuel cells- $H_2 – O_2$ fuel cell and MeOH-O_2 fuel cell-advantages and applications.

Engineering applications – future water powered car, Hydrogen production and storage.

UNIT - V: CORROSION AND ITS PREVENTION (7L)

Corrosion – basic concepts –types of corrosion, chemical, electrochemical corrosion (absorption of O_2 and evolution of H_2). Types of electrochemical corrosion – galvanic corrosion, pitting corrosion- factors affecting the rate of corrosion.

Cathodic protection – sacrificial anodic protection and impressed current cathodic protection method. Methods of metallic coatings-hot dipping (**tinning and galvanizing**), metal cladding (**Al cladding**), electroplating (**copper plating**) and electroless plating (**nickel plating**).

UNIT-VI: ORGANIC REACTIONS AND DRUG MOLECULES (5L)

Introduction: reactions involving substitution(S_N1, S_N2) addition to double bond(C=C), elimination(E^1 and E^2), oxidation (using $KMnO_4$, CrO_3), reduction (Hydrogenation by Ni/H_2, Pd/C)

Drugs : Definition, classification structure and applications of commonly used drug molecules - paracetamol, aspirin, ibuprofen and diphenhydramine (Benadryl)

Principles of spectroscopy and selection rules: Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules -**Applications**.

TEXT BOOKS:

1. Engineering Chemistry: by Jain & Jain ,Dhanapathrai Publications (2015)
2. Engineering Chemistry: by Thirumala Chary & Laxminarayana, Scitech Publications (2016)
3. Engineering Chemistry: by & B.Rama Devi, Prsanta Rath & Ch. Venkata Ramana Reddy, Cengage Publications (2016)

REFERENCE BOOKS:

1. Fundamentals of Molecular Spectroscopy by C. N. Banwell
2. Drugs by David Krupadanam- Universities Press
3. University chemistry by B. H. Mahan
4. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
5. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

After completion of the course, the student will be able to:

1. *Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.*
2. *Identify and differentiate conductivity of polymers, thermoplastic, thermosetting plastics and various lubricants.*
3. *Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.*
4. *Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.*
5. *Differentiate the types of corrosion and methods used to prevent the corrosion.*
6. *Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.*

Syllabus for B. Tech I Year II semester
Electronics and Communication Engineering (ECE)

PROBLEM SOLVING USING C

(Common to All Branches)

Code: 7FC01	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Outcomes:

After completion of this course student will learn

1. To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs(in C language)
2. To test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

UNIT I

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

UNIT II

History of C language, Characteristics of C language, Structure of C Language, C Tokens

Arithmetic expressions, Operator Precedence & **Associativity**

Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching and **Jumping Constructs**

Pretest and Post test, Iteration and loops (3 lectures)

UNIT III

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference, **Storage Classes**

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

UNIT IV

Arrays: Arrays (1-D, 2-D), Character arrays **Ragged Arrays and Dynamic Arrays**

Basic Algorithms Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required) Quick sort or Merge sort.

UNIT V

Pointers Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notation of linked list (no implementation) **Dynamic Memory allocation Functions**.

Strings: String Handling Functions.

UNIT IV

Structure: Structures, Defining structures and Array of Structures,

Nested Structures enum, typedef

File handling (only if time is available, otherwise should be done as part of the lab)

File Handling Functions, File Modes, File Operations

Suggested Text Books

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

Reference Books

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

H: High M: Medium L: Low

a	b	c	d	e	f	g	h	i	j	k	l
H	M	M								L	

Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)

ENGINEERING MATHEMATICS -II
(Common to EEE, ECE, ME, CE)

	L	T	P/D	C
Code: 7HC08	**3**	**1**	**0**	**4**

Pre Requisites*: Engineering Mathematics-I*
Course Objectives: *To make the students to understand and expected to learn*

1. *Multiple integration and its applications also acquire knowledge on curvilinear coordinate system.*
2. *Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.*
3. *Methods to solve higher order ordinary differential equations.*
4. *Series solution of second order ordinary differential equations with variable coefficients.*
5. *Basic concepts of Complex Analysis and conformal mapping and their properties.*
6. *Series expansion of a function using Taylor's and Laurent's series. Evaluation of definite integrals and improper integrals.*

UNIT 1: MULTIVARIABLE CALCULUS (INTEGRATION):
Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Introduction to orthogonal curvilinear coordinates, Simple applications involving cubes; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes (without proofs).

UNIT 2: FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS:
Exact, linear and Bernoulli's equations; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT 3: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS:
Higher order linear differential equations with constant coefficients, method of variation of parameters, Cauchy-Euler equation;

UNIT 4: SERIES SOLUTIONS TO SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS:
Power series solutions: Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT 5: COMPLEX VARIABLE – DIFFERENTIATION:
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT 6: COMPLEX VARIABLE – INTEGRATION:
Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation

of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

TEXT BOOKS:

(i) R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.

(ii) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

REFERENCE BOOKS:

(i) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

(ii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

(iii) B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers

(iv) Engineering Mathematics, Srimanta Pal, OXFORD university press.

(v) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

(vi) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

(vii) Engineering Mathematics, P. Sivaramakrishna Das, Pearson Publications.

Course Outcomes: *After the course completion the students will be able to*

1. *Solve the problems of multiple integration and apply these concepts for finding the parameters like surface area, volume, center of mass and centre of gravity.*
2. *Find the solutions of first order first degree and not of first degree differential equations and their applications such as Newton's law of cooling, Natural growth and decay.*
3. *Identify and solve higher order ordinary differential equations with constant coefficients using some standard methods and also their applications in LCR circuits.*
4. *Write the solutions of Legendre and Bessel's equations s series.*
5. *Understand the concept of analyticity of a function; solve the problems on conformal mapping.*
6. *Express the functions of a complex variable in series form also able to evaluate definite and improper integrals using complex integration.*

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Syllabus for B. Tech I Year II semester
Electronics and Communication Engineering (ECE)

WORKSHOP/MANUFACTURING PRACTICES (THEORY)
Common to I year I sem (CSE, IT & CE) II sem (EEE, ECE & ME)

Code: 7BC01

L	T	P	C
1	0	0	1

Course Objectives:
Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.
Course Outcomes:

1) *To understand various basic tools to perform simple joints using metal and wood.*
2) *To understand the principle of various electrical and electronic appliances and their applications.*
3) *To understand the manufacturing process of welding, casting and tin smithy and their applications.*
4) *To understand the operation of basic as well as advanced machines used for fabrication of Metals, Plastics and Glass.*

I: Theory: In theory classes the following syllabus is to be covered in 10hrs using PPTS and Videos (Elementary treatment only)

1. Fitting & Power Tools
2. Electrical & Electronics Appliances
3. Carpentry
4. Plastic molding & Glass Cutting
5. Metal Casting
6. Metal Joining: Arc & gas welding and brazing
7. Metal forming
8. Machining
9. Advanced manufacturing methods: (Micro machining, USM,ECM,EDM)
10. CNC machining & Additive Manufacturing

Suggested Text/Reference Books:
(1) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(2) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

Syllabus for B.Tech. I year II Semester

Electronics and Communication Engineering

ENGLISH (READING, LISTENING AND WRITING SKILLS)

Branches: ECM, CSE, IT and Civil (Sem-I) ECE, EEE and Mech (Sem-II)

L	T	P	C
1	0	0	1

Course code: 7HC01

Course Objectives: The students

- acquire knowledge on various types of listening techniques, barriers and benefits of listening
- recognize the speech sounds and learn the intonation patterns
- learn various vocabulary patterns
- develop the ability to structure and punctuate the sentences
- learn different reading techniques
- learn different writing skills

Unit-I : Listening & Phonology

1.1 Importance of Listening;

1.2 Introduction to Speech Sounds

1.3 Vowels, Diphthongs, Consonant Sounds

Unit-II: Stress & Intonation

2.1 Significance of word accent

2.2 Intonation Patterns

Unit-III: Vocabulary

3.1 Word Roots - Affixes: Prefixes and Suffixes

3.2 Homophones, Homonyms, Homographs

3.3 Synonyms – Antonyms

3.4 One word substitutes

3.5 Idioms and Phrases

Unit-IV: Basic Writing Skills

4.1 Sentence Structure
4.2 Kinds of Sentences
4.3 Punctuation in Writing

Unit-V : Reading Comprehension

5.1 Skimming and Scanning
5.2 Prediction Techniques and Inferring

5.3 Note Making

Unit-VI: Writing Skills

6.1 Paragraph Writing

6.2 Letter Writing

Course Outcomes: At the end of the course the students will be able to

- understand and differentiate different types of listening techniques used to interact with real world problems
- differentiate the speech sounds and improve their accent and modulation while speaking
- understand and illustrate different word roots, word derivatives – synonyms, antonyms and word inflections
- discriminate a variety of sentence types, their structure and use punctuations
- get acclimatized to reading strategies and note making.
- develop proficiency in writing and preparing resume

Suggested Readings:

(i) *English grammar just for you* Rajeevan Karal, Oxford publications

(ii) *Practical English Usage.* Michael Swan. OUP. 1995.

(iii) *Remedial English Grammar.* F.T. Wood. Macmillan.2007

(iv) *On Writing Well.* William Zinsser. Harper Resource Book. 2001

(v) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.

(vi) *Communication Skills.* Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

(vii) *Learn to Write* by Dr. G. Varalakshmi, Kindle Edition 2016

(viii) *A practical course for developing writing skills in English* by J.K. Gangal, PHI Learning Pvt Ltd.

Syllabus for B. Tech I Year II semester
Electronics and Communication Engineering (ECE)

CHEMISTRY LAB

Code: 7HC63

L	T	P	C
0	0	3	1.5

Course Objectives:

The student will be able to learn:

1. *Preparation of coordination complex NiDMG Complex*
2. *Determination of surface tension*
3. *Determination of viscosity*
4. *Saponification/acid value of an oil*
5. *Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTA Method*
6. *Determination of chloride content of water*
7. *Determination of cell constant and conductance of solutions (HCl Vs NaOH / Mixture of acid Vs Strong base)*
8. *Potentiometry - determination of redox potential and emf ($FeSO_4$ Vs $KMNO_4$ / HCl Vs NaOH)*
9. *Determination of the rate constant of acid catalyzed hydrolysis of methylacetete*
10. *Synthesis of a polymer- Thiakol rubber / Urea-Farmaldehyde resin*
11. *Synthesis of a drug- Aspirin*
12. *Thin layer chromatography*

List of Experiments

1. Preparation of coordination complex NiDMG Complex
2. Determination of surface tension
3. Determination of viscosity
4. Saponification/acid value of an oil
5. Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTA Method
6. Determination of chloride content of water
7. Determination of cell constant and conductance of solutions (HCl Vs NaOH / Mixture of acid Vs Strong base)
8. Potentiometry - determination of redox potential and emf ($FeSO_4$ Vs $KMNO_4$ / HCl Vs NaOH)
9. Determination of the rate constant of acid catalyzed hydrolysis of methylacetete
10. Synthesis of a polymer- Thiakol rubber / Urea-Farmaldehyde resin
11. Synthesis of a drug- Aspirin
12. Thin layer chromatography

Course Outcomes

After completion of the course, the student will be able to learn:

1. *Methods to prepare inorganic complexes.*
2. *The process to determine surface tension of different liquids using stagnometer*
3. *The process to determine viscosity of lubricants by using redwood viscometer.*
4. *How to find acid value of an oil.*
5. *The principle and determination of Hardness of a water sample.*
6. *The methods to estimate amount of chlorine in water.*
7. *To determine unknown concentration of acid by using conductometric method.*
8. *To determine unknown concentration of acid by using potentiometric method.*
9. *Estimate rate constants of reactions from concentration of reactants/products as a function of time.*
10. *Methods to prepare industrially important polymers.*
11. *The method of preparation for organic compounds.*
12. *To separate the organic compounds from their mixture by using Thin layer chromatography.*

Syllabus for B.Tech. I year II Semester

Electronics and Communication Engineering

Problem Solving using C LAB

(Common to All Branches)

Code: 7FC71	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Course Outcomes:

After completion of this course student will learn

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program
7. To be able to declare pointers of different types and use them in defining self referential structures.
8. To be able to create, read and write to and from simple text files.

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

2. Unit I (Cycle 1)

1. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
2. Write an algorithm to find the largest of three given numbers and draw a flowchart.
3. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
4. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.

3. Unit II (Cycle 2)

1. Write an algorithm, flowchart, and C program for:
2. Finding the area and circumference of a circle of given radius.
3. Finding the volume of a sphere of given radius.
4. Finding the lateral surface area of a right circular cone of given base radius and height.
5. Finding selling price of an item, given its cost price and profit percent.
6. Finding the interest on a given principal for a given period of time at a given rate of per year.
7. Write a C program to display all the sizes of data types in C.
8. Write a C program to display a given decimal integer into an equivalent octal number and hexadecimal number using %o and %x in printf function.

4. Unit II (Cycle 3)

1. Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.
2. Write a C program for finding the largest of three given numbers.
3. A salesman gets a commission of 5% on the sales he makes if his sales is below Rs.5000/- and a commission of 8% on the sales that exceeds Rs.5000/- together with Rs.250/-. Write an algorithm or a flowchart and develop C program for computing the commission of the salesman, given his sales.

5. Unit III (Cycle 4)

1. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
2. Write a C program to compute the sum of:
3. $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$, given x and n.
4. 1! + 2! + 3! + . . . + n!, given n.
5. $1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10! + \ldots$ to n terms where the n^{th} term becomes less than 0.0001.

6. Unit III (Cycle 5)

1. Write a C program in the menu driven style to perform the operations +, -, *, /, % between two given integers.
2. Write a C program to find the largest and the least of some numbers given by the user.
3. Write a C program to find the sum of the digits of a positive integer.

7. Unit III (Cycle 6)

1. Write C functions for the following:
   - **a)** A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
   - **b)** A function that takes a real number x and a positive integer n as arguments and returns x^n.
   - **c)** A function that takes a positive integer n as an argument and returns the n^{th} Fibonacci number.
2. Using recursion write C functions for the following:
   - **a)** Factorial of a non-negative integer n.
   - **b)** Number of combinations of n things taken r at a time.
   - **c)** Greatest Common Divisor of two integers.
   - **d)** Least Common Multiple of two integers.

8. Unit III (Cycle 7)

- **a)** Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
- **b)** Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
  1. Larger of two numbers.
  2. Smaller of two numbers.
  3. Sum of the squares of two numbers.
- **c)** Write a program to generate Pascal's triangle.
- **d)** Write a program to count the number of letters, words, and lines in a given text.

9. Unit IV (Cycle 8)

1. Write a program to store the numbers given by the user in an array, and then to find the mean, deviations of the given values from the mean, and variance.
2. Write a C program to initially store user given numbers in an array, display them and then to insert a given number at a given location and to delete a number at a given location.
3. Write a program to store user given numbers in an array and find the locations of minimum and maximum values in the array and swap them and display the resulting array.

10. Unit IV (Cycle 9)

1. Write a C program to implement the operations of matrices – addition, subtraction, multiplication.
2. Write a program to find whether a given matrix is symmetric, lower triangular, upper triangular, diagonal, scalar, or unit matrix.

11. Unit V (Cycle 10)

1. Write a function to swap two numbers.
2. Write a function to compute area and circumference of a circle, having area and circumference as pointer arguments and radius as an ordinary argument.

12. Unit VI (Cycle 11)

1. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
2. Define a structure point. Write a program to find the distance between two points.
3. Define a structure student having members roll no., name, class, section, marks. Create an array of 10 students give the data and find the average marks, section-wise.

13. Unit VI (Cycle 12)

1. Write a program to:
   a) Create a file by the name given by the user or by command line argument and add the text given by the user to that file.
   b) Open the file created above and display the contents of the file.
   c) Copy a file into some other file, file names given by the user or by command line arguments.
   d) Append a user mentioned file to another file.
   e) Reverse the first n characters of a file.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Syllabus for B. Tech I Year II semester
Electronics and Communication Engineering (ECE)

WORKSHOP/MANUFACTURING PRACTICES (LAB)

B.Tech I year I sem (CSE, ECM, IT & CE) II sem (EEE, ECE & ME)

Code: 7BC61

L	T	P	C
0	0	3	1.5

Course Objectives:

1) *To identify various basic tools to perform simple joints using metal and wood.*
2) *To recognize various electrical and electronic and their applications.*
3) *To understand the manufacturing process of welding, casting and tinsmith and apply the processes in making simple products.*
4) *To understand and operate basic machines for fabrication of Metals, Plastics and Glass.*
5) *To understand the functions and parts of commonly used domestic appliances.*

Course outcomes:

1. *After completion of the course, the student will be able to **fabricate** components with their own hands.*
2. *Assemble different components and produce small devices of their interest.*

Work shop and Manufacturing Practices

Minimum of 10 experiments out of twelve given here under is to be completed

S.No	Trades	List of Experiments
1	Fitting Shop	**1**. Preparation of T-Shape Work piece **2.** Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
2	Carpentry	3.Practice of Cross Half lap joint 4. Practice of Half lap Dovetail joint
3	Electrical & Electronics	5. One lamp one switch Practice 6. Stair case wiring: Practice
4	Welding shop (Arc & Gas)	Demonstration of Gas and Resistance welding 7. Practice of Lap and Butt joint using Arc welding
5	Casting	8.Preparation of mould by using split pattern 9. Mould preparation and pouring of molten metal.
6	Tin Smithy	10. Preparation of Rectangular Tray & Square box
7	Machine Shop	11. Demonstration of turning , Drilling and Reaming operations
8	Plastic molding & Glass Cutting	12 a) Demonstration of Injection Moulding b) Demonstration of Glass Cutting with hand tools
9	Domestic Appliances	13.Demonstration of Electric Iron, fan, Mixer, Hair Drier, Washing Machine etc.
10	Lab project	14. Making various components and / or assembling the components which can be useful in domestic / engineering applications

A	b	c	d	e	f	g	h	i	j	k	l
							X	X	X		X

Syllabus for B. Tech I Year II semester
Electronics and Communication Engineering (ECE)

ENGLISH LAB (Reading, Listening and Writing)

Common to I Year I Semester (ECM, CSE, IT and Civil) & II Semester (ECE, EEE and MECH)

Code: 7HC61 **L T P C**
0 0 2 1

Course Objectives *: The students will*

- *acquire knowledge on various types of listening techniques, barriers and benefits of listening*
- *recognize the speech sounds and learn the intonation patterns*
- *learn various vocabulary patterns*
- *develop the ability to structure and punctuate the sentences*
- *learn different reading techniques*
- *learn different writing skills*

Course Outcomes *: At the end of the course the students will be able to*

- *understand and differentiate different types of listening techniques used to interact with real world problems*
- *differentiate the speech sounds and improve their accent and modulation while speaking*
- *understand and illustrate different word roots, word derivatives – synonyms, antonyms and word inflections*
- *discriminate a variety of sentence types, their structure and use punctuations*
- *get acclimatized to reading strategies and note making.*
- *develop proficiency in writing and preparing resume*

Unit-I : Practice sessions on
Listening for Basic Vocabulary
Listening for General Information
Listen for specific information
Listening Comprehension

Unit-II: Practice sessions on Pronunciation
Articulation of Vowel and Consonant sounds
Listening for Word accent
Intonation Patterns

Unit-III: Exercises on Word Roots
Affixes: Prefixes and Suffixes
Identifying Homophones,
Homonyms, Homographs
Synonyms - Antonyms
One word substitutes
Idioms and Phrases

Unit-IV: Exercises on
Punctuation and Spelling
Error Identification in Sentences
Conversion of Sentences

Unit-V : Practice sessions on
Using passages for skimming and scanning
Note Making using Texts
Reading Comprehension using different techniques

Unit-VI: Exercises on
Paragraph Writing using hints/Guided Paragraphs
Writing Letters

Writing Resume

SuggestedReadings:

(i) *English grammar just for you* Rajeevan Karal, Oxford publications
(ii) *Practical English Usage*. Michael Swan. OUP. 1995.
(iii) *Remedial English Grammar*. F.T. Wood. Macmillan.2007
(iv) *On Writing Well*. William Zinsser. Harper Resource Book. 2001
(v) *Study Writing*. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(vi) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
(vii) *Learn to Write* by Dr. G. Varalakshmi, Kindle Edition 2016
(viii) *A practical course for developing writing skills in English* by J.K. Gangal, PHI Learning Pvt Ltd.

1	2	3	4	5	6	7	8	9	10	11	12
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Syllabus for B. Tech I Year I semester
Electronics and Communication Engineering (ECE)

TECHNICAL SEMINAR -II

Code: 7C292

L	T	P	C
-	-	2	1

Course Objective :

Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.

Course Outcomes: After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

Mapping of Course Outcomes with Program Outcomes

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

Procedure

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

Distribution of marks

There shall be a Technical Paper writing and seminar evaluated for 100 marks in First Year First Semester. The evaluation is purely internal and will be conducted as follows:

Literature survey, topic and Content	: 10 marks
Presentation including PPT	: 15 marks
Seminar Notes	: 10 marks
Interaction	: 5 marks
Report	: 10 marks
Attendance in the seminar class	: 10 marks
Punctuality in giving seminar as per schedule time and date	: 10 marks
Mid semester viva (on the seminar topics completed up to the end of 9^{th} week	: 10 marks
End semester Viva	: 20 marks
Total	100 marks

Syllabus for B.Tech. II year I Semester

ELECTRONIC DEVICES AND CIRCUITS

(Common to ECE/EEE/ECM)

Code: 7C301

L	T	P/D	C
3	-	-	3

Course Objectives:

The objective of this course is to provide the learners with a comprehensive understanding of electronic devices, circuits and their applications.

Course Outcomes:

After studying this course, the students will be able to

1. *Learning the operation of diode and its application as rectifier and filters*
2. *Understand the Fundamentals of BJT operation, Characteristics ,different biasing circuits, analysis of BJT amplifiers.*
3. *Analyze and Design of BJT Single stage, multistage amplifiers at low and high frequencies.*
4. *Analysis of small signal model of FET and frequency response*
5. *Design different types of Feedback Amplifier, Oscillators and their analysis*
6. *Understand the Basic regulator circuits and voltage multipliers.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT-I

PN JUNCTION DIODE:

P-N junction diode characteristics and applications under forward & reverse bias. Transition capacitance and Diffusion capacitance. Break down of junctions (Avalanche and Zener Break down). Zener Diode Characteristics.

P-N junction diode as a Rectifier :Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Analysis of Rectifier circuits without and with filters (L,C and π filters)

UNIT- II BIPOLAR JUNCTION TRANSISTOR: Characteristics and Biasing

Fundamentals of BJT& Operation, Minority carrier profiles. I/P and O/P Characteristics CB, CE and CC configurations. Transistor as a switch. Switching characteristics (Rise time, Fall time, Delay Time and Storage time), Design of transistor as

switch. Problems on transistor switch. BJT Biasing Methods & Stabilization. - Fixed Bias, Collector to Base Bias, Voltage Divider Bias and Problems, Concept of Thermal runway in BJTs.

UNIT-III

Small signal & High frequency analysis of BJT:

Small signal Low frequency Model of BJT, h-parameter representation – Exact analysis of .CE Amplifier-. Approximate analysis of CE, CB and CC Amplifiers. Concept of Multistage amplifier - N-stage cascaded amplifier, equivalent circuits, Frequency response of single & two stage RC coupled Amplifier, Analysis at Low and High frequencies.

Small signal High frequency Model of BJT (hybrid π model) – relationship between high frequency parameters and h-parameters, β cut off Frequency (common Emitter short circuit Current gain), Millers Theorem.

UNIT-IV

FIELD EFFECT TRANSISTOR:

Construction & Working of JFET, JFET characteristics, FET Parameters, Construction & Working of MOSFET, MOSFET characteristics, (Enhancement and depletion mode); Comparison of JFET & MOSFET

Biasing of JFET - Self bias and fixed bias. Small signal Analysis of common source, common drain and common gate amplifier configurations

UNIT- V

FEED BACK AMPLIFIERS

Fundamentals-classification- Characteristics of feedback Amplifier effect of feedback in voltage series, voltage shunt, current series and current shunt amplifiers. Problems

OSCILLATORS

Classification of Oscillators. Condition for Oscillations. RC Phase shift Oscillator, Wein bridge oscillator- Hartley oscillator, Colpitts oscillator, Quartz crystal Oscillator,

UNIT-VI

VOLTAGE REGULATORS:

Classification of Voltage Regulators - Basic regulator circuit: Zener, Transistor Based: Shunt and Series Voltage regulators. Protection Circuits: Current limiting, Short circuit protection. Specifications of Voltage regulator, Voltage multipliers. Switching Regulators – (boost up, step down (buck) & Flyback)

Text Books

1. Electronic Devices and Crcuits-J.Millman, C.C.Halkias and satyabratha jit Tata McGraw Hill,2 Ed. 2007
2. Electronic Devices AND Circuits-R.L.Boylestad &Louis Nashelsky, Pearson/Prentice Hall, 9th edition, 2006.
3. Electronic devices and Circuit Theory-Robert L. Boylstead, Louis Nashelsky, 9ht ed., 2008, PE
4. Integrated electronics-J.Milliman and C.C.Halkias, MC Graw –Hill-1972

References:

1. Electronic circuit analysis-K.Lal Kisshore,2004,BSP
2. 2.Electronic Devices and Circuits – K.LalKishore, 2 ed., 2005, BSP
3. 3.Electronic Devices: Systems and Applications – Robert Diffenderter, 2nd Indian Reprint., 2010, Cengage Learning
4. Electronic Devices and Crcuits by Sanjeev Guptha,Dhapat Rai Publications.
5. Electronic Devices and Circuits by S.Salivahanan and N.Suresh Kumar, Tata Mc Graw Hill Publications
6. Electronic Circuits and Applications, Muhammad H Rashid, Cengage Learning

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M		M							M

Syllabus for B.Tech. II year I Semester

Electronics and Communication Engineering

DIGITAL LOGIC DESIGN

(Common to ECE/ECM/EEE)

Code: 7C302

L	T	P/D	C
3	-	-	3

COURSE OBJECTIVES: *To learn the different numbering systems, Boolean functions and design of Combinational and Sequential Circuits.*

COURSE OUTCOMES:

After completing this course, the students will have demonstrated

i. *an ability to understand number systems and apply the rules of Boolean algebra to simplify Boolean expressions.*
ii. *an ability to simplify of Boolean expressions using K-map.*
iii. *an ability to design MSI combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters.*
iv. *an ability to design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers*
v. *an ability to design digital design using PLD's such as ROM's, PLA's, PAL s.*
vi. *an ability to design digital controllers using Algorithmic State Machine Charts .*

Mapping of Course Outcomes with Program Outcomes

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

UNIT – I

Number System: Binary, decimal, octal, hexa decimal, weighted and un-weighted codes.

Boolean Algebra: Axiomatic definition of Boolean algebra, Binary operators, postulates of and theorems. Boolean addition, subtraction, 1's complement, 2's complement. Switching functions, Canonical forms and Standard forms, Simplification of switching functions using theorems.

UNIT – II

Logic gates: Basic gates and universal gates.

Minimization of Switching Functions: simplification rules, Karnaugh map method, Prime implicants, don't care combinations, Minimal SOP and POS forms, Quine-McCluskey Tabular Method, Prime Implicant chart.

Application: Design of a Basic Calculator Using Logic Gates.

UNIT - III

Combinational Logic Design:

Single output and multiple output combinational logic circuit design, AND-OR, OR-AND, and NAND/NOR realizations, Exclusive-OR and Equivalence functions, Binary adders/subtractors, Encoder, Decoder, Multiplexer, Demultiplexer, MUX realization of switching functions, Parity bit generator, Code-converters, Concepts of threshold logic and threshold gates.

Applications: Application of Decoder in Seven Segment Display, application of Encoders in Servomotors.

UNIT - IV

Sequential Circuits-1:

Classification of sequential circuits (Synchronous, Asynchronous Pulse mode, and Level mode with examples). Basic flip-flops-Triggering and excitation tables. Conversion of flip-flops.

Applications: Application of SR Flip Flop in Switch Debounce Circuit.

UNIT - V

Sequential Circuits-2:

The sequential circuit model, Asynchronous counters, Design of simple synchronous sequential circuits such as counters (Design of modulo-N counter, Ring counter, twisted ring counter) and Shift registers

Applications: Design of 1010 sequence detector, Design of Digital Clock using Counters

UNIT - VI

Programmable Logic Devices:

Basic PLD's-ROM, PROM, PLA, and PLD Realization of Switching functions using PLDs. Algorithmic State Machines: State machines and state diagrams.

Applications: Design of a Weighing machine and Binary multiplier.

Text Books:

1. Morris Mano-,Digital design –PHI, 2nd Edition.
2. ZviKohavi and Niraj K Jha -Switching & Finite Automata theory – Cambridge, 3rd Edition.
3. SubrataGhoshal, Digital Electronics,2012, Cengage Learning

References:

1.Fletcher -An Engineering Approach to Digital Design – PHI.
2.Fundamentals of Logic Design, Roth, Kenny, Seventh Edition, Cengage Learning
3.R.P.Jain-Switching Theory and Logic Design- TMH Edition,2003.
4.John M. Yarbrough -Digital Logic Applications and Design – Thomson Publications, 2006
5.CVS Rao -Switching Theory and Logic Design –Pearson Education, 2005

1	2	3	4	5	6	7	8	9	10	11	12
H	H	M	M	M				M			M

Syllabus for B.Tech. II year I Semester
Electronics and Communication Engineering
SIGNALS AND SYSTEMS
(Common to ECE/ECM)

Code: 7C303

L	T	P	C
2	1	-	3

Course Objectives :

To study the concepts of signals and systems their characterization in the Time as well as frequency domains

COURSE OUTCOMES:

After studying this course, the students will be able to

i. *Understand the concepts of signals, comparison of signals, orthogonal signal space and the concepts of impulse, step and signum functions.*
ii. *Apply the orthogonality properties to understand the Fourier methods of signal analysis- Fouries series and Fourier Transforms.*
iii. *Understand the concepts of systems, their characterization in the Time as well as Transformed domains.*
iv. *Understand and apply the mathematical tools, such as Convolution, Correlation and the Laplace transform, to analyze signals and systems.*
v. *Determine the sampling frequency for any low pass and band pass signals applying the sampling theorem.*
vi. *Distinguish between continuous and Discrete time signals and systems. Apply the concepts of Z-Transforms in the analysis of DT signals and systems.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I

Signals: Signals. Classification of Signals. Even, Odd, Periodic. Non-periodic. Energy and Power Signals. Exponential and Sinusoidal Signals. Concepts of Impulse Function. Unit Step Function. Signum Function.

Signal Analysis - Analogy between Vectors and Signals. Orthogonal Signal Space. Signal Approximation using Orthogonal Functions. Mean Square Error. Closed or Complete Set of Orthogonal Functions. Orthogonality in Complex Functions.

Applications: The concepts of orthogonality find applications in DSP, DIP, DC, Design of experiments and so on.

UNIT-II

Fourier Representation of Continuous Time Signals

Periodic Signals- Fourier Series, Dirichlet's Conditions. Trigonometric. Exponential Fourier series. Fourier Spectrum.

Non- Periodic Signals - Fourier Transforms. Fourier Transform of Arbitrary Signal. Standard Signals. Fourier Transform of Periodic Signals. Properties of Fourier Transforms. Fourier Transforms Involving Impulse and Signum Function Energy Density Spectrum, Parseval's Theorem. Introduction to Hilbert Transform.

Applications: Knowledge of signal bandwidth is necessary in the design of a filter; in the determination of the carrier frequency and also the sampling frequency and analog communication.

UNIT-III

Signal Transmission through Linear Systems

Systems. Classification of Systems. Linear System. Impulse Response (IR) of a Linear System. Linear Time Invariant (LTI) System. Linear Time Variant (LTV) System. Transfer Function of a LTI System. Filter Characteristics of Linear Systems. Distortion Less Transmission Through a System. Signal Bandwidth. System Bandwidth. Ideal LPF, HPF and BPF Characteristics. Causality and Poly-Wiener Criterion for Physical Realization. Relationship between Bandwidth and Rise Time.

Applications: The concept of system bandwidth is applied in the design of a practical filter or system.

UNIT-IV

Convolution and Correlation of Signals

Concept of Convolution in Time Domain and Frequency Domain. Graphical Representation of Convolution. Convolution Properties. Cross Correlation and Auto Correlation of Functions. Properties of Correlation Function... Relation between Convolution and Correlation. Detection of periodic signals in the presence of Noise by Auto and Cross Correlations.

Laplace Transforms - Review of Laplace Transforms. Partial Fraction Expansion. Inverse Laplace Transform. Concept of Region of Convergence (ROC) for Laplace Transforms. Constraints on ROC for Various Classes of Signals. Properties of LT. Initial and final value theorems, Relation between LT and FT of a Signal. Laplace Transform of Certain Signals using Waveform Synthesis. Laplace Transform of Periodic Signals.

Applications: These math tools are required in the design, analysis and implementation of various filters, LT signals and systems .

UNIT-V

Sampling

Sampling Theorem. Graphical and Analytical Proof for Band Limited Signals. Impulse (Ideal) Sampling. Natural (Chopped) Sampling and Flat Top(S&H) Sampling. Reconstruction of Signal from its Samples. Effect of Under Sampling. Aliasing. Introduction to Band Pass Sampling.

Applications: Sampling techniques are applied in the conversion of analog to digital conversion

UNIT-VI

Z–Transforms

Fundamental Difference between Continuous and Discrete Time Signals. Discrete Time Signal Representation using Complex Exponential and Sinusoidal Components. Periodicity of Discrete Time using Complex Exponential Signal. Concept of Z- Transform of a Discrete Sequence. Distinction Between Laplace, Fourier and Z Transforms. Region of Convergence in Z-Transform. Constraints on

ROC for Various Classes of Signals. Inverse Z-Transform. Properties of Z-Transforms. Initial and final value theorems. Introduction to Discrete Time Systems.

Applications: Analysis and Synthesis of DT signals and systems.

Text Books

1. Signals, Systems and Communications- B. P. Lathi, BSP.
2. Signal processing and Linear Syustems - B. P. Lathi, BSP.
3. Signals and Systems – Anand Kumar

References

1. Signals & Systems – Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2ndEdn.
3. Linear Systems and Signal Processing - B. P. Lathi, Oxford University Publications.

1	2	3	4	5	6	7	8	9	10	11	12
H	M	H		M							M

Syllabus for B. Tech (E.C.E.)II Year I semester

PROBABILITY THEORY AND STOCHASTIC PROCESS

Code: 7C304

L	T	P/D	C
2	1	-	3

After studying this course, the students will be able to

1. *Understand the concepts of Probability, Probability of Random Events,Bayes Theorem, Joint, Marginal, Conditional, Total Probability.*
2. *Understand concepts of Discrete Random Variables,Continuous Random Variables and Transformations of Random Variables.*
3. *Understand concepts ofmultiple random variables, independent random variable, transformation of multiple random variables.*
4. *Understand concepts ofthe.Mean. Auto-correlation, Auto-covariance and Auto-correlation Coefficient,Cross-correlation Function. Cross-covariance Function. Cross-correlation Coefficient.*
5. *Understand the concepts of Power Spectral Density Function of Random Process, Time Averaging and Ergodicity.*
6. *Understand the concepts of Random Signal Response of Linear Systems,Thermal Noise and Shot noise*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I
PROBABILITY

Set Definitions. Sample Points and Sample Spaces. Probability of Random Events. Laws of Probability. Joint,Marginal and Conditional Probabilities. Total Probability. Bayes Theorem. Statistical Independence.

UNIT-II
RANDOM VARIABLES

Probability Distribution Functions. Discrete Random Variables and Probability Mass Function. Expected values. Continuous Random Variables. Probability Density Functions. Complex Random Variables. Moments and Characteristic Functions. Distributions and Density Functions and their Properties. Expected Values. Moments and Characteristic Functions – Binomial. Poisson. Uniform. Gaussian. Exponential. Rayleigh. Transformations of Random Variables.

UNIT-III
RANDOM VECTORS
Joint Probability Distribution Functions. Joint Probability Densities. Conditional Probability Distributions Functions. Marginal Distributions and Density Functions. Conditional Probability Densities. Expected Value of a Function of Random Variables. Joint Moments. Joint Characteristic Functions. Sum of Two RandomVariables. Sum of Several Random Variables. central limit theorem (proof not expected)Jointly Gaussian Random Variables. Independent Random Variables. Transformations (Functions) of Multiple Random Variables.

UNIT-IV
RANDOM PROCESSES
Definition: The concept. Probabilistic Structure. Classification. Formal Definition. Description: Joint Distribution. Analytical Description using Random Variables. Average Values: Mean. Auto-correlation, Auto-covariance and Auto-correlation Coefficient. Two or More Random Processes: Cross-correlation Function. Cross-covariance Function. Cross-correlation Coefficient.
Applications: Calculation Coding efficiency of Shanon Fano Coding.

UNIT-V
STATIONARITY AND CORRELATION THEORY
Strict-sense Stationarity. Wide-sense Stationarity (WSS). Auto-correlation Function of Real WSS Random Process and its Properties. Cross-correlation Function and its Properties. Power Spectral Density Function of a WSS Random Process and its properties. Wiener-Khinchine Theorem. Power and Bandwidth Calculations. Cross-power Spectral Density Function and its Properties
Time Averaging and Ergodicity: Time Averages – Interpretation. Mean and Variance. Ergodicity. General Definition. Mean-ergodic. Correlation -ergodic.
Applications: Removal of noise using correlation.

UNIT-VI
LINEAR SYSTEMS WITH RANDOM INPUTS
Value of System Random Signal Response of Linear Systems: System Response – Convolution. Mean and Mean-squared Response. Autocorrelation Function of Response. Cross-Correlation Functions of Input and Output. Spectral Characteristics of System Response. Power Density Spectrum of Response. Cross-Power Density Spectrums of Input and Output. Band Pass. Band-Limited and Narrowband Processes. Properties.Thermal Noise. Shot noise
Applications– Modulation. Sampling.

Text Books

1. Peyton Z. Peebles Jr., Probability, Random Variables and Random Signal Principles, 4th edn., Tata McGraw-Hill, New Delhi, 2002.
2. Athanasios Papoulis, S.Unnikrishna Pillai, Probability, Random Variables and Stochastic Process , PHI, 4th Edition, 2002
3. Y Mallikarjuna Reddy, Probability Theory and Stochastic Process, 4th edition, University Press, 2013

References

1. G. R. Grimmett, D. R. Stirzaker, Probability and Random Processes, Second Edition, Oxford Science Publications, 1995.
2. Hwei HSU, Probability, Random Variables & Random Processes, Schaum's Outlines, TMH, 2009
3. K Murugesan, P. Gurusamy, Probability, Statistics and Random Processes, Anuradha Publications, 2006

a	b	c	d	e	f	g	h	i	j	k	l
H	M	M								L	

II Year B.Tech, Semester-I

Transform Techniques & Numerical Methods

(Common to ECE & EEE)

	L	T	P/D	C
Code: 7HC13	**2**	**0**	**0**	**2**

Pre Requisites: Engineering Mathematics – II

Objectives:

To learn

- *Concept, properties of Laplace transforms*
- *Solving ordinary differential equations using Laplace transforms techniques.*
- *Various methods to the find roots of an equation.*
- *Concept, properties of Z-Transforms, Solving Difference equations using Z-Transforms.*
- *Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.*
- *Applications of PDE.*
- *Concept of finite differences and to estimate the value for the given data using interpolation.*
- *Evaluation of integrals using numerical techniques*
- *Solving ordinary differential equations using numerical techniques.*

UNIT - I: Laplace Transformations: (12 L)

Laplace transform of standard functions, shifting theorems, change of scale property, Laplace Transform of Derivatives and Integrals, Multiplication by powers of 't', Divison by 't' (without proofs). Laplace transform of unit step function, Impulse function. Inverse Laplace transforms**:** properties, partial fraction method and convolution theorem (without proof). Solving ordinary differential equations with constant coefficients using Laplace Transforms.

UNIT - II: Z- Transforms: (8L)

Z- Transforms and Inverse Z-transforms, properties, damping rule, Shifting properties, Initial and final value theorems Convolution theorem (without proofs).

Applications-Solution of difference equation by Z- transforms

UNIT– III: Partial Differential Equations: (10L)

Formation of Partial Differential Equations by Elimination of Arbitrary Constants and Arbitrary Functions. Solutions to First order Linear and Non-linear Equations-Standard Forms, Equations Reducible to Standard Forms. Classification of partial differential equations. Method of Separation of Variables, Solution of One dimensional Heat Equation.

UNIT- IV: Solution of algebraic and transcendental equations and Numerical integration: (10L)

The Bisection Method – The Method of False Position –Fixed point iteration Method – Newton-Raphson Method.

Newton-Cotes Quadrature Formula, Trapezoidal rule – Simpson's 1/3 rule – Simpson's 3/8 rule.

UNIT – V: Interpolation*: *(10L)

Introduction– Finite differences- Forward Differences, Backward differences, Central differences. Newton's formulae for interpolation – Gauss Central Difference Formulae (without proofs), Lagrange's Interpolation formula for unevenly spaced points.

***UNIT – VI: Numerical solution of Ordinary Differential equations:* (12L)**

Solution by Taylor's series – Picard's Method of successive Approximations – Euler's Method – Runge-Kutta Methods of fourth order, Predictor-Corrector Methods-Milne's Method.

Text Books:

(i) R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
(ii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
(iii) S. S. Sastry, Introductory methods of numerical analysis. PHI, 4th Edition, 2005.

Reference Books:

(i) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
(ii) Engineering Mathematics, Srimanta Pal, OXFORD university press.
(iii) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
(iv) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Course outcomes:

After learning the contents of this paper the student must be able to

- *Use the Laplace transforms techniques for solving ODE's*
- *Use the Z-Tranforms technique for solving Difference equations*
- *Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.*
- *Find the root of a given equation.*
- *Estimate the value for the given data using interpolation*
- *Find the numerical solutions for a given ODE's*

a	B	c	d	e	f	g	h	i	j	k	l	m
x	X			x								

Syllabus for B. Tech (E.C.E.) II Year I semester

Code: 7AC43 **ELECTRICAL TECHNOLOGY**

(Common to ECE & ECM)

L	T	P	C
2	**-**	**-**	**2**

After studying this course, the student will be able to

1. Understand the principle and operation of DC generator along with its applications.
2. Understand the principle and operation of DC motor along with its applications.
3. Understand the principle and operation of Transformer along with its applications.
4. Understand the principle and operation of three phase induction motor along with its applications.
5. Understand the principle and operation of synchronous machine along with its applications.
6. Understand the principle and operation of single phase motors along with its applications.

UNIT – I: D.C. GENERATORS:

Principle of operation, Constructional features, E.M.F equation, Types of D.C generators, build up of e.m.f, O.C. characteristics, Load characteristics of shunt, series and compound generators, simple problems.

UNIT –II: D.C. MOTORS:

D.C. Motors - Principle of operation, Back E.M.F, Torque equation, Characteristics and application of shunt, series and compound motors, Speed control of D.C. motors, Armature voltage and field flux control methods, Principle of 3 point starter, Losses, efficiency, Swinburne's test, Simple Problems.

UNIT-III: TRANSFORMERS:

Single Phase Transformers, types, constructional details, E.M.F equation, Operation on no load and on load, Phasor diagrams, Equivalent circuit, S.C. & O.C. tests - Losses and efficiency, Regulation. Introduction to three phase supply, phase sequence, star and delta connected loads, three phase transformer (star – delta, delta – star transformers).

UNIT-IV: THREE PHASE INDUCTION MOTORS:

Construction details of cage and wound rotor machines, Production of a rotating magnetic field, Principle of operation, rotor E.M.F, rotor frequency, rotor reactance, rotor current and pf at standstill and running operation, Torque derivation for standstill and running conditions, Slip – torque characteristics.

UNIT-V: SYNCHRONOUS MACHINES:

Constructional Features of round rotor and salient pole machines. E.M.F Equation, Synchronous reactance and impedance, S.C. & O.C. tests and regulation by synchronous impedance method - Principle of operation of Synchronous motor.

UNIT – VI: SINGLE PHASE MOTORS:

Single phase induction motor, Constructional features, Double revolving field theory, Split phase motor, Shaded pole motor, Principle of operation of A.C. series motor, Universal motor, Stepper motor and Tacho.

TEXT BOOKS:

1. Electrical Machines – S.K.Battacharya, Tata McGraw – Hill Publishers, 2nd edition.
2. Electric Machines – I.J. Nagrath & D.P. Kothari, Tata McGraw – Hill Publishers, 3rd edition, 2004.

REFERENCE BOOKS:

1. Principles of Electrical Engineering – V.K.Mehta, S.Chand publications, 2nd edition.
2. Electrical Technology – Edward Huges, Pearson publishers, 8th edition.

Syllabus for B. Tech. II Year I semester

ELEMENTS OF MECHANICAL ENGINEERING

(Common to All Branches Except Mechanical Engineering)

Code: 7BC04

L	T	P/D	C
2	-	-	2

Course Objectives:

The main objective of the course is to offer the students fundamental knowledge of First Law of Thermodynamics. *Working of SI and CI engines, working principle of different types of Turbines& pumps, properties of material and engineering application. Working principles of various types of power transmission systems*

COURSE OUTCOMES:

At the end of basic mechanical engineering a student should be able to

1. To acquire the knowledge of basic concepts of thermodynamics and analyze the p-v & t-s diagrams of the different cycles.
2. To acquire the knowledge two and four stroke engines, the function of components used in the steam power plant
3. To identify & understand the function of components used in VCR & VAR system, & about the working of hydraulic pumps & hydraulic turbines.
4. To identify & understand *properties of material and engineering application*
5. To acquire the knowledge *of various types of power transmission systems*
6. To acquire the knowledge the different NC and CNC machine.

UNIT - I

Energy Resources and Conversion, Basic concepts of Thermodynamics – general classification of heat engines, Property and state, System, Boundary and surroundings , Zeroth Law, First Law of Thermodynamics and its applications- Joule's experiment, reversible non-flow processes- Constant volume, constant pressure, constant temperature process, polytropic process, Second Law of Thermodynamics – Statements, Heat engines, Carnot cycle, Air standard cycles – Otto, Diesel Cycles.

UNIT-II

Internal combustion engines: Internal combustion engines, definition, classification, components, working of four stroke cycle engines, SI and CI Engines, Performance parameters, Need for cooling, and lubrication of IC engines.

Steam Power plant, Boiler, Steam Turbines: Layout of steam power plant, Water tube and Fire tube Boilers :- Simple cross-tube boiler, Cochran, Babcock and Wilcox Boiler and High Pressure Boilers. (Benson & La-mount only).

UNIT- III

a) **Hydraulic pumps & turbines:-** Centrifugal Pumps, Pelton wheel, Francis turbine and Kaplan Turbine -- Layout of Hydro electric power plant

b) **Refrigeration & Air conditioning systems:-** Description of Vapour Compression and Vapour Absorption systems

UNIT-IV

Engineering Materials – Classification, mechanical properties, Ferrous Materials – Constituents of Cast Iron & types of Cast Iron, Steels – manufacture by Bessemer converter, Arc furnace, types of steel, effect of alloying elements on steel, Stainless steel, Non- Ferrous Materials: Properties and applications of Aluminum & alloys, Copper and alloys, composite materials – types, fabrication methods, Ceramics – Properties and applications

UNIT-V

Transmission of Motion and Power – Shafting, Belt drive, types of belt drive, types of belts, chain drives, types of chain drive, Pulleys, parts, types of pulleys, gear drive- classification, Terminology of spur gear, Gear trains – simple and compound, Clutches – purpose and basic principle of contact clutch, brakes - purpose and basic principle of block brake

UNIT-VI

Robot and sensors – Introduction, definition, Robot component, **CNC Machine tools** – Introduction, Machine control, Vertical and Horizontal spindles, CNC drill, mill, boring and tapping, Adaptive control, NC and CNC turning centers

TEXT BOOKS :

Mathur, M.L., Mehta, F.S. and Tiwari, R.P., Elements of Mechanical Engineering, Jain Brothers, New Delhi, 2005.
R.K. Rajput, "Elements of Mechanical Engineering", Laxmi Publications, 1994.

Syllabus for B. Tech. II Year I semester
7HC21: ENVIRONMENTAL SCIENCE AND ECOLOGY

II B. Tech I Sem (for EEE, ME and ECE)

II B. Tech II Sem (for CSE, IT, ECM and CE)

(Mandatory course)

L	T	P	C
3	0	0	0

There are no credits but grading will be given based on marks scored as **Outstanding/ Excellent/ Very good/ Good/ Above average/ Average/ Satisfactory/Not satisfactory**

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations Course Outcomes:
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

UNIT-II Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source.

UNIT-III Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants. Acid rain, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and

types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

UNIT-V Sustainable development and Green Technology: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism (CDM).

UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

TEXT BOOKS:

1. Introduction to Environmental Science Dr. Y. Anjaneyulu, 2004, BS Publications.
2. Environmental Studies by Erach Bharucha, 2005 University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

1	2	3	4	5	6	7	8	9	10	11	12
H	H	H	M	M							L

Syllabus for B. Tech (E.C.E.)II Year I semester
ELECTRONIC DEVICES & CIRCUITS LAB
(Common to ECE/ECM/EEE)

Code: 7C371

L	T	P/D	C
-	-	2	1

L	T	P/D	C
-	-	2	1

Course Objectives:

This course introduces the characteristics and applications of semiconductor devices; emphasis is placed on characteristics and testing practically to strengthen the knowledge.

Course Outcomes:

After studying this course, the students will be able to

1. *Understand color coding, operations on Diode,BJT, FET and other electronic components.*
2. *Correlate theoretical concepts with practical implementation.*
3. *Apply the knowledge of Diodes, Capacitors and Transistors for the realization of rectifiers, regulators, amplifiers and Oscillator circuits.*
4. *Adapt effective Communication, presentation and report writing skills*

Mapping of Course Outcomes with Program Outcomes

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

PART A: Electronic Workshop Practice (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Bread Boards.
2. Identification and Specifications of Active Devices like Diodes, BJTs and JFETs.
3. Study and operation of
    - Digital Multimeters
    - Function Generator
    - Regulated Power Supplies
    - Soldering

- SMD components

PART B: (For Laboratory examination – Minimum of 10 experiments)

1. Study and Operation of CRO:
   Oscilloscope, CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger Pulse, delay line, probes for CRO, Measurement of amplitude and frequency. Time Period measurement, Lissajous patterns.
2. Determination of Cut-in Voltage, Forward and Reverse resistances of PN Junction diode using V-I Characteristics.
3. Zener diode characteristics and Zener as voltage Regulator.
4. Input and output characteristics of BJT in CB Configuration.
5. Input and output characteristics of BJT in CE Configuration.
6. Half wave rectifier with and without filters.
7. Full wave rectifier (Center trapped and Bridge) with and without filters.
8. Drain and Transfer characteristics of FET in CS Configuration.
9. Common Emitter Amplifier Characteristics
10. Common Collector Amplifier Characteristics (Emitter Follower).
11. FET amplifier (Common Source).
12. RC Phase Shift Oscillator.

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic Components

Syllabus for B. Tech (E.C.E.) II Year I semester

Code: 7AC94 **ELECTRICAL TECHNOLOGY LAB**

(only for ECE)

L	T	P	C
-	-	2/2	0.5

The following experiments to be conducted:

1. OC & SC tests on Single – Phase transformer (Predetermination of efficiency and regulation at given power factors).
2. Brake test on 3-phase induction motor (performance characteristics).
3. Speed control of DC shunt motor by
   a) Armature Voltage Control
   b) Field flux control method
4. Brake test on DC shunt motor (performance characteristics).
5. Predetermination of efficiency of DC shunt machine by Swinburne's test.
6. Regulation of alternator by Synchronous impedance method.

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M		M							M

Syllabus for B. Tech (E.C.E.) II Year I semester

Digital Logic Design Lab

Code: 7C372

L	T	P/D	C
-	-	2/2	0.5

Course Objectives:

The objectives of this course are

- *To Design and analyze the various circuits and systems using Digital ICs.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

Verify the operations of the Digital ICs (Hardware) in the Laboratory

1. DeMorgon's Theorem and the Universal gates
2. 3x8 Decoder using IC 74x138
3. Priority encoder using 74x148
4. 4-bit Binary Adder using IC 74x283
5. D Flip-Flop IC 74x74
6. Decade counter using IC74x90

1	2	3	4	5	6	7	8	9	10	11	12
					M				H	M	M

Syllabus for B. Tech (E.C.E.) II Year I semester
Technical seminar- III

Code: 7C393

L	T	P/D	C
-	-	2	1

Course Objective :

Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.

Course Outcomes: After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

Mapping of Course Outcomes with Program Outcomes

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

Procedure

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

Distribution of marks

There shall be a Technical Paper writing and seminar evaluated for 100 marks in First Year First Semester. The evaluation is purely internal and will be conducted as follows:

Literature survey, topic and Content	: 10 marks
Presentation including PPT	: 15 marks
Seminar Notes	: 10 marks
Interaction	: 5 marks
Report	: 10 marks
Attendance in the seminar class	: 10 marks
Punctuality in giving seminar as per schedule time and date	: 10 marks
Mid semester viva (on the seminar topics completed up to the end of 9th week	: 10 marks
End semester Viva	: 20 marks
Total	100 marks

1	2	3	4	5	6	7	8	9	10	11	12
H	H	H	M	M							L

Syllabus for B. Tech (E.C.E.) II Year II semester

ANALOG CIRCUITS
(Common to ECE, EEE AND ECM)

Code: 7C405

L	T	P/D	C
3	-	-	3

Course Objectives :
To understand the basic functioning and applications of the basic building blocks of analog electronic circuits - amplifiers and oscillators.

COURSE OUTCOMES :
After studying this course, the students will be able to

1. *Distinguish between small and large signal amplifiers.*
2. *Analyze and Design tuned and RF amplifiers .*
3. *Analyze the linear and non-linear wave shaping circuits.*
4. *Design and Analyze various types of multivibratos and applications*
5. *Analysis of sweep generators and their applications.*
6. *Learn and Analyze various types of Logic gates and Sampling gates.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I
POWER AMPLIFIERS
Classification of Power Amplifiers - Class A, B, AB & C power amplifiers –push pull configuration, complementary symmetry circuits , Distortion in Amplifiers. Harmonic distortion and Crossover Distortion in Power Amplifiers– Conversion efficiency and relative performance.

UNIT II
TUNED AMPLIFIERS
Introduction to Tuned Amplifiers, Q-Factor. single tuned capacitive coupled amplifier, tapped single tuned capacitance coupled amplifier, single tuned inductively coupled amplifier, stagger tuning, synchronous tuned Amplifier.

UNIT III

WAVE SHAPING – Linear and Non-linear:

RC high pass, low pass circuit response for sinusoidal, step, pulse, square, ramp & exponential inputs - Differentiator –Integrator. RL, Diode clippers- Transistor clipper- clipping at two independent levels – Emitter coupled clipper- comparator-– Applications of voltage comparators.

Clamping operation – clamping with source, diode resistances- clamping circuits theorem- practical clamping circuits.

UNIT IV

MULTIVIBRATORS:

Stable states of Bistable Multivibrator A fixed bias transistor Bistable Multivibrator -A self biased transistor Bistable Multivibrator - commutating capacitor – Unsymmetric triggering of Bistable Multivibrator - triggering through a unilateral device- symmetrical triggering – Schmitt trigger circuit.

General operation of monostable multivibrator, collector coupled monostablemultivibrator - wave forms of collector coupled monostable multivibrator - Emitter coupled monostablemultivibrator - triggering of monostable multivibrator. Astablemultivibrator, collector coupled Astable multivibrator -Emitter coupled Astable multivibrator. Designing of Bistable, Monostable and Astable Multivibrators.

UNIT V

TIME BASE GENERATORS:

General features of time base signals-sweep circuit using a transistor switch-UJT,UJT characteristics, UJT as a sweep circuit, - General considerations & principles of Miller & Boot strap time base generators- the transistor miller time base- the transistor, Boot strap time base generator- A simple current sweep transistor current time base generator.

UNIT VI

SAMPLING and LOGIC GATES:

Basic operating principle unidirectional, Bidirectional sampling gates using diodes, transistors - reduction of pedessel effect and sampling oscilloscope.

LOGIC GATES: Digital operation of a system- OR, AND, NOT, NAND & NOR gates- DTL Logic– RTL Logic, TTL logic – comparison.

Text Books:

1. Integrated electronics-J.Milliman and C.C.Halkias, MC Graw –Hill-1972
2. Pulse digital and switching wave forms-J. Millman and H. Taub, Tata McGraw-Hill, New Delhi,2001.
3. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002 .

References:

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss
3. Electronic Circuit Analysis-K.Lal Kishore, 2004, BSP

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	M					M		L

Syllabus for B. Tech (E.C.E.) II Year II semester
ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

Code: 7CC06

L	T	P/D	C
2	1	-	3

After studying this course, the students will be able to

1. *Apply the Maxwell's equations in propagation of EM waves*
2. *Demonstrate the behavior of EM waves in different media.*
3. *Understand the property of EM energy at different boundary conditions.*
4. *Understand the impossibility of TEM waves in rectangular wave guides.*
5. *Design different transmission lines.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I
REVIEW OF VECTOR ANALYSIS AND ORTHOGONAL COORDINATE SYSTEMS
Line, surface, and volume integrals. Curl, divergence and gradient of fields.
ELECTROSTATICS
Static electric fields, Coulomb's Law, Gauss Law and Applications, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation time, Parallel plate, Coaxial and Spherical capacitors.
Applications: Electric current in vacuum and gases, photocopier.

UNIT II
MAGNETOSTATICS: Static magnetic fields, Ampere's Circuital Law, Magnetic Flux Density, Magnetic Scalar and Vector Potentials. Forces due to Magnetic fields, Ampere's Force Law, Inductance and magnetic energy.
Applications: Electromagnetic suspension (EMS) maglev train, speakers and micro phones.

UNIT III
MAXWELL'S EQUATIONS
Differential and Integral forms-word statement-proofs and conversion. Faraday's Law and their Application in free space, polarization, Power flow and energy storage; Boundary conditions and boundary value problems
.***Applications: Electromagnetic wave propagation***

UNIT I V
REFLECTION AND REFRACTION OF EM WAVES
Reflection by a perfect conductor-Normal and Oblique Incidence-Reflection by a perfect Insulator-Normal and Oblique Incidence. Brewster angle.EM Wave characteristics, Guided waves between parallel Planes, Power losses in plane conductor. Pointing Theorem.
Applications: Calculation of power loss in plane conductor.

UNIT V
TRANSMISSION LINE THEORY
Transmission line – general solution –The infinite line – Wavelength, velocity of propagation – Waveform distortion – the distortion less line - Loading and different methods of loading – Line not terminated in Z_0 – Reflection coefficient – calculation of current , voltage, power delivered and efficiency of transmission – Input and transfer impedance – Open and short circuited lines – reflection factor and reflection loss.
Applications: Calculation of voltage and current distribution in a 10-Km transmission line.

UNIT VI
HIGH FREQUENCY TRANSMISSION LINES
Transmission line equations at radio frequencies – Line of Zero dissipation – Voltage and current on the dissipation less line, Standing Waves, Nodes , Standing Wave Ratio – Input impedance of the dissipation less line - Open and short circuited lines – Power and impedance measurement on lines – Reflection losses. Smith Chart-Construction and applications.
Applications: determination of load standing wave ratio and reflection coefficient with smith chart

Text Books:
1. W.H.Hayt Jr., Engineering Electromagnetics, Tata Mc-Graw-Hill, 2001.
2. EC Jordan, EM waves and radiating systems, PHI, 1995.
3. Elements of Electromagnetics-Mathew N.OSadiku, 4ed., 2008, Oxford Univ.Press
4. Transmission Lines and Networks by Umesh Sinha

References:
1. N. Narayana Rao, Elements of Engineering Electro magnetics, Pearson Education, 2006.
2. J.D.Ryder, Networks lines and fields, PHI, 1990

1	2	3	4	5	6	7	8	9	10	11	12
M	H	M	M	M							M

Syllabus for B. Tech (E.C.E.) II Year II semester
ANALOG COMMUNICATIONS

Code: 7CC07

L	T	P/D	C
3	-	-	3

Prerequisites: *PTSP, SS.*

Course Objectives:

- *To provide both the theory and practice of modulation techniques used in various analog transmitter and receiver systems.*

Course Outcomes

After studying this course, the students will be able to

1. *Understand need for modulation, Types of analog modulation such as AM, DSBSC, SSBSC, VSB , their generation and detection.*
2. *Understand types of multiplexing ,and commercial applications of all types of analog modulations*
3. *Understand the types of angle modulation such as FM, PM, their generation and detection methods, comparison and applications*
4. *Understand types of Noise, analysis and calculation of noise in AM,DSBSC and SSB*
5. *Understand the circuits and characteristics of transmitters and receivers for AM and FM.*
6. *Understand types of Pulse Modulations such as PAM, PPM, PWM, their generation, detection, and applications.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I
AMPLITUDE MODULATION

Introduction to Analog Communications, Need for Modulation, Frequency Translation, Amplitude Modulation-Time Domain and Frequency Domain Representation of AM signals, Power and Current Relations in AM waves. Generation of AM Waves: Square Law Modulator, Switching Modulator. Detection of AM Waves: Square Law Detector, Envelope Detector.

UNIT-II
DSBSC & SSBSC MODULATION

Double sideband suppressed carrier and single sideband modulation- Time domain and frequency domain representation of DSBSC and SSB signals. Generation and Detection of DSBSC,SSB signals. Vestigial sideband modulation. Generation and Detection of VSB signal, Frequency Division Multiplexing, ISB Modulation. Comparison of AM techniques, Commercial Applications of AM.

UNIT-III

ANGLE MODULATION

Frequency modulation-Narrowband FM and wideband FM- spectrum of FM signals-Transmission bandwidth of FM.Phase modulation-relationship between FM and PM signals Generation of FM signals-direct(parametric variation method) and indirect(Armstrong method) methods, Detection of FM signals : Frequency discriminators,phase difference discriminators,Phase locked loop, Zero crossing Detector.Comparison of FM & AM, Commercial Applications of FM,PM.

Applications: Design of a 88-108 MHz FM system

UNIT-IV

NOISE AND DISTORTIONS IN COMMUNICATION

Noise in base-band systems-SNR at the output of a base-band system-SNR improvement. Noise in linear CW modulation systems-noise in DSB/SC and SSB systems-noise in AM systems. Noise in angle modulated systems-Output SNR in angle modulated systems- threshold effects in angle modulated systems. Pre-emphasis & De-emphasis.

UNIT-V

TRANSMITTERS AND RECEIVERS

Radio Transmitters, Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter ,FM Transmitter, Frequency stability in FM Transmitter

Radio Receiver-types-Tuned Radio Frequency receivers and super-heterodyne receivers, RF section and characteristics, Intermediate frequency, Image frequency and its rejection ratio, receiver characteristics-Automatic gain control,Tracking & alignment, AM receiver, FM receiver, Amplitude limiting.

Applications: Design of an AM transmitter system.

UNIT-VI

PULSE MODULATION

Analog Pulse Modulation: Sampling theorem for base-band and band pass signals, Pulse Amplitude modulation: generation and demodulation, Time Division Multiplexing system, PPM generation and demodulation, PWM, Spectra of Pulse modulated signals.

Text Books

1. Simon Haykin, *Communication Systems,* John Wiley & Sons , 2nd Edition ,1998.
2. K. Sam Shanmugam, *Digital and Analog Communication Systems*", John Wiley & Sons
3. H.Taub & D.Schilling,Gautam sahe, Principles of Communication systems –TMH,2007,3rd edition

References

1. George Kennedy and Bernard Davis ,*Electronics & Communication System*, TMH,2nd Edition, 2004.
2. Analog and Digital Communications, Theory and Lab work, Abhay Gandhi, Cengage Learning.
3. Dennis Roddy, John Coolen, "Electronic Communications", PHI 1997 B.P. Lathi, "Modern Digital and Analog Commmunication Systems" 3rd Ed. Oxford University Press.
4. P.Ramakrishna Rao,"Analog Communications"1st edition,TMH
5. K N HariBhat& Ganesh Rao, "Analog Communications"2nd edition, pearson publications.
6. A.Bruce Calrson, " Communication systems", Third edition, MGH Publication.

Syllabus for B. Tech (E.C.E.) II Year II semester

COMPUTER ORGANIZATION AND ARCHITECTURE

Code:7DC11

L	T	P/D	C
3	-	-	3

a	b	c	d	e	f	g	h	i	j	k	l	m
	x	x									x	x

Course Objectives: *Students will learn about*

1. *Various basic computer architectures, data representations and instruction sets.*
2. *Arithmetic unit, control unit and efficient computation using pipelining*
3. *Memory organization and optimization*
4. *I/O Communications and interfaces*

Course Outcomes: *After completing this course, student should be able to*

1. *Use data types with instruction set of specific architecture.*
2. *Analyze performance aspects with control unit along with pipelining*
3. *Evaluate memory access in terms of latency.*
4. *Utilize communication protocols for interfacing*

Unit – I

Introduction: Organization and Architecture, Structure and Function – Computer Evolution - Brief history of computers – Designing for performance.

Computer System: Components, Function – Interconnection Structures – Bus interconnection – PCI.

Unit – II

Instruction Set: Characteristics – Operand Types – Operation Types – Addressing Modes – Instruction formats

CPU: Computer Arithmetic operations: ALU – Integer Representation and Arithmetic – Floating Point Representation and Arithmetic.

Unit – III

Computer Memory System Overview - Cache Memory Principles - Elements of Cache Design

Internal Memory - Semiconductor Main Memory - Error Correction - Advanced Dram Organization

External Memory - Magnetic Disk – Raid

Unit – IV

Characteristics of CISC and RISC

Control unit: Micro–Operations – Control of Processors – Hardwired Implementation.

Micro Programmed Control: Basic concepts – Control Memory - Microinstruction Sequencing – Conditional branching – Mapping of instruction – Microinstruction Execution – Microprogram Example

Unit – V

Processor Structure and Function - Processor Organization - Register Organization - Instruction Cycle - Instruction Pipelining - Instruction Execution Characteristics - The Use of a Large Register File - Compiler-Based Register Optimization - Reduced Instruction Set Architecture - RISC Pipelining

Unit – VI

Input/Output - External Devices - I/O Modules - Programmed I/O - Interrupt - Driven I/O - Direct Memory Access - I/O Channels and Processors.

TEXT BOOKS:

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", Prentice Hall, 9th Edition, 2013
2. John P.Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 3rd Edition, 2002.

REFERENCES:

1. Patterson, D. A., and Hennessy, J. L., "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann Publishers, 4th Edition, 2008.
2. **D.A.Godse A.P.Godse, Computer Architecture & Organization, Technical Publications, 2007.**
3. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Tata McGraw Hill, 5th Edition, 2002.
4. Morris Mano, " Computer Systems Architecture ", 3rd Edition, Pearson PHI Publication, 1993

Syllabus for B. Tech (E.C.E.) II Year II semester

DATA STRUCTURES

(Common to all Branches)

Code:7EC01

L	T	P/D	C
2	-	-	2

Course Objective:

1. Understand the concepts of Abstract data Type, linear data structures such as stacks, queues and lists and their applications.
2. Comprehend different non linear data structures such as trees and graphs and analyze their time complexities.
3. Understand object oriented programming and advanced C++ concepts and be able to write programs with C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, Templates etc.

Course Outcomes:

1 Explain Abstract data type, stack and Queues with their applications

2 Write programs on Singly linked lists, Doubly linked lists, Circular list and explain their operations.

3 Explain concepts of Trees, AVL Trees and Graphs with examples and applications.

4 Describe and solve problems of searching and sorting and evaluate the time complexity of each algorithm.

5 Explain concepts of OOPs and implement programs using objects, classes, constructors and destructors.

6 Explain and apply concepts of oops , write programs implementing functions , operator overloading and inheritance.

UNIT I

Introduction to data structures: Abstract data type (ADT), Stacks, Queues and Circular queues and their implementation with arrays.

Applications of Stack: infix to post fix conversion, postfix expression evaluation.

Applications of Queues .

UNIT II

Singly linked lists, Advantages of Linked lists over Arrays, Doubly linked lists, Circular list and their operations, representing stacks and queues with Linked lists.

UNIT III

Trees- Binary trees, terminology, representation, traversals.

AVL trees, AVL tree operations: Insertion, deletion and searching.

Graphs- terminology, representation, graph traversals (DFS and BFS).

UNIT IV

Searching - Linear and binary search methods.

Sorting - Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort.

Heaps - Introduction, Min Heap, Max Heap,Operations on Heaps, Heap Sort.

Performance analysis of Searching and Sorting Algorithms.

UNIT V: Introduction to C++ programming-object oriented programming concepts, Structured Vs OOP.

Classes and objects-class definition, Objects, class scope and accessing members, Constructors -default constructor, parameterized constructor, copy constructor. Destructor.

UNIT VI: Static class members, this pointer, friend functions, Dynamic memory management with operators new and delete. Overloading-function overloading, Operator overloading, restrictions on operator overloading, overloading unary and binary operators, templates, inheritance: single, multiple and multi level inheritance.

TEXT BOOKS:

1. **Data Structures and C++ by Reema Thareja**
2. **Data Structure through C by Yashavant Kanetkar**.
3. **The complete reference C++ By Herb Schildt.**

REFERENCES:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. *Data Structures and Algorithms*. Addison Wesley, 1983.

2. Data Structures using c Aaron M.Tenenbaum , Yedidyah Langsam,Moshe J Augenstein.

3. Introduction to Data Structures In C By Kamtane

4. Data Structures, A pseudocode Approach with C by Richard F. Gilberg and Behrouz A. Forouzan.

Syllabus for B. Tech (E.C.E.) II Year II semester

MANAGEMENT SCIENCE AND FINANCIAL ACCOUNTING (MSFA)

Code: 7ZC01

L	T	P/D	C
2	-	-	2

Course Objective: To make students understand the basics of management and Financial Accounting, its principles, practices and latest concepts for increasing the performance of engineering graduates in their respective fields, which facilitate them in making better planning and decisions

Course Outcomes:

1. Outlines the significance of management, defines the basic concepts and applicability of management principles in changing paradigms.
2. Helps in understanding organization behavior, personality determinants and other key aspects
3. Infers the need to understand the importance of Strategic management and Business environment in particular
4. Enrich students with basic concepts of Financial Accounting.
5. Understand basic concepts of Depreciation and need for preparing trial balance.
6. Helps in preparation of Financial Statements (final accounts).

UNIT I

INTRODUCTION TO MANAGEMENT: Management- Definitions, Levels of Management, Functions of management- Planning: types of planning, planning process; Organizing: Organizational Design and Structure, Staffing; Directing; Controlling: Basic control process- Fayol's principles of Management - Taylor's principles of scientific management- Maslow's Motivational theory.

UNIT II

INTRODUCTION TO ORGANIZATIONAL BEHAVIOR: Definition, Nature and Scope of OB, Personality-determinants of Personality – Perception- Attitudes- Attribution theory- Johari Window and Transactional Analysis, Stress Management- factors and remedies

UNIT III

STRATEGIC MANAGEMENT: Introduction to Strategic Management, Vision, Mission, Goals, Objectives, Environmental Scanning- PESTEL, SWOT Analysis, Competitive Advantage, Concept of Core Competence, PORTER's five force model, types of strategies, Strategic formulation and Implementation.

UNIT IV

FUNDAMENTALS OF FINANCIAL ACCOUNTING: Definition of Accounting, Accounting Concepts and conventions, principles of Double-Entry system, Book Keeping, Overview of books of original records Journal, Ledger and Subsidiary books

UNIT V

TRIAL BALANCE AND DEPRECIATION OF FIXED ASSETS: Significance of Trial balance, Preparation of trial balance Definition of Depreciation, Depreciation of fixed assets, Methods of Depreciation – Straight line method and Diminishing Balance method

UNIT VI

CLASSIFICATION OF REVENUE AND CAPITAL EXPENSES, AND PREPARATION OF FINAL ACCOUNTS: Revenue expenditure, Capital expenditure, Preparation of Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments

References:

- A R Aryasri: Management Science, Tata Mc Graw Hill
- Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi
- A R Aryasri: Managerial Economics and Financial Analysis, Tata Mc Graw Hill

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	H							L

Syllabus for B. Tech (E.C.E.)II Year II semester
BASIC SIMULATION LAB
(Common to ECE/ECM)

Code: 7CC73

L	T	P/D	C
-	-	2	1

Mapping of Course Outcomes with Program Outcomes

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

SYLLABUS CONTENT

1. Basic Operations on Matrices
2. Generation of Various signals and sequences (Periodic and Aperiodic) such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding Even and Odd parts of a Signal/Sequence and Real and Imaginary Parts of a Signal.
5. Convolution of Signals and Sequences.
6. Auto Correlation and Cross Correlation of Signals and Sequences
7. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical realiazability and stability properties.
8. Gibbs Phenomenon.
9. Sampling Theorem Verification.
10. Locating the Zeros and Poles and Plotting the Pole-Zero maps in the S-Plane and Z-Plane for the given transfer function.

11. Verification of Linearity and Time Invariance Properties of a given Continuous / Discrete System

12. Generation of Gaussian noise (Real and Complex), Computation of its Mean, Mean Square Value and its Skew, Kurtosis, and PSD , Probability Distribution Function.

13. Finding the Fourier transform of the signal using Fast Fourier Transform

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	M							L

Syllabus for B. Tech (E.C.E.) II Year II semester
Analog Circuits Lab

Code: 7C474

L	T	P/D	C
-	-	3	1.5

a	b	c	d	e	f	g	h	i	j	k	l
	x	x	x	x						x	x

Course Objectives: To prepare students to practice the design and analysis of any Analog electronics circuit.

Course Outcomes:
At the end of the laboratory course, the students will be able to

1. To understand the design and working of various linear and non-linear wave shaping circuits.
2. To demonstrate the working principle of various multivibrators.
3. To verify the functionalities of various logic gates.
4. To perform and verify the BJT/ FET and feedback amplifiers.
5. To perform and verify the working of oscillators and voltage regulators.
6. To perform laboratory experiment to verify the conversion efficiency of various power amplifiers.

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content:

Part-A: Hardware based experiments

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers. clampers.
3. UJT Relaxation Oscillator
4. Astable and monostable Multivibrator.
5. Bistable Multivibrator.
6. Study of Logic Gates with discrete components.

Part-B: Software Simulation based experiments (Multisim OR Pspice OR Tina Pro Or Equivalent Simulation Software)

1.Common Emitter and Common Source amplifier

2.Voltage shunt and Feedback Amplifier
3.Cascade Amplifier (CE+CE, CE+CC)
4.RC Phase Shift Oscillator using Transistors
5.Class- A and Class-B Complementary Symmetry Power Amplifier
6.Series and Shunt Voltage Regulator.

1	2	3	4	5	6	7	8	9	10	11	12
M	H	M	M	M							L

Syllabus for B. Tech (E.C.E.) II Year II semester

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
II-II	7C475	ANALOG COMMUNICATIONS LAB	-	-	2	1

Prerequisites: *SS, PTSP, BS Lab*

Course Objectives:

The objectives of this course are

- *To perform laboratory experiments on various analog and digital modulation techniques and measure the performance parameters.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Demonstrate the modulation and demodulation of various forms of amplitude modulation techniques.*
CO2	*Demonstrate the modulation and demodulation of frequency modulated waveform.*
CO3	*Verifying the spectral components of AM and FM & Verifying the concepts of frequency multiplexing techniques.*
CO4	*Analyze the characteristics of heterodyne receiver.*
CO5	*Verifying sampling theorem and Demonstrate the modulation and demodulation of pulse modulation techniques.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus content:

1. AM Generation and Detection
2. DSB-SC Generation and Detection
3. SSB-SC generation and detection
4. FM Generation and Detection
5. Receiver Characteristics
6. Simple and delayed AGC characteristics
7. PLL characteristics and FM demodulation using PLL
8. Spectrum Analysis of AM and FM signals
9. Frequency Division Multiplexing – Verification
10. Sampling Theorem Verification
11. PAM Generation and Detection
12. Pulse Position Modulation & Demodulation

1	2	3	4	5	6	7	8	9	10	11	12
					M				H	M	M

Syllabus for B. Tech (E.C.E.) II Year II semester

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
II-II	7C494	TECHNICAL SEMINAR IV	-	-	2	1

Course Objective :

Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.

Course Outcomes: After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

Mapping of Course Outcomes with Program Outcomes

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

Procedure

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

Distribution of marks

There shall be a Technical Paper writing and seminar evaluated for 100 marks in First Year First Semester. The evaluation is purely internal and will be conducted as follows:

Literature survey, topic and Content	: 10 marks
Presentation including PPT	: 15 marks
Seminar Notes	: 10 marks
Interaction	: 5 marks
Report	: 10 marks
Attendance in the seminar class	: 10 marks
Punctuality in giving seminar as per schedule time and date	: 10 marks
Mid semester viva (on the seminar topics completed up to the end of 9th week	: 10 marks
End semester Viva	: 20 marks
Total	100 marks

1	2	3	4	5	6	7	8	9	10	11	12
					M				M	M	M

Syllabus for B. Tech (E.C.E.) II Year II semester

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
II-II	7C496	COMPREHENSIVE VIVA-VOCE-I	-	-	-	1

Course Objectives:

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcomes :

At the end of this course, the student will be able to

1. Comprehend the concepts in the core and elective courses.
2. Exhibit technical knowledge to face interviews.
3. Exhibit lifelong Learning skills for higher education and to pursue Professional practice.

Mapping of Course Outcomes with Program Outcomes

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

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external evaluation.

Internal:

Comprehensive Viva Voce is Conducted twice in a semester and evaluated for 15 marks each.

End examination : 70 Marks.

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

1	2	3	4	5	6	7	8	9	10	11	12
M	M	M	M	H	M				H	M	L

Syllabus for B.Tech. II year II Semester

Syllabus for B. Tech (E.C.E.) II Year II semester

7C461 SUMMER INDUSTRY INTERNSHIP-I

Course Objective:

The students undergo industrial training so that he/she become industry-ready.

Course Outcomes:

At the end of the training, the student is able to

1. Select the real-time problem in the industry.
2. Analyze the requirements with respect to the problem statement
3. Design the optimal solution for the problem.
4. Implement the solution using the apropriate modern tools.
5. Present and submit the report

Mapping of Course Outcomes with Program Outcomes

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

Student shall carryout the project in industry during summer vacation for 3-6 weeks. There is internal and external Evaluation. Internal Evaluation carries 25 marks and external Evaluation carries 75 marks, Total 100 marks. Evaluation is carried out in B.Tech III year I semester.

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	L							L

Syllabus for B. Tech (E.C.E.) III Year I semester						
Year/Sem	**Sub. Code**	**Subject Name**	**L**	**T**	**P/D**	**C**
III - I	**7CC08**	IC Applications	**3**	**-**	**-**	**3**

Course Objectives

- To maintain the right blend of theory and practice in analyzing and designing a wide variety of applications using IC 741 op-amps
- To acquaint the learners with a wide variety of Digital ICs families, and their applications in various digital circuits and systems.

Course Outcomes

After studying this course, the students will be able to

- Demonstrate the concepts of Differential Amplifier and Operational Amplifier and their characteristics.
- Design the basic circuits using Operational Amplifiers.
- Explore, design and analyze Filters, Timers, Voltage Controlled Oscillator and Phase Locked Loop.
- Demonstrate the design and analyze Oscillators, D/A Converters and A/D Converters, and IC regulators.
- Classify and characterize the TTL/ECL Logic Families.
- Explore the design of various logic gates using CMOS logic.

Mapping of Course Outcomes with Program Outcomes

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

UNIT – I

OPAMP & ITS CHARACTERISTICS

Differential Amplifiers and its Characteristics. Op-Amp Block Diagram, Ideal OP-AMP Characteristics, DC and AC Characteristics. 741 Op-Amp and its Features and Characteristics. Parameters Measurement: Offset Voltage and Current, Slew Rate and CMRR. Frequency Compensation.

UNIT – II

BASIC APPLICATIONS OF OP-AMPs

Adder/Subtractor, Difference Amplifier, Instrumentation Amplifier, Differentiator, Integrator, V/I & I/V Converters, Comparators, Multivibrators, Square and Triangular Waveform Generators, Clippers, Clampers, Peak Detector, S/H circuit.

UNIT – III

FILTERs, TIMERs & PLLs

Filters:Introduction, Butterworth Filters- First and Second Order Active Filters- LPF, HPF, BPF, BRF. Introduction to 555 Timer, Functional Block, 555 timers as Monostable and Astable Multivibrators and Applications, Schmitt Trigger. Voltage Controlled Oscillator (IC 566), Phase Locked Loop.

Applications: Design of visitors counter using 555 timer.

UNIT – IV

OSCILLATORS, D/A AND A/D CONVERTERS, IC REGULATORS

Oscillators: Introduction, Design and Analysis of Wein Bridge, RC Phase shift Oscillators using op-amp. D/A Converters: Introduction, Characteristic Parameters, R-2R Ladder, Weighted Resistor, Inverter R-2R type D/A Converter, A/D Converters: Introduction, Characteristic Parameters, Counter Type, Dual Slope, Successive Approximation and Flash types A/D Converters, IC REGULATORS: Three terminal voltage regulators 7805, 7809, 7912, IC 723.

UNIT – V

LOGIC FAMILIES

Classification of IC Logic Families, Multi emitter transistor logic. Standard TTL NAND & NOR Gate-Analysis & TTL Open Collector Outputs ,Tristate TTL. Unsaturated logic- ECL logic family ,ECL Inverter/Buffer, ECL NOR/OR logic. Electrical characteristics of logic gates.

UNIT – VI

MOS& CMOS LOGIC FAMILY

NMOS & PMOS logic- Logic gates implementation, Passive pull up & active pull up .CMOS logic family- Design of logic gates and Boolean functions. CMOS Open Drain and Tristate Outputs. Comparison of Various Logic Families. IC interfacing, TTL driving CMOS & CMOS driving TTL.

Applications: Design of 4x1 MUX using CMOS

Text Books

1. D. Roy Chowdhary, Linear Integrated Circuits , New Age Publications (P) Ltd, 2nd Edition, 2003.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, PHI,1987.
3. John F. Wakerly, Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005.

References

1. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits, McGraw Hill, 1988.
2. R.F. Coughlin & Fredrick Driscoll, Operational Amplifiers & Linear Integrated Circuits, PHI, 6th Edition.
3. K. Lal Kishore, Linear Integrated Circuit Application, Pearson Educations,2005.
4. Millman, Micro Electronics, McGraw Hill,1988.
5. C.G. Clayton, Operational Amplifiers, Butterworth & Company Publ. Ltd. Elsevier,1971.

1	2	3	4	5	6	7	8	9	10	11	12
M	M	H	M	H							M

Syllabus for B. Tech (E.C.E.) III Year I semester						
Year/Sem	**Sub. Code**	**Subject Name**	**L**	**T**	**P/D**	**C**
III - I	**7CC09**	**Digital Communications**	**3**	**-**	**-**	**3**

Prerequisites: *PTSP, SS, AC*

Course Objectives:

The objectives of this course are

- *To provide both the theory and practice of digital communication including signal design, modulation methods, demodulation methods and their performance evaluation.*
- *To make the learners understand concept and applications of various source coding to maximize the channel capacity and error control coding techniques for providing reliable communications.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Demonstrate the principle of converting analog signal to digital by using PCM, DM,ADM systems.*
CO2	*Explore baseband transmission and optimal reception of digital signals using different filters and M-ary Error Probabilities.*
CO3	*Design and compare ASK,PSK,FSK,DPSK,QPSK modulators and demodulators .*
CO4	*Demonstrate the concepts of information theory , source coding techniques ,channel capacity and can find channel capacity and coding efficiency.*
CO5	*Demonstrate encoding and decoding techniques of different channel coding techniques like ,block codes, cyclic codes, convolutional codes.*
CO6	*Explore the knowledge on different types of spread sprectrum modulation techniques,DSSS,FHSS,CDMA and PN sequence*.and OFDM

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

Unit-I:

ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS

Model of Digital Communication Systems, Advantages of Digital Communication Systems, Digital Representation of Analog signal.

PULSE CODE MODULATION: PCM Generation and Reconstruction, Quantization Noise, Non-uniform Quantization and Companding, DPCM, DM, Noise in DM, ADM.
Applications: Design of E-1 and T-1 carrier systems

Unit-II:
BASE BAND DIGITAL TRANSMISSION
Digital Signals and Systems, Digital PAM Signals, Transmission limitations, Eye Diagram, Power Spectra of Digital PAM signals, Spectral Shaping by Precoding, Noise and Errors, Binary Error Probabilities, Regenerative Repeaters, Optimum receiver, Matched Filtering.

Unit-III:
DIGITAL MODULATION TECHNIQUES
Introduction, Gram Schmidt Orthogonalization, BASK, ASK Modulator, Non-coherent and Coherent ASK Detector, BFSK, Bandwidth and Frequency spectrum of FSK, FSK Modulator, Non-coherent and Coherent FSK Detector, FSK Detection using PLL, BPSK, Coherent PSK Detection, QPSK, DPSK, Definition of BER, Calculation of error probability of BASK, BPSK, BFSK, QPSK, Comparison of Digital modulation systems, MSK.
Applications: Design of MODEM for voice transmission

Unit-IV:
INFORMATION THEORY
Information and entropy, Mutual information, Information rate.
SOURCE CODING: Introduction, Advantages, Shannon's theorem for Channel capacity, Huffman code, Shannon-Fano coding, bandwidth –S/N trade off.

Unit-V:
CHANNEL CODING
Linear Block Codes, Error detection and correction capabilities of Linear Block Codes, Hamming Code, Cyclic Codes: Encoding, syndrome calculation, Decoding, Convolution Codes: Encoding using State, tree and trellis diagrams, Decoding using Viterbi algorithm.

UNIT VI:
SPREAD SPECTRUM MODULATION
Use of Spread Spectrum, Spread spectrum techniques: DSSS and FHSS, PN-sequences: Generation and Characteristics, CDMA.

TEXT BOOKS:

1. B. P. Lathi, *Modern Analog and Digital Communication*, 3rd Ed., Oxford University Press
2. K. Sam Shanmugham, *Digital and Analog Communication Systems*, John Wiley & Sons
3. Simon Haykin, *Digital communications* -, John Wiley, 2005
4. H. Taub and D. Schilling, *Principles of Communication Systems* –, TMH, 2003
5. A. Bruce Carlson, & Paul B. Crilly, "*Communication Systems – An Introduction to Signals & Noise in Electrical Communication"*, McGraw-Hill International Edition, 5th Edition, 2010.

REFERENCES:

1. John Proakis, *Digital Communications* –, TMH, 1983.
2. Singh & Sapre, Communication *Systems Analog & Digital* –, TMH, 2004.
3. Sklar: *Digital Communication*, 2nd Ed., Pearson Education
4. "Digital Communications", J.S Chitode, Technical publication, Pune.

Syllabus for B. Tech (E.C.E.) III Year I semester						
Year/Sem	**Sub. Code**	**Subject Name**	**L**	**T**	**P/D**	**C**
III - I	**7DC05**	**Microprocessors and Microcontrollers**	**3**	**-**	**-**	**3**

a	b	c	d	e	f	G	h	i	j	k	l	M
x	x	x	x	x		X					x	X

Course objectives: To develop skills for programming and interfacing using 8086 Microprocessor and 8051 Microcontroller..

Course outcomes:

1. *Understand Architecture of 8086 and analyzing in single mode and in multi processor mode.*
2. *Understand instructions of 8086 and to write Assembly Language Programs*
3. *Interface I/0 devices with 8086*
4. *Understand Architecture of 8051 microcontroller.*
5. *Understand instructions of 8051 and to Interface I/0 devices with 8051*
6. *Understand the need advanced processors.*

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

UNIT - I

Architecture of 8086 Microprocessor: Memory segmentation, BIU and E.U General purpose registers. 8086 flag register and function of 8086 Flags. Pin diagram of 8086-Minimum mode and maximum mode of operation. Timing Diagram.

UNIT – II

Instruction set of 8086: Addressing modes of 8086. Assembly directives. Simple programs, procedures, and macros. Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation. Introduction to DOS and BIOS interrupts.
Applications: Design of an 8-bit Calculator

UNIT - III

Interfacing with 8086: Interfacing with RAMs, ROMs along with the explanation of timing diagrams. 8255 PPI – various modes of operation. Interfacing with key boards, ADCs, and DACs Stepper Motor .Interrupt structure of 8086. Vector interrupt table. Interrupt service routines. 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

Applications: Interfacing of a Temperature sensor with 8086

UNIT - IV

The 8051 Architecture: Architecture of 8051 Micro controller, Memory Organization. Special Function Registers. Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT – V

Instruction set of 8051: Programming the 8051, Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Simple programs. Programs based on SFRs on Timers ,Interrupts.

Applications of 8051: Interfacing 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs.

UNIT – VI

Introduction to ARM Processors: Harvard and Von Neumann architectures, CISC & RISC Architecture CPU Registers, CPU Operating Modes, The ARM 7 TDMI architecture-ARM organization and implementation-The ARM instruction set-The Thumb instruction set-Basic ARM assembly language programs

TEXT BOOKS :

1. Advanced microprocessor & Peripherals - A.K.Ray & K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
3. 8051 Microcontroller–Kenneth J. Ayala, Penram International/ Thomson, 3rd Edition, 2005.
4. The 8051 Microcontroller And Embedded Systems Using Assembly And C – Mazidi, Pearson Education India, 2nd edition, 2008. Jane W. S Liu, " Real Time Systems" Pearson Higher Education ,3rd Edition, 2000.
5. Steve Furber, ARM System on-chip Architecture, Addison Wesley

REFERENCES :

6. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd Edition.
7. 8051 Micro Controllers and Embedded Systems – Dr. Rajiv Kapadia, Jaico Publishers.

Syllabus for B. Tech (E.C.E.) III Year I semester						
Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III - I	7AC07	Control Systems	3	-	-	3

1	2	3	4	5	6	7	8	9	10	11	12
H	M										L

H: High M: Medium L: Low

Course Objective: Students learn about fundamental concepts of time and frequency domain analysis of a given system.

Course Outcomes: Students

1. Learn basic concepts of control systems.
2. Study about time response analysis.
3. Learn basic concepts of stability and root locus method.
4. Study about frequency response analysis.
5. Learn basic concepts stability analysis in frequency domain.
6. Learn fundamentals of state space analysis.

UNIT – I INTRODUCTION:

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems

Transfer function representation:

Transfer Function of Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II TIME RESPONSE ANALYSIS:

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, PID controllers.

UNIT – III STABILITY ANALYSIS IN S-DOMAIN:

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT – IV FREQUENCY RESPONSE ANALYSIS:

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT – V STABILITY ANALYSIS IN FREQUENCY DOMAIN:

Polar Plots-Nyquist Plots-Stability Analysis.

CLASSICAL CONTROL DESIGN TECHNIQUES: Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain.

UNIT – VI STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS:

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

TEXT BOOKS:

1. Automatic Control Systems 8th edition –B. C. Kuo 2003– John wiley and sons.
2. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

REFERENCES:

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems – N.K. Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. – NISE 3rd Edition – John wiley.
4. "Modeling & Control of Dynamic Systems" – Narciso F. Macia George J. Thaler, Thomson Publishers.

a	b	c	d	e	f	g	h	i	j	k	l
							x			x	

L	T	P/D	C
3	0	0	3

7ZC05 BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT

Course Objectives: To make the students understand the concepts and principles of Indian Banking Business, Insurance Business and Capital market business products and services, which facilitate them to understand the nature of market

UNIT I

INTRODUCTION TO BANKING BUSINESS: Introduction to financial system - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank. KYC norms, New Dimensions and products- E-Banking: Mobile-Banking, Net Banking, Digital Banking, Negotiable Instruments: Cheque system.

UNIT II

BANKING SYSTEMS AND ITS REGULATION: Banking Systems: Branch Banking, Unit Banking, Correspondent Banking, Group Banking, Deposit Banking, Mixed Banking and Investment Banking - Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA's, Functions of RBI, Role of RBI in regulating Indian Banking.

UNIT III

INTRODUCTION TO INSURANCE: Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance: Life insurance and its products, General Insurance and its variants.

UNIT IV

INSURANCE BUSINESS ENVIRONMENT: Procedure for issuing an insurance policy –Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

UNIT V

RISK MANAGEMENT: Introduction to Risk Management – meaning, classification of risks – Systematic Risk and Unsystematic Risk, Risk management process – Stages, Risk Management Approaches and Techniques.

UNIT VI

DERIVATIVES AS A RISK MANAGEMENT TOOL: Introduction to Financial Derivatives, Advantages of Derivatives - types of Derivative Contracts - Forwards, Futures, Options and Swaps - Differences among Forwards, Futures and Option Contracts.

ESSENTIAL READINGS:

- Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.

- General Principles of Insurance Harding and Evantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.

SUGGESTED READINGS:

- Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
- Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
- G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.
- Gulati: Principles of Insurance Management, Excel, 2009.
- James S Trieschmann, Robert E. Hoyt & David N. Sommer: Risk Mgt. & Insurance, Cengage, 2009.
- Dorfman: Introduction to Risk Management and Insurance, 8/e, Pearson, 2009.
- P.K. Gupta: Insurance and Risk Management, Himalaya, 2009.
- Vivek & P.N. Asthana: Financial Risk Management, Himalaya, 2009.
- Jyotsna Sethi & Nishwan Bhatia : Elements of Banking and Insurance, 2/e,PHI, 2012.

JAVA PROGRAMMING (7EC65)

Course Objective:

Understand the concepts of Object oriented programming of Java. Write the programs and execute using OOP principles such as garbage collection, overloading methods, constructors, recursion, string handling, StringTokenizer, inheritance and its types, packages, multithreading and threads.

Course Outcomes:

At the end of this course, the student will be able to

1. Understand the concept of OOP as well as the purpose and usage of principles of inheritance, Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
2. Understand and implement concepts of polymorphism, encapsulation and method overloading.
3. Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments)
4. Students understand and implement error exception handling and multi-threading.
5. Understand the advantages of GUI over CUI and write GUI programs
6. Students learn to create GUI and write programs for event-handling using various user interface components on applets.

UNIT-I

History of Java, Java buzzwords, datatypes, variables, simple java program,scope and life time of variables,operators, expressions, control statements, type conversion and costing, arrays,, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, overloading methods and constructors, string handling, StringTokenizer.

UNIT-II

Inheritance –Definition ,single inheritance , benefits of inheritance, Member access rules, super class, polymorphism- method overriding, Dynamic method dispatch, using final with inheritance, abstract class, Base class object.

UNIT-III

Interfaces : definition, variables and methods in interfaces , differences between classes and interfaces, usage of implements and extends keyword, uses of interfaces.

Packages: Definition, types of packages, Creating and importing a user defined package.

Applications using interface

Applications using packages

UNIT-IV

Exception handling -exception definition, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating user defined exceptions.

Multi-Threading:-Thread definition, types of multitasking, uses of multitasking, thread life cycle, creating threads using Thread class and Runnable interface, synchronizing threads, daemon thread.

Applications of multithreading.

UNIT-V

Advantages of GUI over CUI ,The AWT class hierarchy, Component, Frame, user interface components-labels, button, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, menubar, graphics, layout, managers –boarder, grid, flow and card layouts.
Applications: developing calculator, developing feedback form, developing biodata.

UNIT-VI

Event handling: Delegation event model, closing a Frame, mouse and keyboard events, Adapter classes.
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.
Applications: Developing of simple advertisements.

TEXT BOOKS

1. Java; the complete reference, 6th editon, Herbert schildt, TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education.

REFERENCES

1. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, seventh Edition, Pearson Education.
2. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell,Seventh Edition, Pearson Education

a	b	c	d	e	f	g	h	i	j	k	l
				x		x				x	

L	T	P/D	C
3	0	0	3

7ZC22 BASICS OF ENTREPRENEURSHIP

Course Objective: The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up's

Course Outcomes:

1. The students' will acquire basic knowledge on Skills of Entrepreneurship.
2. The students' will understand the techniques of selecting the customers through the process of customer segmentation and Targeting
3. Business Models and their validity are understood by the students'.
4. The basic cost structure, Revenue Streams and the pricing strategies are understood by the students'.
5. The students' will acquire knowledge about the project management and its techniques.
6. The students' get exposure on marketing strategies and business regulations for the Start up.

Unit – I: Introduction to Entrepreneurship & Self Discovery: - Define Entrepreneurship, Entrepreneurship as a Career option, Find your Flow, Stock of Your Means, Characteristics, Qualities and Skills of Entrepreneurship, Effectuation, Principles of Effectuation, Life as an Entrepreneur, Stories of Successful Entrepreneurs.

Unit – II: Opportunity & Customer Analysis: - Identify your Entrepreneurial Style, Methods of finding and understanding Customer Problems, Run Problem Interview, Process of Design Thinking, Identify Potential Problems worth Solving, Customer Segmentation, Niche Marketing and Targeting, Craft your Values Proportions, Customer-driven Innovation.

Unit – III: Business Model & Validation: - Introduction to Business Models, Lean approach to Business Model Canvas, Blue and Red Ocean Strategies, the Problem-Solution Fit, Build your Solution Demo, Solution Interview Method, Identify Minimum Viable Product (MVP), Product-Market fit test.

Unit – IV: Economics & Financial Analysis: - Revenue Analysis, Identify different Revenue Streams and Costs Analysis – Startup Cost, Fixed Cost and Variable Cost, Break Even Analysis, Profit Analysis, Introduction to Pricing, different Pricing Strategies, Sources of Finance, Bootstrapping and Initial Financing, Practice pitching to Investors and Corporate.

Unit – V: Team Building & Project Management: - Leadership Styles, Shared Leadership Model, Team Building in Venture, Roles and Responsibilities of team in venture, Explore collaboration tools and techniques, Brainstorming, Introduction to Project Management, Project Life Cycle, Create a Project Plan.

Unit – VI: Marketing & Business Regulations: - Positioning, Positioning Strategies, Branding, Branding Strategies, Selecting and Measuring Channels , Customer Acquisition, Selling Process, Selling Skills, Sales Plans. Business regulations – List of Required Registrations, Compliance Check List, Business Structures and Legal Entities.

ESSENTIAL READINGS:

- Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.
- Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
- Alfred E. Osborne, Entrepreneur's Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.

SUGGESTED READINGS:

- Madhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.
- S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth And A key to Business Success, New Age International Publishers, First Edition, (formerly Wiley Eastern Limited), New Delhi, 2007.
- *https://www.wfglobal.org/*
- *https://www.learnwise.org/#/IN/en/home/login*,

L	T	P/D	C
3	0	0	3

7ZC25 INDIAN POLITY & ECONOMY

Course Objectives:
To provide basic knowledge relating to the Indian Polity and Economy, thus making the students appreciate the current aspects related to both polity and economy.

Course outcomes:
CO_1: Gain knowledge relating to the Indian Constitution and the Preamble to the Constitution.
CO_2: Gain knowledge relating to the fundamental rights and duties of the Indian citizens and the directive principles of state policy.
CO_3: Students will learn about the federal structure and judiciary of India.
CO4: Gain knowledge relating to Economics, various sectorial growth and National Income.
CO5: Students will learn about Indian Industrial policy and benefits of LPG to India
CO6: Comprehend knowledge relating to Fiscal policy & Taxation system in India

Unit I INTRODUCTION TO SALIENT FEATURES OF CONSTITUTION: Significance of the Constitution, Distinction between Written and Unwritten Constitution, Composition of the Constituent Assembly and the role and objectives of the Drafting Committee, Main features and the nature of the Constitution of India. Preamble to the Constitution and its relevance; Basic principles of Preamble and their reflection in the constitutional provisions.

Unit II FUNDAMENTAL RIGHTS, DUTIES AND DIRECTIVE PRINCIPLES OF STATE POLICY: Fundamental Rights and Duties of Citizens- Importance of Rights and Duties, Dignity of an individual, Safeguards against deprivation of life and personal liberty; Writs for the protection of Fundamental Rights; Meaning of Directive Principles of State Policy, Classification of the Directive Principles, Role of Directive Principles, Role of Directive Principles in the establishment of economic and social democracy.

Unit III GOVERNMENT AND JUDICIARY: Legislative, financial and judicial powers of the President; Appointment of Prime Minister and constitution of Council of Ministers; Powers and functions of Prime Minister; Individual and collective responsibility; Powers and discretionary powers of the Governor; Appointment of the Chief Minister, Formation of the Council of Ministers; Powers and jurisdiction of the Supreme Court and High Courts of India.

Unit IV INTRODUCTION TO ECONOMICS & NATIONAL INCOME: Definition, Economics and economy, back ground of economy, sectors of the economy, types of economy, growth of economy, primary moving force of Economic growth in India, mixed economy, Introduction to National Income & related aggregates : GNP, NNP,GDP&NDP.
Unit V INDUSTRIAL POLICY & LIBERALIZATION OF ECONOMY: Industrial policy in India, its objectives, Review of Industrial policies up to 1986, Industrial policy 1991 - causes of its implementation, benefits of Liberalization, privatization & Globalization to the Indian economy.
Unit VI FISCAL POLICY & TAXATION SYSTEM: Fiscal policy- Definition, objectives, importance, setbacks, recent fiscal policy of India, Reforms to strengthen the fiscal policy in India. Taxation system in India, methods of taxation, a good tax system, VAT, GST, Reforms in taxation.

ESSENTIAL READINGS:

- Indian Polity - M. Laxmikanth, 5th Edition, McGraw Hill Education, Chennai
- Environment And Ecology A Complete Guide for Civil Services Preliminary and Main Examinations – R. Rajgopalan, 2017, Oakbridge Publishing Pvt. Limited.
- Indian Economy, Datt & Mahajan, 70th Edition, Sultan Chand publishers.
- Latest Budget document by Ministry of Finance

SUGGESTED READINGS:

- Introduction to Constitution of India – Dr. Durga Das Basu, 22nd Edition, 2015, LexisNexis
- Our Constitution – Subhash C Kashyap, 5th Edition, 2015, National Book Trust, India
- Indian Economy, Misra & Puri, 33rd Edition, Himalaya publishing house

1	2	3	4	5	6	7	8	9	10	11	12
H	H	M	M	M				M			M

Syllabus for B. Tech (E.C.E.) III Year I semester						
Year/Sem	**Sub. Code**	**Subject Name (Open Elective-I)**	**L**	**T**	**P/D**	**C**
III - I	**7CC36**	**Fundamentals Of Signal Processing**	**3**	**-**	**-**	**3**

Course Objectives :

To study the concepts of signals and systems their characterization in the Time as well as frequency domains

COURSE OUTCOMES:

After studying this course, the students will be able to

i. *Understand the concepts of signals, comparison of signals, orthogonal signal space and the concepts of impulse, step.*
ii. *Apply the orthogonality properties to understand the Fourier methods of signal analysis- Fourier series and Fourier Transforms.*
iii. *Understand the concepts of systems, their characterization in the Time as well as Transformed domains.*
iv. *Understand and apply the mathematical tools, such as Convolution, Correlation and the Laplace transform, to analyze signals and systems.*
v. *Determine the sampling frequency for any low pass signals applying the sampling theorem.*
vi. *Distinguish between continuous and Discrete time signals and systems. Apply the concepts of Z-Transforms in the analysis of DT signals and systems.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I

Signals: Signals. Classification of Signals. Even, Odd, Periodic. Non-periodic. Energy and Power Signals. Exponential and Sinusoidal Signals. Concepts of Impulse Function. Unit Step Function.

Signal Analysis - Analogy between Vectors and Signals. Orthogonal Signal Space. Signal Approximation using Orthogonal Functions. Mean Square Error. Closed or Complete Set of Orthogonal Functions. Orthogonality in Complex Functions.

UNIT-II

Fourier Representation of Continuous Time Signals

Periodic Signals- Fourier Series, Dirichlet's Conditions, Trigonometric and Exponential Fourier series.

Non- Periodic Signals - Fourier Transforms. Fourier Transform of Arbitrary Signal. Standard Signals. Fourier Transform of Periodic Signals. Properties of Fourier Transforms. Fourier Transforms Involving Impulse and Signum Function Energy Density Spectrum, Parseval's Theorem. Introduction to Hilbert Transform.

UNIT-III

Signal Transmission through Linear Systems

Systems, Classification of Systems, Impulse Response (IR) of a Linear System, Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer Function of a LTI System, Distortion Less Transmission Through a System, Signal Bandwidth, System Bandwidth. Ideal LPF, HPF BPF and BSF Characteristics.

UNIT-IV

Convolution and Correlation of Signals

Concept of Convolution in Time Domain and Frequency Domain, Graphical Representation of Convolution, Convolution Properties, Cross Correlation and Auto Correlation of Functions, Properties of Correlation Function, Relation between Convolution and Correlation.

Laplace Transforms - Review of Laplace Transforms. Partial Fraction Expansion. Inverse Laplace Transform,Concept of Region of Convergence (ROC) for Laplace Transforms. Constraints on ROC for Various Classes of Signals. Properties of LT

UNIT-V

Sampling

Sampling Theorem, Graphical and Analytical Proof for Band Limited Signals. Impulse (Ideal) Sampling, Natural (Chopped) Sampling and Flat Top(S&H) Sampling, Reconstruction of Signal from its Samples, Effect of Under Sampling- Aliasing.

UNIT-VI

Z–Transforms

Fundamental Difference between Continuous and Discrete Time Signals, Discrete Time Signal Representation, Periodicity of Discrete Time Signal. Concept of Z- Transform of a Sequence. Distinction Between Laplace, Fourier and Z Transforms, Concept of Region of Convergence (ROC) for Z-Transform. Constraints on ROC for Various Classes of Signals. Inverse Z-Transform. Properties of Z-Transforms.

Text Books

1. Signals, Systems and Communications- B. P. Lathi, BSP.
2. Signal processing and Linear Syustems - B. P. Lathi, BSP.
3. Signals and Systems – A. Anand Kumar

References

1. Signals & Systems – Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2ndEdn.
3. Linear Systems and Signal Processing - B. P. Lathi, Oxford University Publications.

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	M							M

Syllabus for B.Tech(ME)

Fundamentals of digital circuits & Microprocessors

(Elective for Mechanical Engineering)

Code: 7CC37

L	T	P/D	C
3	-	-	3

Course objectives: To develop the skills for understanding the design of digital circuits, learn programming skills for 8086 Microprocessor and interfacing peripherals to it.

Course outcomes:

1. *To understand number systems and apply the rules of Boolean algebra to simplify Boolean expressions using theorems and K-maps.*
2. *To design combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters etc.*
3. *To design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers*
4. *To understand Architecture of 8086 and analyzing in single mode and in multi processor mode.*
5. *To understand instructions of 8086 and to write Assembly Language Programs*
6. *To interface I/0 devices with 8086.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT – I

Number System and Boolean Algebra: Binary, decimal, octal, hexa decimal, weighted and un-weighted codes. Axiomatic definition of Boolean algebra, Binary operators, postulates of and theorems. Boolean addition, subtraction, 1's complement, 2's complement. Switching functions, Canonical forms and Standard forms, Simplification of switching functions using theorems. K-map representation, simplification of logic functions using K-map.

UNIT - II

Combinational Logic Design: Single output and multiple output combinational logic circuit design, Binary adders/subtractors, Encoder, Decoder, Multiplexer, Demultiplexer, MUX realization of switching functions, Parity bit generator, Code-converters.

UNIT - III

Sequential circuits: Classification of sequential circuits, the clocked SR flip flop, J- K, T and D-types flip flops, triggering mechanism of flip-flops, flip-flop conversion. Applications of flip-flops: Ripple (Asynchronous) counters, synchronous counters, shift registers, ring counter.

UNIT - IV

Architecture of 8086 Microprocessor: Memory segmentation, BIU and E.U General Purpose registers, 8086 flag register and function of 8086 Flags, Pin diagram of 8086-Minimum mode and maximum mode of operation, Timing diagram.

UNIT – V

Instruction set of 8086: Addressing modes of 8086, Assembly directives, Simple programs, procedures, and macros. Assembly language programs: involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulations.

UNIT - VI

Interfacing with 8086: Interfacing with RAMs, ROMs, 8255 PPI – various modes of operation, Interfacing with key boards, ADCs and DACs Stepper Motor; Interrupt structure of 8086.

Text Books:

4. Morris Mano-,Digital design –PHI, 2nd Edition.
5. ZviKohavi and Niraj K Jha -Switching & Finite Automata theory – Cambridge, 3rd Edition.
6. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
7. Advanced microprocessor & Peripherals - A.K.Ray & K.M.Bhurchandi, TMH, 2000.

References:

6. Fletcher -An Engineering Approach to Digital Design – PHI.
7. Fundamentals of Logic Design, Roth, Kenny, Seventh Edition, Cengage Learning
8. R.P.Jain-Switching Theory and Logic Design- TMH Edition,2003.
9. CVS Rao -Switching Theory and Logic Design –Pearson Education, 2005
10. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd Edition.

III Year B.Tech – I Sem.

Code: 7AC47 **POWER ELECTRONIC DEVICES AND CONVERTORS**

(Open Elective – I)

L	T	P	C
3	0	-	3

UNIT – I - MODERN POWER SEMICONDUCTOR DEVICES:

Modern power semiconductor devices- MOS turn off Thyristor (MTO)-Emitter Turn off Thyristor (ETO) – Integrated Gate- Commutated Thyristor (IGCT) – MOS – controlled Thyristors (MCTs) – Static Induction Circuit – comparison of their features.

UNIT – II - PHASE CONTROLLED RECTIFIERS:

Principle of phase controlled converter operation, single phase full converters, dual converters, three phase full and semi converters, reactive power, power factor improvements – extinction angle control, symmetrical angle control and PWM control.

UNIT – III - DC-DC CONVERTERS:

Study of class – A, B, C, and D choppers, non – isolated DC-DC converters, buck boost, buck-boost converters under continuous and discontinuous conduction operation.

UNIT – IV – ISOLATED DC-DC CONVERTERS:

Isolated DC-DC converters forward, fly-back, push-pull, half-bridge and full –bridge converters Relationship between I / P and O/P voltages. Expression for filter inductor and capacitors.

UNIT – V - INVERTERS:

Single phase and three – phase inverters, 120^0 and 180^0 modes of operation, PWM techniques: single, multiple and sinusoidal PWM techniques, selective harmonic elimination, space vector modulation, current source inverter, multi- Current source inverter, techniques for reduction of harmonics.

UNIT –VI – MULTILEVEL INVERTERS:

Diode clamped multi level inverters, capacitors clamped multilevel inverters, cascaded H bridge inverter, SPWM, SVPWM and other modulation techniques, applications of multilevel inverters, techniques for reduction for harmonics.

TEXT BOOKS:

1. Power Electronics – Circuits, Devices & Applications: M.H.Rashid, PHI

2. Power Electronics: Converters, Applications: Ned Mohan, T.M. Undeland, William P.Robbins, John Wiley & Sons.

REFERENCES:

1. Switch Mode Power Supply Handbook: Keith H.Billing, MC Graw Hill International Edition 1996.

2. Switching Power supply Design: Abrahan L.Pressman, Mc.Graw Hill International Second Edition, 1996.

SMART MATERIALS

CODE: 7BC51

Course Objectives:

To provide the knowledge on principles of smart materials, their functions and applications.

Course Outcomes:

After studying this course the student will be able to:

1 Apply the knowledge for developing/producing sensors, devices based on the assimilated know-how of composites, ceramics, electro-magnetic materials, shape memory alloys, and their properties.
2 Develop/process new sensing and actuating smart devices based on the assimilated knowledge on the principles of phase transformations.
3 Evaluate shape memory materials, electro rheological fluids and develop newer applications.
4 Comprehend the principles of operation of optical fibers, actuators, and methods of analyses employed in smart materials.
5 To apply the principles for developing smart skins for aerospace and transportation vehicles.
6 To develop or process sensors and actuators for MEMS using shape memory alloys, PZT actuators.

UNIT - I

Introduction: Characteristics of composites and ceramics materials, Dynamics and controls, concepts, Electro-magnetic materials and shape memory alloys-processing and characteristics

UNIT - II

Sensing And Actuation: Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications, their compatibility conventional and advanced materials, signal processing, principles and characterization.

UNIT - III

Control Design: Design of shape memory alloys, Types of MR fluids, Characteristics and application, principles of MR fluid value designs, Magnetic circuit design, MR Dampers, Design issues.

UNIT - IV

Optics And Electromagnetic: Principles of optical fiber technology, characteristics of active and adaptive optical system and components, design and manufacturing principles.

UNIT - V

Structures: Principles of drag and turbulence control through smart skins, applications in environment such as aerospace and transportation vehicles, manufacturing, repair and maintainability aspects.

Controls: Principles of structural acoustic control, distributed, analog and digital feed back controls, Dimensional implications for structural control.

UNIT - VI

Principles Of Vibration And Modal Analysis: PZT Actuators, MEMS, Magnetic shape Memory Alloys, Characteristics and Applications.

Information Processing: Neural Network, Data Processing, Data Visualisation and Reliability – Principles and Application domains.

06 Hours

TEXT BOOKS:

1. **Analysis and Design',** A. V. Srinivasan, 'Smart Structures –Cambridge Universities Press, New York, 2001, (ISBN :
0521650267)

2. **'Smart Materials and Structures',** M V Gandhi and B S Thompson Chapmen & Hall, London, 1992 (ISBN : 0412370107)

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REFERENCE BOOKS:

1. **'Smart Materials and Structures',** Banks HT, RC Smith, Y Wang,Massow S A, Paris 1996

2. **G P Gibss'Adaptive Structres',** Clark R L, W R Saunolers, JhonWiles and Sons, New York, 1998

3. **An introduction for scientists and Engineers',** Esic Udd, OpticSensors : Jhon Wiley & Sons, New York, 1991 (ISBN :0471830070)

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-I	7H518	QUANTITATIVE ANALYSIS	1	1	-	2

a	b	c	d	e	f	g	h	i	j	k	l
x											

Course Outcomes: *Students will able to answer*

1. *The questions given on testing divisibility, prime number and questions of HCF and LCM .*
2. *The questions given on averages, percentage and profit and loss.*
3. *The questions given on ratio and proportion.*
4. *The questions given on simple and compound interest.*
5. *The questions given on time and work, time and distance.*
6. *The questions given on mensuration and data sufficiency.*

Syllabus

Unit I

Number System: Test for Divisibility, Test of prime number, Division and Remainder – HCF and LCM of Numbers - Fractions.

Unit II

Average: Average of different groups, Replacement of some of the items - Percentage - Profit and Loss.

Unit III

Ratio and Proportion: Properties of Ratio, Comparison of Ratios, Useful Simple Results on Proportion – Partnership and Share.

Unit IV

Simple Interest: Effect of change of P, R and T on Simple Interest - Compound Interest: Conversion Period, Difference between Compound Interest and Simple Interest.

Unit V

Time and Work- Pipes and Cisterns, Time and Distance- Problems on Trains- Boats and Streams, Allegation or Mixtures.

Unit VI

Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures.
Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

Text Books:

1. Quantitative Aptitude by R.S.Agarwal
2. Quantitative Aptitude by Abhijit Guha
3. Quantitative Aptitude for Competative Examinations, U.Mohan Rao, Scitech Publication.

Syllabus for B. Tech (E.C.E.) III Year I semester						
Year/Sem	**Sub. Code**	**Subject Name**	**L**	**T**	**P/D**	**C**
III - I	**7DC71**	**Microprocessors and Micro Controllers Lab**	**-**	**-**	**4**	**2**

Course Objectives:

The objective of this course is to develop the Assembly language programming skills and real-time applications of Microprocessor as well as microcontroller.

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Explore to write the Assembly Language Programs using Arithmetic instructions of 8086*
CO2	*Explore to write the Assembly Language Programs using String instructions of 8086*
CO3	*Explore to write the Assembly Language Programs for I/O interface with 8086*
CO4	*Explore to write the Assembly Language Programs using Arithmetic instructions of 8051*
CO5	*Explore to write the Assembly Language Programs using Timers and interrupts of 8051*

Mapping of Course Outcomes with Program Outcomes

	a (PO 1)	b (PO 2)	c (PO 3)	d (PO 4)	e (PO 5)	f (PO 6)	g (PO 7)	h (PO 8)	I (PO 9)	j (PO10)	k (PO10)	l (PO12)	m (PO13)
CO1		3	2		3								
CO2	2	2	3							2		2	
CO3		2	3						2				
CO4		2											3
CO5				2									3
Over all	**2**	**2**	**3**	**2**	**3**				**2**	2		2	3

Prerequisites: *STLD,LDICA*

Syllabus Content

Introduction to MASM/TASM, KIEL Assemblers

Familiarization with 8086, 8051 Kits

Cycle - I

8086 ALP using kit and MASM

1. Basic arithmetic and logical operations
2. Code conversion decimal arithmetic programs
3. String manipulation programs
4. Display a message on the screen of a computer using DOS / BIOS interrupts.

Cycle – II

Following peripherals and interfacing experiments to be implemented on 8086 and 8051 kits

1. A/D and D/A interfacing
2. Serial interfacing with PC
3. Keyboard and display interfacing
4. Stepper motor controller

Following simple programs may be given as lab assignment for students to executive at home by using 8086 emulator like EMU86 or MASM.

Write ALP and execute the program to

1. Find square of a number
2. Exchange two numbers
3. Find average of a given series of numbers
4. Add a constant to a series of values in memory & store the result back in memory
5. Find sum of cubes of a given series of numbers
6. Display squares of a given series of numbers in memory
7. Find factorial of a given number
8. Find largest number from a given series of numbers
9. Sort a series of given numbers in ascending order
10. Find whether the given number is even or odd number
11. Find sum of all even no.s from a given series of even and odd numbers
12. Find GCD of two given numbers
13. Find LCM of two given numbers
14. Display Fibonacci series
15. Reverse a String
16. Programs based on DOS/BIOS interrupts

Programs on 8051

1. Arithmatic Operations
2. Timers
3. Interrupts
4. Serial communication

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	L							L

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-I	7CC76	IC APPLICATIONS LAB	-	-	4	2

Prerequisites: EDC, ECA, STLD.

Course Objectives:

The objectives of this course are

- To Design and analyze the various circuits and systems using IC 741 op-amp.
- To Design and analyze the various circuits and systems using Digital ICs.

Course Outcomes: After studying this course, the students will be able to

- An ability to explore the applications of IC 741 OP-AMP.
- An ability to design Active filters and its applications
- An ability to understand and implement generate square and Triangular waveforms using 555 Timers
- An ability to design D to A converters and its applications

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

(IC Application Lab)

Design and testing of

1. OP AMP Modes(-ve feed back) – Inverting ,Non inverting, Differential amp, Unity gain.
2. OP AMP Applications – Adders, Subtractor.
3. OP AMP Applications – Comparator Circuits.
4. OP AMP Applications – clipper Circuits.
5. Square wave generator using OP AMP
6. Triangular wave generator using OP AMP
7. Active Filter Applications – LPF, HPF (first order)
8. Oscillators-RC phase shift , wein bridge.
9. IC 555 Timer – Monostable
10. IC 555 Timer -Astable .
11. 4 bit DAC using OP AMP.

12. IC 723 voltage regulator

1	2	3	4	5	6	7	8	9	10	11	12
M	M	H	M	H							M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-I	7C577	DIGITAL COMMUNICATIONS LAB	-	-	4	2

Prerequisites: *SS, PTSP, AC, BS Lab*

Course Objectives:

The objectives of this course are

- *To perform laboratory experiments on various digital modulation techniques and measure the performance parameters using both Hardware and MatLab.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand the Practical concepts of converting analog signal to digital signal by using PCM, DM, ADM circuits of Modulator and demodulator.*
CO2	*Design and analyze ASK, FSK, PSK, DPSK, QPSK modulators and demodulators. .*
CO3	*Design and Evaluate the performances of Linear Block code.*
CO4	*Understand the Practical concepts of Digital modulation techniques DPSK and QPSK.*
CO5	*Design of modulator and demodulator using MAT Lab Simulation Tool.*
CO6	*Design and implementation of Compander and Data Scrambler/Descrambler using Matlab.*

Mapping of Course Outcomes with Program Outcomes

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

Part A: LIST OF HARDWARE EXPERIMENTS (Any EIGHT)

1. Sampling Theorem, Time Division Multiplexing – Verification
2. PCM/DPCM
3. Delta Modulation/ Adaptive Delta Modulation.
4. Line Coding Techniques
5. Amplitude Shift Keying

6. Frequency Shift Keying
7. Phase Shift Keying
8. Differential Phase Shift Keying
9. Quadrature Phase Shift Keying

Part B: List of experiments to be simulated using MATLAB (Any FOUR)

1. μ-LAW Companding
2. DPCM Encoding and Decoding
3. Scrambling/Descramblng
4. Design of ASK, PSK, FSK. and QPSK MATLAB
5. Error Control Coding using Linear Block Codes

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-I	7C461	Summer Industry Internship – I	**-**	**-**	**-**	**1**

Course Objective:

The students undergo industrial training so that he/she become industry-ready.

Course Outcomes:

At the end of the training, the student is able to

6. Select the real-time problem in the industry.
7. Analyze the requirements with respect to the problem statement
8. Design the optimal solution for the problem.
9. Implement the solution using the appropriate modern tools.
10. Present and submit the report

Mapping of Course Outcomes with Program Outcomes

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

Student shall carryout the project in industry during summer vacation for 3-6 weeks. There is internal and external Evaluation. Internal Evaluation carries 30 marks and external Evaluation carries 70 marks, Total 100 marks. Evaluation is carried out in B.Tech III year I semester.

1	2	3	4	5	6	7	8	9	10	11	12
					M				H	M	M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-I	7C595	Technical Seminar - V	-	-	2	1

Learn basics of technical paper writing and enhance verbal and writing skills, which is useful for employabilty

Pre-Requisites: All Courses till this semester

Course Outcomes:

At the end of this course, the student will be able to

1. Identify a topic from the current technologies of their choice in the computer science domain and the allied fields, after surveying in the internet resources, journals and technical magazines in the library.
2. Arrange the contents of the presentation and also write the report of the research paper.
3. Present the technical topic in front of the panel and the fellow students, using the oratory skills and also submit the report of the research paper.
4. Interact through answering the questions and also can add some points to the seminar

Mapping of Course Outcomes with Program Outcomes

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

There shall be a Technical Paper writing and seminar evaluated for 100 marks in Third Year First Semester. The evaluation is purely internal and will be conducted as follows:

Content	: 20 marks
Presentation including PPT	: 20 marks
Seminar Notes	: 10 marks
Interaction	: 10 marks
Report	: 25 marks
Attendance	: 10 marks
Punctuality	: 5 marks
Total	100 marks

1	2	3	4	5	6	7	8	9	10	11	12
					M		M			L	

Syllabus for B. Tech. III Year I semester
Electronics and Communication Engineering

CYBER SECURITY

(Mandatory Course)

L	T	P	C
2	-	-	0

Code: 7FC20

Prerequisite : Nil

Course Objectives:

- To familiarize with network security, network security threats, security services, and countermeasures.
- To be aware of computer security and Internet security.
- To study the defensive techniques against these attacks.
- To familiarize with cyber forensics.
- To be aware of cyber crime related to mobile and laptop etc.
- To acquire knowledge relating to Cyberspace laws and Cyber crimes.
- To understand ethical laws of computer for different countries, Offences under the Cyberspace and Internet in India.

Course Outcomes:

At the end of this course the student will be able to

1. The students will be able to understand cyber-attacks, types of cybercrimes.
2. Realize the importance of cyber security and various forms of cyber attacks and countermeasures.
3. Get familiar of cyber forensics.
4. Get familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet.
5. Cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
6. Elucidate the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008.

UNIT-I: Introduction to cyber Security

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc.,

UNIT-II: Cyber Forensics:

Introduction to cyber forensic, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT-III: Cybercrime: Mobile and Wireless Devices:
Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops and desktop.

UNIT-IV: Cyber Security: Organizational Implications:
Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.
Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT-V: Privacy Issues:
Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

UNIT-VI: Cyberspace and the Law & Miscellaneous provisions of IT Act.
Introduction to Cyber Security Regulations, International Law. The INDIAN Cyberspace, National Cyber Security Policy. Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threats.
Other offences under the Information Technology Act in India, The role of Electronic Evidence and miscellaneous provisions of the IT Act.2008.

Cybercrime: Examples and Mini-Cases
Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:
1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.
3. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2ndEdition, O' Reilly Media, 2006.
4. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, New Delhi, 2006.
5. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.
6. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007.
7. Cyber Laws and IT Protection, Harish Chander, PHI, 2013

III-II SUBJECTS

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	H							M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7CC10	Digital Signal Processing	3	-	-	3

Course objectives: To develop skills for analyzing and synthesizing algorithms and systems that process discrete time signals, with emphasis on realization and implementation.

Course outcomes:

1. *Distinguish between CT and DT signals and systems and understand the growing need of DSP and study the concepts of discrete time signals and systems.*
2. *Represent periodic DT signals as a Fourier series; non-periodic DT signals as a Fourier Transform and use a powerful mathematical tool called DFT.*
3. *Compute the Fourier Transform of DT signals using the FFT algorithms.*
4. *Realize a digital filter in several forms and structures for a given transfer function H(z).*
5. *Design of digital filters by several methods once the desired specifications are given & Distinguish b/w IIR and FIR filters;*
6. *Understand the need and implement the multirate sampling techniques.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I : INTRODUCTION:

Introduction to Digital Signal Processing: Discrete time signals & sequences, Periodicity, linear shift invariant systems, stability, and causality, Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems.

Applications: Contents form the foundation for DSP.

UNIT II : DISCRETE FOURIER TRANSFORM:

Discrete Fourier series representation of periodic sequences, Discrete-Time Fourier Transform(DTFT), Discrete Fourier transform (DFT): Properties of DFT, Relation between Z-transform and DFT,

Convolution: Linear and circular convolutions, Overlap add and Overlap save methods, Computation of DFT.
Applications: Analysis of DT signals-Periodic and Aperiodic.

UNIT III : FAST FOURIER TRANSFORMS:
Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.
Applications: Design of spectrally efficient system such as OFDM system.

UNIT IV : REALIZATION OF DIGITAL FILTERS:
Review of Z-transforms, Applications of Z–transforms, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.
Applications: Design of digital system function to meet the given specifications.

UNIT V: DIGITAL FILTERS:
ANALOG FILTER APPROXIMATIONS – Butterworth and Chebyshev Approximations.
IIR DIGITAL FILTERS: Design of IIR Digital filters from analog filters-Impulse Invariance, Step invariance and Bilinear Transformation methods, Design Examples, Analog-Digital transformations.
FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response, Design of FIR Digital Filters using Fourier series method, Windowing Techniques-Rectangular, Triangular, Hamming, Hanning and Bartlett's Windows, Steps in Kaiser windowing method, Frequency Sampling technique, Comparison of IIR and FIR filters.
Applications: Design of IIR/FIR digital filter conforming to given specifications.

UNIT VI: MULTIRATE DIGITAL SIGNAL PROCESSING:
Decimation, interpolation, sampling rate conversion. Introduction to DSP Processors.

Applications of Multirate Digital Signal processing: Design of digital filter banks and quadrature mirror filters etc.

TEXT BOOKS:

1. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
3. Digital Signal Processing: A Modern Introduction, Ashok Ambardar, 9th Indian Reprint, 2012, Cengage Learning.

REFERENCE BOOKS:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using MatLab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
5. Discrete Time Signal Processing – A.V.Oppenheim

1	2	3	4	5	6	7	8	9	10	11	12
H	M	M	M	M							M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7C611	VLSI Technology and Design	3	-	-	3

Prerequisites: *EDC,STLD, LDICA*

Course Objectives*:*

The objectives of this course is to provide the students an in-depth knowledge on various aspects of VLSI circuits and their design including testing.

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand the existing device technologies and IC fabrication process*
CO2	*Explore and analyze the electrical properties of the devices of CMMOS device.*
CO3	*Design basic logic gates, combinational and sequential circuits using CMOS logic.*
CO4	*Analyze the effects of parasitic on IC power and performance.*
CO5	*Design memory cells and basic data path units.*
CO6	*Explore the need for testing and design verification of VLSI circuits.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

UNIT I

INTRODUCTION TO MOS TECHNOLOGIES: MOS, PMOS, NMOS, CMOS & BiCMOS

INTRODUCTION TO IC TECHNOLOGY AND FABRICATION PROCESS: VLSI Design Flow, Oxidation, Lithography, Diffusion, Ion Implantation, Metallisation, Encapsulation, Probe testing, Integrated Resistors and Capacitors [T1-CH1, 2 & 3].

Application – CMOS IC Manufacturing

UNIT II

BASIC ELECTRICAL PROPERTIES: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of Merit (ω_o), Zpu/Zpd, Latch-Up in CMOS, Pass Transistors [T1-CH2]

INVERTERS: NMOS Inverter, Various Pull-Ups, CMOS Inverter Analysis and Design, Bi-CMOS Inverters [T1-CH2]

UNIT III

CIRCUIT DESIGN PROCESSES: MOS Layers, Stick Diagrams, Lamda-based CMOS Design rules for Wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling. [T1-CH3]

GATES: CMOS Logic Gates and Structures, Switch logic, Layout Diagrams Gates [T1-CH5]
Application – IC Physical Design – NAND and NOR

UNIT IV

DELAYS: Sheet Resistance R_s and its concept to MOS, Area Capacitance Units, Calculations - C_g, τ-Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out [T1- CH4 & 5, T2-CH4]

Semiconductor Integrated circuit Design: PLD's, Introduction to CPLD's and FPGA's.

UNIT V

MEMORY AND SUBSYSTEM DESIGN: Latches and Registers [T2-CH7]**,** Clocking strategies (Single Phase) [T1-CH5.5], Memory cells (SRAM & DRAM), Adders, Shifter, Multipliers and ALUs [T1- CH8]

Applications – SRAM Based FPGAs and Multiply and Accumulate (MAC) Units

UNIT VI

INTRODUCTION TO CMOS TESTING: CMOS Testing, Need for testing, Test Principles, Design Strategies for Test, Chip level Test Techniques, System-level Test Techniques [T1-CH7]

Applications – Implementation of basic ATPG

TEXTBOOKS:

1. Basic VLSI Design –Douglas A. Pucknell, Kamran Eshraghian, PHI, 3rd Edition,2005.
2. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, Second Edition, 2009.

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REFERENCES:

1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
2. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
3. Digital Integrated Circuits: A Design Perspective - John M. Rabaey, 2/E, 2002
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
5. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.

1	2	3	4	5	6	7	8	9	10	11	12
	M	M	M								M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7C612	Internet of Things and Applications	3	-	-	3

Course Objectives: The student will learn about

1. *Terminology, technology and applications of IoT*
2. *Sensors and Actuators required to build an IoT system*
3. *Necessary Wireless Networks and protocols*
4. *Raspberry PI3 as a hardware platform for IoT sensor interfacing and*
5. *Various IoT application as case studies*

Course Outcomes: After completing this course, student shall be able to

1. *Build a simple IoT System for a given application*
2. *Describe and utilize necessary protocols for communication and management of an IoT system*
3. *Design, Develop and Illustrate IoT applications using Raspberry PI platform and Python Scripting*

Mapping of Course Outcomes with Program Outcomes

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

Unit – 1- Introduction to IoT

Part A - Introduction

IoT terms and basic definitions, IoT vs M2M, Characteristics of IoT, IoT Eco-System, IoT applications and marketplace and IoT Reference Model

Part B – Sensor and Actuators

Introduction to transducers, sensors and actuators, Sensor – classification and types, Actuators – Classification and types.

Unit 2–Embedded Platform for IoT – Rpi 3

Embedded Platform brief introduction - Ardiuno, Raspberry Pi 3 and Intel Galileo

RPI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Unit 3 – IoT Wireless Networks

Introduction to WSN and its architecture – Network topologies, Issues, Challenges and Security, WSN Technologies and its application - WiFi, Bluetooth, Zigbee, LoRa.

Unit 4 – IoT Protocol
Characteristics and Architecture of MQTT, XMP, DDS, AMQP, COAP and REST and their comparison

Unit 5 - IoT Design Methodology
Process and requirement, Level Specification, Domain model and service specification, IoT application Development

Unit 6: Case Studies Illustrating IoT Application
Home Automation – Smart Lighting, Home intrusion detection, Cities – Smart parking, Environment – Weather monitoring system, Weather reporting bot, Air pollution monitoring, Forest fire detection, Agriculture – Smart irrigation,

Text Books

1. Internet of Things, Author(s): Srinivasa K.G. | Siddesh G.M. | HanumanthaRaju R, ISBN: 9789386858955, Cengage Publications, 2018
2. Internet of Things A Hands on Approach by ArshdeepBahga, Vijay Madisetti Publisher Universities Press. ISBN – 978 81 7371 954 7

Reference books

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7CC13	ANTENNAS AND WAVE PROPAGATIONS	3	-	-	3

Prerequisites: *EMTL*

Course Objectives:

The objectives of this course are

- *To study and learn various antennas, their working principle, arrays and radiation patterns of antennas.*
- *To understand various techniques involved in various antenna parameter measurements.*
- *To understand the radio wave propagation in the atmosphere*

Course Objectives*: After studying this course, the students will be able to*

CO1	*Learning the radiation mechanism of antenna and antenna parameters*
CO2	*Design and analyze wire antennas and antenna arrays*
CO3	*Evaluate knowledge on Horn, Parabolic and Lens antennas.*
CO4	*Analysis of Horizontal Polarized antennas, Helical antennas , Patch antennas etc.*
CO5	*Understand the propagation mechanisms of ground wave, sky wave and space wave concepts.*
CO6	*Analyse the concepts of sky wave propagation .*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

Unit-I:

FUNDAMENTAL PARAMETERS OF ANTENNAS

Review of Electromagnetic Theory: Vector Potential, Solution of Wave Equation, Retarded Case, Hertizian Dipole. Antenna Characteristics: Radiation Pattern, Beam Solid Angle, Directivity, Gain, Input Impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation Patterns, Equivalence of Impedances, Effective Aperture, Vector Effective Length, Antenna efficiency.

Unit-II:

LINEAR WIRE ANTENNAS AND ARRAYS

Wire Antennas: Short Dipole, Radiation Resistance and Directivity, Half Wave Dipole, Monopole, Small Loop Antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-Element Array, Uniform Array, BSA and EFA, EFA With increased Directivity. BSA with Non- uniform Amplitude Distributions and Binomial Arrays.

Unit-III:

APERTUREAND REFLECTOR ANTENNAS

Magnetic Current and its Fields, Uniqueness Theorem, Field Equivalence Principle, Duality Principle, Method Of Images, Pattern Properties, Slot Antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat Reflector, Corner Reflector, Common Curved Reflector Shapes, Lens Antenna.

Applications: Design of parabolic reflector for DTH.

Unit-IV:

Long Wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial Mode Helix, Normal Mode Helix, Biconical Antenna, Log Periodic Dipole Array, Spiral Antenna, Microstrip Patch Antennas. Antenna Measurements: Radiation Pattern Measurement, Gain and Directivity.

Applications: Design of a 3-element Yagi guda Antenna for given specifications

Unit-V:

Surface Wave Propagation-Modes of Wave Propagation-Surface Wave Propagation and Surface Wave Tilt-Plane Earth Reflection, Reflection and Refraction of Waves-Field Strength due to Ground Wave-Multi-Hop Transmission. Tropospheric and Space Wave Propagation

UNIT VI:

Ionospheric Propagation: Structure of Ionosphere-Measures of Ionosphere Propagation-Critical Frequency-Angle of Incidence-MUF And LUF ,Optimum Working Frequency-Skip Distance, Virtual Height , Refractive Index of The Ionosphere, Effect of the Earth Magnetic Field and Fading

TEXT BOOKS -

1. John D. Kraus and Ronald J. Marhefka, *Antennas for All Applications* –TMH, 3rd Edn., 2003.
2. E.C. Jordan and K.G. Balmain ,*Electromagnetic Waves and Radiating Systems* –, PHI, 2nd ed., 2000. .

REFERENCES –

1. C.A. Balanis, *Antenna Theory* - John Wiley & Sons, 2nd ed., 2001.
2. K.D. Prasad, *Antennas and Wave Propagation* –, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. E.V.D. Glazier and H.R.L. Lamont ,*Transmission and Propagation* –, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. F.E. Terman *Electronic and Radio Engineering* –, McGraw-Hill, 4th edition, 1955.
5. John D. Kraus, *Antennas* – McGraw-Hill, 2nd ed, 1988.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-I)	L	T	P/D	C
III-II	7C615	Digital Design Through Verilog	3	-	-	3

Prerequisites: *STLD, Programmaing concepts of any language*

Course Objectives:

The objectives of this course are

- *To introduce syntax, lexical conventions, data types and memory related to Verilog HDL.*
- *To design, test and implementation of thedigital hardware using various modeling styles.*
- *To design digital systems using FSM modeling.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand levels of design description, concurrency, simulation and synthesis.*
CO2	*Apply language constructs, data types, operators available in verilog HDL.*
CO3	*Design combinational logic and sequential logic in gate level modeling.*
CO4	*Explain Gate and Switch level modeling.*
CO5	*Use system tasks, functions and UDPs.*
CO6	*Demonstrate SM charts and realize digital design using SM charts.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

UNIT I

INTRODUCTION TO VERILOG HDL: Verilog HDL, Levels of Design Description, Concurrency, System Tasks, Simulation and Synthesis, Functional Verification.

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators. Verilog Module structure, Test bench module- Net types, Strengths and Contention Resolution, Delays.

UNIT-II

MODELING AT DATA FLOW LEVEL: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

BEHAVIORAL MODELING: Introduction, Initial Construct, Always Construct, Assignments with delays, Blocking and Non blocking Assignments - Examples, Wait construct, Multiple Always Blocks, Design at Behavioral Level constructs- Case statements, i*f* and i*f*-else, repeat, for loop, while loop, forever loop. Other constructs- assign-deassign, disable, force-release.

UNIT-III

GATE LEVEL MODELING: Introduction, Gate Primitives- Illustrative Examples, Tri-State Gates, Design of Basic Circuits using Instantiation of Gate Primitives- Half, Full and Parallel Adders, Decoders, Multiplexers. Design of Flip-flops with Gate Primitives.

SWITCH LEVEL MODELING: Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets-Examples.

UNIT-IV

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, User- Defined Primitives (UDP).

UNIT-V

COMPONENT TEST AND VERIFICATION: Test bench – combinational circuit testing, sequential circuit testing, test bench techniques, design verification, assertion verification.

UNIT-VI

DIGITAL SYSTEM DESIGN AND VERIFICATION: FSM Design (Moore and Mealy Machines) – Vending Machine design and verification , Derivation and Realization of Algorithmic State Machine Chart Design and Verification examples - Binary Multiplier, Dice game. Other design examples - RAM (Single &DualPort), UART Design.

Text Books

1. T.R. Padmanabhan and B. Bala Tripura Sundari, Design through Verilog HDL – WSE, 2004 IEEE Press.
2. Charles H Roth, Digital Systems Design using VHDL , Jr. Thomson Publications, 2004.
3. Samir Palnitkar, Verilog HDL , 2nd Edition, Pearson Education, 2009

References

1. Sunggu Lee, Advanced Digital Logic Design using Verilog, State machines and Synthesis for FPGAs, - Cengage Learning
2. Stephen. Brown and ZvonkoVranesic, Fundamentals of Logic Design with Verilog, TMH, 2005.
3. J. Bhaskar, A Verilog Primier, BSP, 2003.
4. Michael D. Ciletti, Advanced Digital Design with Verilog HDL, PHI, 2005.
5. Sunggu Lee, Digital Logic Design using Verilog, State machine and synthesis for FPGA, Cengage Learning, 2009.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-I)	L	T	P/D	C
III - II	7C616	Embedded C Programming	3	-	-	3

a	b	c	d	e	f	g	h	i	j	k	l	M
	X	X	X	X							X	X

Course Objectives:

The objectives of this course are

- *To provide basic knowledge in embedded system design using Embedded C.*
- *To make the learners understand concept and applications of Embedded C Programming in various fields including industrial automation..*

***Course Outcomes**: After studying this course, the students will be able to*

CO1	*Demonstrate the use of development software for a particular application and choosing appropriate OS.*
CO2	*Understanding and building basic embedded system using 8051.Understanding its design*
CO3	*Design of embedded systems and implementation of switch reading.*
CO4	*Demonstrate the concepts of OOP's theory inheritance and functions in embedded C to support modular programming.*
CO5	*Learning the need for realtime implementation in Embedded C..*
CO6	*Case study of 'Intruder Alarm" toachihve real time hands on.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

UNIT – I:

Programming Embedded Systems in C

Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions

UNIT – II:

Introducing the 8051 Microcontroller Family

Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements ,Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface, Power consumption ,Conclusions

UNIT – III:

Reading Switches

Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), The need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

UNIT – IV:

Adding Structure to the Code

Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

UNIT – V:

Meeting Real-Time Constraints

Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

UNIT – VI:

Case Study: Intruder Alarm System

Introduction, The software architecture, Key software components used in this example, running the program, the software, Conclusions

TEXT BOOKS:

1. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008

REFERENCE BOOKS:

1. PICmicro MCU C-An introduction to programming, The Microchip PIC in CCS C - Nigel Gardner

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-I)	L	T	P/D	C
III-II	7C617	DIGITAL IMAGE & VIDEO PROCESSING	3	-	-	3

a	B	C	d	E	f	g	h	i	j	k	M
x	X	X	x	X						x	

Prerequisites: *SS, DSP*

Course Outcomes*:* **After studying this course, the students will be able to**

1.Get the knowledge of the basic step in image processing system, Discrete cosine transforms and discrete wave let transforms.

2.Differentiate image enhancement methods ,different types of spatial domain and frequency domain methods.

3.Get the knowledge of point, line and edge detection, thresholding , Region based segmentation.

4.Differentiate different types of redundancies, lossy and lossy less image compression, different types of coding techniques.

5.Know the difference between analog video and digital video, different types of image formation and sampling of video signals

6.Study the different types of motion estimation techniques and application of motion estimation in video coding.

Mapping of Course Outcomes with Program Outcomes

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

UNIT I:

Introduction to Image Processing

Fundamentals of Image Processing and Image Transforms, Basic steps of Image Processing System Sampling and Quantization of an image – Basic relationship between pixels

Image Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Wavelet Transforms: Continuous Wavelet Transform, Discrete Wavelet Transforms.

UNIT II:

Image Enhancement

Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

UNIT III:

Image Segmentation & Compression

Image Segmentation concepts, Point, Line and Edge Detection, Thresholding and Region Based segmentation. Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding.

UNIT IV:

Basic steps of Video Processing

Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals and filtering operations.

UNIT V:

2-D Motion Estimation

Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Application of motion estimation in Video coding.

UNIT VI:

Three dimensional Motion Estimation & Waveform based coding

Feature based motion estimation, Direct Motion Estimation. **Block based transform coding**: over view, one dimensional unitary transform, two dimensional unitary transform, The discrete cosine transform, Bit allocation and transform coding gain , **Predictive Coding:** over view, optimal predictor design and predictive coding gain, Block based hybrid video coding.

TEXT BOOKS

1. Digital Image Processing – Gonzaleze and Woods, 3rd ed., Pearson.
2. Video processing and communication – Yao Wang, Joem Ostermann and Ya–quin Zhang.1st Ed., PHI.

REFERENCE BOOKS

1. Digital Video Processing – M. Tekalp, Prentice Hall International

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-I)	L	T	P/D	C
III-II	7CC18	CELLULAR AND MOBILE COMMUNICATIONS	3	-	-	3

Prerequisites: *DC*

Course Objectives*:*

The objectives of this course are

- *Be acquainted with the role of cellular and mobile communications in frequency management issues.*
- *Be acquainted with different interference factors influencing cellular and mobile communications.*
- *Be able to efficiently use the background behind developing different path loss and/or radio coverage in cellular environment*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand the working principle and limitations/advancements of conventional mobile telephone systems, cellular mobile systems and Advanced generations of cellular wireless systems*
CO2	*Analyze Frequency reuse concept and avoidance of Co-channel interference.*
CO3	*Explore the concepts of adjacent channel interference, its effects and avoidance mechanism.*
CO4	*Analyze signal reflections, path loss, propagation delay/loss, near and long distance propagation loss under different conditions, Merits of Lee model*
CO5	*Analyze frequency allocation of cellular systems*
CO6	*Demostrate the concept of handoff mechanism and dropped calls.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

UNIT I

INTRODUCTION TO CELLULAR MOBILE RADIO SYSTEMS:

Limitations of conventional mobile telephone systems, Significance of 800MHz,Basic cellular wireless systems; 1G,2G,2.5G,3G,4G,5G cellular wireless systems; Uniqueness of mobile radio environment –

Long term fading, factors influencing short term fading , parameters of mobile multi path fading- time dispersion parameters, coherence bandwidth, Doppler spread and coherence time, Types of small scale fading.

UNIT-II

FUNDAMENTALS OF CELLULAR RADIO SYSTEM DESIGN:

Concept of Frequency reuse, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, System capacity, Trunking and grade of service; Improving coverage and capacity in cellular system – cell splitting, sectoring, micro cell zone concept.

UNIT-III

CHANNEL INTERFERENCE:

Measurement of real time Co-Channel Interference, Design of antenna system, Antenna parameters and their effects; Diversity techniques- Space diversity, polarization diversity, Frequency diversity and Time Diversity. Non-co-channel interference-Adjacent channel Interference, near end and far end interference, cross talk, effect on coverage and Interference by power decrease, antenna height decrease, effect of cell site components, UHF TV interference

Applications: Design of a cellular systems using frequency reuse factor (k=19) for directional and Omni-directional antenna systems

UNIT-IV

CELL COVERAGE FOR SIGNAL AND TRAFFIC :

Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, path loss from a point to point prediction model in different conditions, merits-of-LEE-model.

UNIT-V

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:

Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

HANDOFF, DROPPED CALLS:

Handoff initiation, types of Handoff, delayed handoff, Advantages of handoffs, Power difference handoff, forced handoff, mobile assigned handoff and soft handoff, Intersystem handoff. Introduction to dropped call rates and their evaluation.

UNIT-VI

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme , TDMA, FDMA CDMA,WCDMA,SDMA,OFDM

TEXTBOOKS :

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES:

1. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

Year/Sem	Sub. Code	SUBJECT	L	T	P/D	C
III-II	7H619	LOGICAL REASONING	1	1	-	2

a	b	c	d	e	f	G	h	i	j	k	l	m
x												

Course Outcomes: *Students will able to answer*

1. *The questions given on series completion and analogy.*
2. *The questions given on odd one out in classification and coding and decoding.*
3. *The questions given on blood relations.*
4. *The questions given on directions and Arithmetical reasoning.*
5. *The questions given on Venn diagrams, cubes and dice. .*
6. *The questions given on clocks and calendar.*

Syllabus

Unit–I: Series Completion: Number Series, Alphabet Series, Alpha – Numeric Series.
Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous pair, Double Analogy, Word Analogy, and Number Analogy.

Unit–II: Classification / Odd One Out: Word Classification, Number Classification and Letter Classification. Coding – Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding.

Unit–III: Blood Relations, Deciphering Jumbled up Descriptions, Relation Puzzle – Direction sense test. Number, Ranking & Time Sequence Test –Mathematical Operations.

Unit –IV: Directions, Arithmetical Reasoning. Puzzle Test: Classification Type Questions, Seating Arrangements Comparison Type Questions, Sequential Order of Things, Selection Based on given conditions, Family – Based Puzzles, Jumbled Problems.

Unit –V: Assertions and Reason– Logical Venn Diagrams – Alpha Numeric Sequence Puzzle. Cubes and Dice – Analytical Reasoning .Logical Deduction: Logic, Statement – Arguments,

Unit – VI: Clocks & Calendar .Data Sufficiency and Syllogism.

Text Books:

1. Verbal and Non Verbal Reasoning by R.S.Agarwal.
2. Quantitative Aptitude and Reasoning, R.V.Praveen, Second Edition, PHI Learning Pvt. Ltd.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7CC78	DIGITAL SIGNAL PROCESSING LAB	-	-	4	2

Prerequisites: *SS,PTSP, Basic Simulation Lab*

Course Objectives*: After completing this course, the students will have demonstrated*

CO1	*To Understand the frequency response of a given systems*
CO2	*Design of FIR & Butterworth and chebyshev approximations and converting them to IIR filters*
CO3	*Transforming an analog filter to its digital equivalent*
CO4	*Sampling rate conversion Interpolation and decimation*
CO5	*An ability to use TMS320c6713 for different algorithms*

Mapping of Course Outcomes with Program Outcomes

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

Overall		3	3	3	3				2			3	3	3	3

Syllabus Content

Tools to be used: MATLAB, CC Studio, TMS320C6713

1. Impulse response of first order and second order systems.
2. Program to find frequency response of LP/HP filters (difference equation/ transfer function).
3. To find Circular convolution of given sequence with and without built in function.
4. To find the DFT/IDFT, FFT of given DT signals with and without built in functions.
5. To find Power Spectral Density of a sequence.
6. To implement IIR filter (LP/HP/BP)
   a) Butterworth filter
   b) Chebyshev Type-I and Type-II filters
7. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser Window
8. Down sampling and up sampling of given sequence by specified factor.
9. Conversion of Analog filter to Digital Filter.
   a) impulse invariant transformation
   b) bilinear transformation
10. Generation of DTMF signals
11. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.

The following experiments are to be implemented using CCS

1. Study the architecture of DSP chips-TMS 320C 5X/6X Instructions
2. To find Linear convolution of given sequence.
3. To find Circular convolution of given sequence
4. To find the DFT & FFT of given sequence
5. Generation of DTMF Signals
6. Implementation of Decimation Process & Interpolation Process.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7C679	VLSI Design Lab	-	-	4/2	1

a	b	c	d	e	f	g	h	i	j	k	l	M
	x	x	x			x		x		x	x	

Prerequisites: *EDC, STLD, LDICA*

Course Outcomes*: After studying this course, the students must have demonstrated*

CO1	*An ability to use VLSI CAD Tools (NGSPICE, Xilinx, and Cadence).*
CO2	*An ability to understand and implement digital logic gates and circuits using SPICE and Verilog HDL.*
CO3	*An ability to perform physical design- layouts using Cadence EDA Tool.*
CO4	*An ability to implement combinatorial and sequential designs on FPGA boards (SPARTAN 3) using Xilinx tools.*
CO5	*An ability to use VLSI CAD Tools (NGSPICE, Xilinx, and Cadence).*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

PART A

The following Experiments are to simulate the design in Xilinx Vivado2017.1 using Verilog HDL and implement it on Artix 7 FPGA.

1. Design of all Logic Gates.
2. Design of Adders(Half Adder,Full Adder,Parallel Adder).
3. Design of 3-8 Decoder.
4. Design of 8-3 Encoder.
5. Design of 8*1Multiplexer.
6. Design of 4*1 Demultiplexer.
7. Design of Flip-flops:D,SR,JK,T.
8. Design of 4-bit Comparator.

PART B

The following Experiments are to Design and Verify the Operation using Cadence Tool.

1. Design and Simulatethe CMOS Inverter.
2. Design and Simulate the CMOS AND Gate.
3. Design and Simulate the CMOS OR Gate.
4. Design and Simulate the CMOS NAND Gate.
5. Design and Simulate the CMOS NOR Gate.
6. Design and Simulate the CMOS Ex-OR Gate.
7. Design and Simulate the CMOS Ex-NORGate.
8. Design and Simulate the Layout diagram for CMOS Inverter using 180nm Technology.

Note: Any Six Experiments From Each Part.

Part-D Lab Project –

1. Hierarchical design and layout of MSI circuits (multiplexer, decoders, etc.)
2. FPGA based traffic light controller using Verilog HDL
3. FPGA based Beverage Vending Machine
4. FPGA based UART serial communication interface
5. Implement 8-bit 3-stage pipeline processor
6. Using SPICE Implement 6T SRAM memory with read and write logic

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7C680	Internet of Things and Applications Lab	-	-	4/2	1

Mapping of Course Outcomes with Program Outcomes

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

Sl. No.	Lab Experiment
1	Study and Configure Raspberry Pi 3 a) Installing Debian OS for Raspberry pi3 b) Flashing and Booting for the Rpi3 for the first time
2	Introduction to Linux Environment – Practice Linux commands and simple python programs on Rpi3 a) Write a Program for arithmetic operation in Python. b) Write a Program for looping statement in Python. b) Programming and Interfacing GPIOS – Blink LEDStart/Stop with Switch
3	Weather monitoring with DHT11 and data storage on cloud (ThingSpeak)
4	Write a program to store senor data in Rpi3 by creating database system.
5	Write a program to send sensor data to Cloud using Node Red service to perform Data Analytics using Rpi3
6	a) Interface and recording pictures and videos using Rpi3 b) Simple program for Colour object detector and tracker
7	Smart Home Application – Security System - Write a program to detect intruder with proximity sensor,record pictures and send alerts
8	Smart City Application – Street lighting System - Write a program to control street lights based on the ambience lighting
9	a) Writing python Code to implement of MQTT protocol on Rpi3 – Publisher b) Writing python Code to implement of MQTT protocol on Rpi3 – Subscriber
10	Writing python Code to implement of MQTT protocol on Rpi3 with multiple Publisher and Subscriber
Internet of Things Students Lab Projects	

IoT Lab Kit Content

• Raspberry Pi 3 model B (Wireless, Bluetooth)
• Micro SD memory card 8 GB • SD memory card adapter
• DHT 11 Sensor • Resistor,
• LED • Switch • Breadboard • Connecting wires
• HDMI to VGA Cable • Power Adapter and Micro USB cable

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7HC74	**SOFT SKILLS AND TECHNICAL COMMUNICATION**		**-**	**2**	**1**

a	b	c	d	e	f	g	h	i	j	k	l
							x	x	x		x

Course Objectives

Enable students –

- **to analyze themselves and to practice the ways to overpower their weaknesses**
- **to enhance their soft skills and behavioral patterns**
- **to equip themselves with the skill of solving problems and taking effective decisions**
- **to build up conflicts and stress management skills**
- **to face interviews confidently and effectively**
- **to cultivate appropriate etiquette and manners to deal with personal and professional life**

UNIT-1: Know Yourself – SWOT / SWOC Analysis

1. Importance of Knowing Yourself
2. Benefits of SWOT/ SWOC analysis
3. How to go about SWOT analysis
4. SWOT/ SWOC analysis grid

UNIT-2: Soft Skills

1. Definition and importance of soft skills
2. Positive attitude
3. Goal setting
4. Team building and Leadership qualities

UNIT-3: 1. Problem Solving

2. **Decision Making**
3. **Time Management**

UNIT-4: Conflict Management

1. **Stress Management – IQ**
2. **Emotional Intelligence – EI**

UNIT-5: Interview Skills

1. Resume writing
   a. Types of Résumé
   b. Differences among Bio-data, Curriculum Vitaé and Résumé
   c. Purpose of Curriculum Vitaé and Resume
   e. Tips to write Curriculum Vitaé and Résumé
   f. The DOs and the DON'Ts of Résumé preparation
   g. Cover letter
2. Types of interviews (Face to Face / Panel Interviews, etc.)

3. Pre-interview preparation
4. Types of questions asked - FAQs
5. Mock Interviews

UNIT-6: Etiquette and Manners

Etiquette: Introduction

1. Classification of etiquette
2. Modern etiquette and social etiquette
3. Work etiquette and benefits of following work etiquette

Manners: Introduction:

1. Practicing good manners

Course Outcomes:

Students become skilled at-

- **identifying their strengths and weaknesses and realize the ways to overcome their weaknesses**
- **enhancing their soft skills and behavioral patterns**
- **solving problems and taking effective decisions**
- **managing the stress and conflicts**
- **facing interviews confidently and effectively**
- **cultivating appropriate etiquette and manners to deal with personal and professional life**

Suggested Reading:

1. Technical communication- *Meenakshi Raman and Sangeetha Sharma (Oxford Publications)*
2. Technical Writing Process and Product *by SharonJ Gerson:Fifth edition.Pearson Publishers.*
3. Developing Communication Skills – *Krishna Mohan and Meera Benarjee*
4. SOFT SKILLS – *Dr. K. Alex, S.Chand publications*
5. Advanced Technical communication - *Kavita Tyagi and Padma Mistri*
6. Developing Speaking-Listening Skills in English (With CD)
7. Basic Communication Skills For Technology- *Andrea J Rutherfoord- Pearson*
8. Developing Communication Skills- *Krishna Mohan- Macmillan*
9. Written Communication Skills- *Michael Hatton-iste*
10. Soft Skills Know Yourself And Know The World- *K Alex- S Chand*

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7C697	Comprehensive Viva-Voce-II	-	-	-	1

a	b	C	d	e	f	g	h	i	j	k	l	m
X	X										X	

Pre-Requisites: All Courses till this semester

On completion:

i. *Students are assessed on the courses they have undergone till the completion of that academic year.*
ii. *Students are required to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills.*

Mapping of Course Outcomes with Program Outcomes

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

There shall be a Comprehensive Viva-Voce in every II Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of an External Examiner, Head of the Department and two Senior Faculty members of the Department.

The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the B.Tech course of study till II-semester. The Comprehensive Viva-Voce is valued for 30 marks for internal and 70 marks for external by the Committee.

There are no internal marks for the Comprehensive Viva-Voce.

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-II	7C663	GROUP PROJECT	-	-	4	2

a	b	C	d	e	f	g	h	i	j	k	l	m
X	X	X	X	X				X	X	X		x

Pre-Requisites: All Courses till this semester

*After studying this course, the students will be able to***:**

i. use the concepts, in conceptualizing, designing and executing the modules of the projects.
ii. exhibit the interest in learning the modern tools and technologies.
iii. inculcate an enthusiasm to use the creative ideas to build the innovative projects
iv. improve communicative skills and team working skills

Mapping of Course Outcomes with Program Outcomes

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

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the teacher and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

There will be 75 marks in total with 25 marks of internal evaluation.

The **internal evaluation** shall consist of:

Day to day work	:	10 marks
Report	:	05 marks
Demonstration / presentation	:	10 marks
End examination	:	50 Marks.

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

IV-I SUBJECTS

Syllabus for B. Tech. IV Year I semester
Computer Science and Engineering
COMPUTER NETWORKS

Code: 7EC05

Course Objective:

1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols and functions of the various layers.

Course Outcomes:

At the end of this course, the student will be able to

1 Classify network topologies and apply the same to different networks with the knowledge acquired from the network reference models and fundamentals of computer networks
2 Illustrate the design issues of data link layer and detect the transmission errors and flow control problems
3 Categorize the Channel allocation issues, MAC protocols such as ALOHA, CSMA and CSMA/CD and MAC addresses with IEEE 802.X and wireless LAN.
4 Distinguish the knowledge of the several routing algorithms and Internetworking concepts.
5 Obtain and use the skills of subnetting and routing mechanisms
6 Distinguish the knowledge of the functions of transport and application layer

UNIT I

Introduction: Uses of Computer Networks, Types of networks: WAN, LAN, MAN, Network Topologies, Reference models: OSI, TCP/IP.

Physical Layer: Transmission media: magnetic media, twisted pair, coaxial cable, fiber optics, wireless transmission.

UNIT II

Data link layer: Design issues in data link layer: framing, flow control, error control, Error Detection and Correction: Parity, CRC checksum, Hamming code, Flow Control: Sliding Window Protocols, Applications: Data link layer protocols HDLC, PPP.

UNIT III

Medium Access sub layer: Channel allocation problem, MAC Protocols: ALOHA, CSMA, CSMA/CD, MAC addresses, IEEE 802.X, Standard Ethernet, Wireless LANS. Bridges, Types of Bridges.

UNIT IV

Network Layer: Design issues in Network Layer, Virtual circuit and Datagram subnets-Routing algorithm: Shortest path routing, Flooding, distance vector routing, Link state routing, Hierarchical routing, Broad casting, Multi casting, Routing for mobile hosts.

Internetworking: Concatenated Virtual Circuits, Connectionless internetworking, Tunneling, Internetwork routing, Fragmentation

UNIT V

Network layer in internet: IPv4, IP addresses, Sub netting, Super netting, NAT.Internet control protocols: ICMP, ARP, RARP, DHCP**.**

Congestion Control: Principles of Congestion, Congestion Prevention Policies.

Congestion Control in datagram Subnet: Choke packet, load shedding, jitter control.

Quality of Service: Leaky Bucket algorithm and token bucket algorithm.

UNIT VI

Transport Layer: Transport Services, Connection establishment, Connection release and TCP and UDP protocols.

Application Layer: Domain name system, FTP, HTTP, SMTP, WWW.

Textbook & Course Materials

Required Textbooks

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.
3. Data Communication and Networks-Bhushan Trivedi-OXFORD Publications.

Recommended Textbooks & Other Readings

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

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H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
IV-I	7C714	**Microwave and Optical Communications**	2	-	-	2

Prerequisites: *EMWTL, AWP*

Course Objectives:

The objectives of this course are

- *To have fundamental understanding of microwave components and circuits in terms of scattering parameters, electrical characteristics of waveguides and transmission lines through electromagnetic field analysis*
- *To expose the students to the basics of signal propagation through optical fibers, optical sources and detectors.*

Course Objectives*: After studying this course, the students will be able to*

CO1	*Distinguish microwave frequencies and analyze Rectangular and circular wave guides.*
CO2	*Formulate various passive components with the help of scattering matrix*
CO3	*Explore different linear beam tubes*
CO4	*Analyze Cross field tubes and slow wave structures.*
CO5	*Analyze the propagation of light in optical fibers and to characterize various optical sources.*
CO6	*Understand the principle of various Losses, Dispersion and to characterize various Optical Detectors.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT-I

Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – TE/TM mode analysis, Cut-off Frequencies, Dominant Modes, Mode Characteristics – Phase and Group Velocities, Wavelength and Impedance Relations; Dominant and evanescent modes; Power Transmission and Power Losses in Rectangular Wave Guide, Related Problems.

UNIT-II

Introduction to micro strip lines, losses, Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide irises, Tuning Screws and Posts. Matched Load, Waveguide Attenuators, Phase Shifters. Waveguide Multiport Junctions – E and H plane Tees, Magic Tee, Hybrid Ring; Directional Couplers. Scattering Matrix– Significance, Formulation and Properties, Directional Coupler, Magic Tee, Circulator and Isolator. Related Problems.
Ferrite Components: Ferrite Characteristics, Faraday rotation, Gyrator, Isolator, and Circulator

UNIT-III

Limitations and Losses of conventional tubes at microwave frequencies. Microwave tubes – O type and M type classifications. O-type tubes: 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process. O/P Power and Efficiency, Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Bunching process, Power Output, Efficiency Electronic Admittance; Oscillating Modes and o/p Characteristics, Related Problems.

UNIT-IV

Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Amplification Process (qualitative treatment), Suppression of Oscillations, Gain Considerations. four propagation constants.
M-TYPE TUBES: Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron operations and o/p characteristics. PI mode and its significance. – Hull Cut-off Condition.

UNIT-V

Introduction, Ray Theory Transmission, Total Internal Reflection, Acceptance Angle, Numerical Aperture, Skew Rays. Fibers- Modes, V Number, Mode Coupling, Step Index Fibers, Graded Index Fibers. Single Mode Fibers- Cut off Wavelength, Mode Field Diameter, Effective Refractive Index.
Optical Sources: Construction and working principles of LED and LASER diaodes.

UNIT-VI

Transmission Characteristics Of Optical Fiber -Attenuation - Material Losses absorption in silica glass fiber - Linear and Non Linear Scattering Losses - Intra and Inter-Modal Dispersion - All Over Fiber Dispersion - Optical fiber connectors, fiber alignment and Joint Losses - Fiber Splicer - Fiber Connectors - Expanded Beam Connectors - Fiber Couplers.
Optical Detectors: Physical principles of PIN and APD, Comparison of Photo detectors.

TEXT BOOKS

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition, 1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.
3. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
4. Micro Wave and Radar Engineering – M. Kulkarni, Umesh Publications, 1998

REFERENCES

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.

2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering, Raghuvanshi G.S. , 1st edition, Cengage Learning
4. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
5. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
6. Elements of Microwave Engineering – R. Chatterjee, Affiliated East-West Press Pvt. Ltd., New Delhi, 1988.
7. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002

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L	T	P/D	C
3	-	-	3

7ZC19 ENTREPRENEURSHIP, PROJECT MANAGEMENT AND STRUCTURED FINANCE

Course Objective: The objective of the course is to make students understand the nature of Entrepreneurship, its importance and to create an awareness regarding the systematic planning and implementation of projects; highlight the components of structured finance and establish a framework of CMBS with respect to Servicing Agreements

Course Outcomes:

1. Students will understand the nature of Entrepreneurship and its importance
2. Will gain knowledge regarding project, its life cycle and organization
3. Will gain knowledge relating to project formulation and implementation
4. Comprehend the components of structured finance
5. Establish a framework of CMBS
6. Students will gain knowledge relating to the CRE Servicing

UNIT I

CONCEPTS OF ENTREPRENEURSHIP: Definition of Entrepreneurship, Evolution of Entrepreneurship, Classification of Entrepreneurs**,** Characteristics of Entrepreneur**,** Selection of Product and the means required for starting an enterprise, Financing and Financial incentives available, Success rate of entrepreneurs – a case study.

UNIT-II

BASICS OF PROJECT MANAGEMENT: Concept and characteristics of a project - types of projects - Objectives of project management - Project Organizational structure - Project life cycle - Challenges and problems of project management - Qualities & functions of a project manager.

UNIT III

PROJECT FORMULATION AND IMPLEMENTATION: Generation of Project Ideas; Monitoring the environment; Preliminary Screening of Projects; Feasibility study; Project Selection. Detailed Project Report: Market, Technical, Financial and Economic aspects. Pre-requisites for Successful Project Implementation; Control of in-progress Projects (Gantt chart, PERT, CPM); Project Risk Management Process, Post-audit; Abandonment Analysis

UNIT-IV

INTRODUCTION TO STRUCTURED FINANCE: Term Loans, Bonds/Debentures, Types of debentures, Issue of debt instruments. Structured Finance: Evolution, Securitization process, characteristics, and structured finance products (ABS, CDO, MBS, CDS)

UNIT-V

COMMERCIAL MORTAGAGE LOAN BASICS: Definition and characteristics of CMBS, CMBS Vs other Mortgage Backed Securities, CMBS three level perspective: property level, loan level, bond level; Life cycle of commercial real estate loans – Loan cycle, Key players in loan cycle; Property types and characteristics, property performance.

UNIT-V1

BASICS OF CRE SERVICING: Introduction to servicing, Role of the Servicer, Servicing approaches, Influence of technology, Ethics in commercial servicing, Servicing – sources of income, Overview of servicing agreements, Pooling & Servicing agreement, Sub servicing agreement.

References:

- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- Jeffrey K. Pinto "Project Management", 2nd edition, Pearson
- Dhandapani Alagiri "Structured Finance – Concepts & Perspectives", ICFAI University press.
- Projects by Prasanna Chandra, McGraw-Hill Publishing Co. Ltd
- Project Management: Systems approach to Planning Scheduling and Controlling, H. Kerzner.
- The Complete Real Estate Documents by Mazyar M. Hedayat, John J. Oleary
- The Fundamentals of Listing and Selling Commercial Real Estate - By Keim K. Loren (Author)

DATABASE SYSTEMS

Code: 7FC23	L	T	P	C
	3	0	0	3

Course Outcomes:

- Students will learn basics of databases and understand the architecture of database management systems.
- Students will learn about good database design techniques and database theories behind.
- Understand conceptual database designs, and functional dependencies and normalization.
- Students will understand the Mathematical foundation for relational databases.
- Student will be able to understand concept of Constraints, Views and will be able to create dynamic databases.
- Learn transaction management, concurrency controls.

Unit – I Introduction to Databases and Transactions What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management

Unit- II Data Models The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

Unit-III Database Design ,ER-Diagram and Unified Modeling Language Database design and ER Model: Overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

Unit- IV Relational Algebra and Calculus Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

Unit- V Constraints, Views and SQL What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

Unit-VI Transaction management and Concurrency control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

TEXT BOOKS:

A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill , Rob, Coronel, "Database Systems", Seventh Edition, Cengage Le

a	b	c	d	e	f	g	h	i	j	k	l
				x		x				x	

L	T	P/D	C
2	1	0	2

7ZC30 ADVANCED ENTREPRENEURSHIP

Course Objective: The course is designed to impart the necessary managerial skills and tactics required for an emerging Entrepreneur for the Engineering students to enhance their prospects as an Entrepreneur.

Course Outcomes:

- The Students' gain knowledge on the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup.
- The Students are exposed to the various business models and critically evaluating the effectiveness of the business models and products
- The students understand the method of business traction, create roles and build their A- team
- The students understand the various channels of revenue building and exploration of new revenue avenues.
- The students understand the need of sales planning and people plan and also financial modeling
- The students are exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support startups

Unit – I: Fundamentals of Entrepreneurship & Refining Business Model and Product:

Fundamentals and key concepts of entrepreneurship, refining the business model, products and services, pivoting, types of business models, business model evolution, generating new business models, analyzing the business model, adding new customer segment, product manager, significance and role of product manager.

Unit – II: Business Planning & Exploring Revenue:

Business plan, sales plan, hiring sale team, people plan, financial planning, financial forecasting, create a procurement plan, negotiating role play, understanding primary revenue sources, exploring customer lifecycle for growth customers, exploring and identify secondary sources of revenue,

Unit- III: Funding the Growth & Building the A-Team:

Overview of funding, funding options for an entrepreneur, explore the right funding options, create funding plan, pitch deck, introduction to building A-Team, pitching to attract the talent, setting your team, defining roles, hiring the A-Team members.

Unit- IV: Brand and Channel Strategy & Leveraging Technologies:

Introduction to branding, drawn the venture's golden circle, positioning and positioning statements, creating brand name, logo, social media handle, Identify right channels, leaping ahead with technology, digital marketing for startups, plan a social media campaign, digital collaboration, store documents online, other technology platforms, make tech plan, platform wish list.

Unit V: Measuring Progress and Legal Matters:

Metrics for customer acquisition (CAC, CLV, and ARPU), metrics for customer retention and satisfaction, find CAC, CLV and ARPU, key financial metrics, communicate metrics, new revenue stream through key financial metrics, re-forecasting of financial plan, identify professional help for legal and compliance requirements, searching of trademark and brand name and company name.

Unit –VI: Seeking Support and Final Project:

Mentors help to create successful startups, identify mentors and advisors, importance of mentors and advisors, scout the board of directors, overview on final project, capstone project presentation, contents of capstone project.

ESSENTIAL READINGS:

- Entrepreneurship Rajeev Roy "" oxford ,2012
- Entrepreneurship Development Khanka, ,S. Chand 2012

SUGGESTED READINGS:

- Small Scale industries and Entrepreneurship Vasanth Desai "Himalya publishing 2012
- Robert Hisrich et al "enterpreneruship TMH 2012
- Entrepreneurship Development Khanka, ,S.Chand 2012
- Entrepreneurship Development B.Janikairam and M Rizwana
- e-source: - www.learnwise.org

a	b	c	d	e	F	g	h	i	j	k	L
								x	x	x	X

L	T	P/D	C
3	-	-	3

7ZC26 ECOLOGY AND DISASTER MANAGEMENT

Course Objectives:

To provide basic knowledge relating to the Ecology and Disaster Management, thus making the students appreciate the current aspects related to both Ecology and Disaster Management.

Course outcomes:

CO_1: Comprehend knowledge relating to the conservation of the environment.
CO_2: Learn about bio-diversity and climatic changes occurring in the environment.
CO_3: Know about the international treaties, conventions and organizations active in the field of environmental protection.
CO_4: To provide students an exposure to disasters, their significance and types.
CO_5: To enhance awareness of institutional processes in the country
CO_6: To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)

Unit I ECOLOGY AND ENVIRONMENT : Environment-Origin, Evolution of Environment and its uses by Humans; Degradation of Natural Environment, Principles of Ecology; Composition and various types of Ecosystem; International Solar Alliance.

Unit II BIO-DIVERSITY AND CLIMATE CHANGE: Classification of Biodiversity, Biodiversity loss, Methods of biodiversity conservation, Conservation of Natural Resources such as Soil, Land, Water and Energy. Sustainable Development and Cleaner Technology. Green house effect and Global Warming, Strategies to cope with Green House Effect, Desertification, Depletion of ozone layer.

Unit III INTERNATIONAL TREATIES, CONVENTIONS & ORGANIZATIONS: Indian Board for Wildlife (IBW). United Nations Environmental Programme (UNEP), United Nations Framework Convention for Climate Change (UNFCCC). International Union for conservation of Nature and National Resources (IUCN), World Wide Fund for Nature (WWF). Montreal Protocol (1987), Kyoto Protocol (1997), Paris Agreement (2016).

Unit IV: INTRODUCTION TO DISASTERS: Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks) Disasters – Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.). Differential impacts – in terms of caste, class, gender, age, location, disability

Unit V: DISASTER MANAGEMENT IN INDIA: Hazard and vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management; Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programs and legislation); Case studies.

Unit VI: APPROACHES TO DISASTER RISK REDUCTION: Disaster cycle – its Analysis, Phases. Culture of safety, prevention, mitigation and preparedness; Community-based DRR: Structural and nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions / Urban Local Bodies (PRIs / ULBs), district administration, states, centre, and other stakeholders; Case studies.

ESSENTIAL READINGS:

- Environment and Ecology – Anil Kumar De and Arnab Kumar De, 2009, New Age International (P) Limited.
- B. K. Khanna: "Disasters: All you wanted to know about", New India Publishing Agency, New Delhi
- Amita sinvhal ,"Understanding earthquake disasters"TMH,2010

SUGGESTED READINGS:

- ICSE Environment Education for Class X – Dr. M.P. Mishra , 2009, S.Chand and Company
- Pradeep sanhi,Madhavi malalgoda and arya bandhu,"Diasaster risk reduction in south asia "PHI

1	2	3	4	5	6	7	8	9	10	11	12
H											M

	Open Elective -II					
Year/Sem	**Sub. Code**	**Subject Name**	**L**	**T**	**P/D**	**C**
IV-I	7CC38	**Communications Theory**	**3**	**-**	**-**	**3**

Prerequisites: *PTSP, SS, AC*

Course Objectives:

The objectives of this course are

- *To provide both the theory and practice of digital communication including signal design, modulation methods, demodulation methods and their performance evaluation.*
- *To make the learners understand concept and applications of various source coding to maximize the channel capacity and error control coding techniques for providing reliable communications.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Demonstrate the principle of converting analog signal to digital by using PCM, DM,ADM systems.*
CO2	*Explore baseband transmission and optimal reception of digital signals using different filters and M-ary Error Probabilities.*
CO3	*Design and compare ASK,PSK,FSK,DPSK,QPSK modulators and demodulators .*
CO4	*Demonstrate the concepts of information theory , source coding techniques ,channel capacity and can find channel capacity and coding efficiency.*
CO5	*Demonstrate encoding and decoding techniques of different channel coding techniques like ,block codes, cyclic codes, convolutional codes.*
CO6	*Explore the knowledge on different types of spread sprectrum modulation techniques,DSSS,FHSS,CDMA and PN sequence*.and OFDM

Mapping of Course Outcomes with Program Outcomes

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

UNIT I

INTRODUCTION TO COMMUNICATION SYSTEM

Communication systems,, Analog and digital signals, Historical review of telecommunication, Channel effect, Noise in communication system, Internal noise and External noise, Introduction to modulation and detection, Need for modulation.

UNIT II

AMPLITUDE MODULATION

Amplitude Modulation- Generation of AM Waves: Square Law Modulator, Detection of AM Waves: Envelope Detector, Double sideband suppressed carrier and single sideband modulation, Generation and Detection of DSB-SC and SSB-SC signals, Comparison of AM techniques, Commercial Applications of AM.

UNIT-III

ANGLE MODULATION

Types of Angle Modulation, Frequency modulation-Narrowband FM and wideband FM, Time domain representation of FM and PM, Relationship between FM and PM signals, Generation of FM signals, Detection of FM signals , Comparison of FM & AM, Commercial Applications of FM,PM.

UNIT-IV

ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS

Model of Digital Communication Systems, Advantages of digital communication systems, Digital Representation of Analog signal, Sampling Theorem.

PULSE ANALOG MODULATION:

PAM generation and demodulation, PWM, PPM, Comparison of analog pulse modulations.

UNIT-V

PULSE CODE MODULATION:

PCM Generation and Reconstruction, Quantization Noise, Non uniform Quantization and Companding, DPCM, DM, Noise in DM, ADM.

UNIT-VI

DIGITAL MODULATION TECHNIQUES

Introduction, Amplitude Shift Keying, ASK transmitter and receiver, Frequency Shift Keying, FSK transmitter and receiver, Phase Shift Keying, BPSK, Coherent PSK Detection, DPSK,QPSK, Comparison of Digital modulation systems.

TEXT BOOKS:

1. B. P. Lathi, *Modern Analog and Digital Communication*, 3rd Ed., Oxford University Press
2. K. Sam Shanmugham, *Digital and Analog Communication Systems*, John Wiley & Sons
3. Simon Haykin, *Digital communications* -, John Wiley, 2005
4. H. Taub and D. Schilling, *Principles of Communication Systems* –, TMH, 2003
5. A. Bruce Carlson, & Paul B. Crilly, "*Communication Systems – An Introduction to Signals & Noise in Electrical Communication"*, McGraw-Hill International Edition, 5th Edition, 2010.

REFERENCES:

1. John Proakis, *Digital Communications* –, TMH, 1983.
2. Singh & Sapre, Communication *Systems Analog & Digital* –, TMH, 2004.
3. Sklar: *Digital Communication*, 2nd Ed., Pearson Education
4. "Digital Communications", J.S Chitode, Technical publication, Pune.

7AC44 FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION

L	T	P	C
3	-	-	3

a	b	c	d	e	f	g	h	i	j	k	l
	x	x	x					x			x

Course Objective:

The basic principles of all measuring instruments and in measurement of electrical and non-electrical parameters viz., Resistance, Inductance, Capacitance, voltage, current Power factor, Power, Energy, Strain, Temperature, Torque, Displacement etc. and the different types of electrical and non electrical transducers. It introduces the different signal analyzers and oscilloscopes.

Course Outcomes

The student should be able to

1. Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
2. Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.
3. Comprehends the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
4. Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
5. Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
6. Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.

UNIT-I MEASURING INSTRUMENTS- INSTRUMENT TRANSFORMERS:

Significance of Measurement, static characteristic of system- Linearity, Sensitivity, Precision, Accuracy - Classification - Deflecting, Control and Damping torques, Ammeters and Voltmeters, PMMC, Moving iron type instruments, Expression for the Deflecting torque and Control torque, Errors and Compensations, Extension of range using Shunts and Series resistance.

UNIT –II: INSTRUMENT TRANSFORMERS

Introduction, advantages, burden of instrument transformer, Current Transformer - errors in current transformer, Effect of secondary open circuit, Potential transformer- errors in potential transformer, Testing of current transformers with silsbee's method.

Power Factor Meters: Type of P.F. Meters, Dynamometer and Moving iron type, 1- ph and 3-ph meters.

UNIT –III MEASUREMENT OF POWER& ENERGY:

Single phase dynamometer wattmeter-LPF and UPF-Double element and three element dynamometer wattmeter, Expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced

systems, Single phase induction type energy meter, Driving and braking torques, Testing by phantom loading, Three phase energy meter .

UNIT - IV MEASUREMENT OF RESISTANCE - MAGNETIC MEASUREMENTS- A.C. BRIDGES:

Principle and operation of D.C. Crompton's potentiometer, Standardization, Measurement of unknown resistance, current, voltage. Method of measuring low- Medium and High resistance, sensitivity of Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, Measurement of high resistance, loss of charge method, Measurement of inductance, Quality Factor, Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle, Desauty Bridge, Wien's bridge, Schering Bridge.

UNIT-V DIGITAL VOLTMETERS- SIGNAL ANALYZERS- CRO:

Digital voltmeters, Successive approximation, Ramp, Dual slope integration continuous balance type, Wave Analyzers, Frequency selective analyzers, Heterodyne, Application of Wave analyzers, Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, Spectral displays, Q meter and RMS voltmeters . CRO- Cathode Ray Tube (CRT), Screens, Probes, Applications of CRO, Measurement of frequency and phase using CRO, Block diagram.

UNIT-VI MEASUREMENT OF NON-ELECTRICAL QUANTITIES:

Transducers - Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers, Principle operation of Resistor, Inductor, LVDT and Capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, Guage factor- Thermistors, Thermocouples, Piezo electric transducers, Photovoltaic, Photo conductive cells. Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque, Measurement of Temperature.

TEXT BOOKS:

1. Electrical Measurements and measuring Instruments – E.W. Golding and F.C. Widdis, 5th Edition, Wheeler Publishing.
2. Transducers and Instrumentation– D.V.S Murthy, Prentice Hall of India, 2nd Edition.
3. A course in Electrical and Electronic Measurements and Instrumentation -A.K. Sawhney, Dhanpatrai & Co. 18th Edition.

REFERENCE BOOKS:

1. Measurements Systems, Applications and Design – D O Doeblin- Tata MC Graw-Hill.
2. Principles of Measurement and Instrumentation – A.S Morris, Pearson /Prentice Hall of India.
3. Electronic Instrumentation- H.S.Kalsi Tata MC Graw – Hill Edition, 3rd Edition.
4. Modern Electronic Instrumentation and Measurement techniques – A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.

PRINCIPLES OF OPERATIONS RESEARCH

Code: 7BC53

Course Objectives:

The course aims at building capabilities in the students for analyzing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints.

Course Outcomes:

CO1: Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.

CO2: Recognize and Solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations

CO4: Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy

CO5: Analyze the performance measures of Queing system and Calculate the EOQ for minimizing the total inventory cost

CO6: Apply simulation techniques for solving various types of problems and general idea development about Markov chains

UNIT – I

INTRODUCTION: Definition, Characteristics and Phases and Types of models, applications.

LINEAR PROGRAMMING PROBLEM- Formulation – Graphical solution, Simplex method-Types of variables, Unique and Multiple optimal solution, Redundancy & Degeneracy in LPP, Unbounded solution, Artificial variables techniques - Big-M method with feasible and infeasible solutions, Two–phase method, Primal to Dual formation with Duality Principle.

UNIT – II

TRANSPORTATION PROBLEM – Formulation – methods of finding initial solution (NW corner, VAM, Least cost Method) Optimal solution (Stepping stone Method, MODI method) Special cases in TP: unbalanced, Degeneracy, Restriction and maximization case.

ASSIGNMENT PROBLEM – Formulation – Optimal solution (Hungarian Method) - Variants of Assignment Problem-Unbalanced, Restriction, Maximization, Airlines layover case, Traveling Salesman problem.

UNIT – III

SEQUENCING – Introduction – Terminology, Assumptions, Johnson's procedure- Processing n jobs through two machines – Processing n jobs through three machines – Processing two jobs through 'm' machines (Gantt Chart).

REPLACEMENT: Introduction – Types of failure, Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, Group replacement.

UNIT – IV

THEORY OF GAMES: Introduction and Terminologies, Criterion and optimal strategy – Solution of games with saddle points: Mixed Strategies-Rectangular games without saddle points, Dominance principle, Average Relational Dominance, m X 2 & 2 X n games -Graphical method and Sub Game Method, Matrix Method, Application of LPP in game theory.

UNIT – V

WAITING LINES: Introduction, Terminology, Structure of a queue, calling population characteristics - size, behavior, pattern of arrivals, Kendall-Lee notation, Queuing Models: Single Channel: Poisson

arrivals: exponential service times: with finite and infinite population, Multichannel: Poisson arrivals: exponential service times with infinite population

INVENTORY : Introduction, Inventory costs, Concept of EOQ, Single item Deterministic models with and without shortages, Single item inventory models with one price break and multiple price breaks, Stochastic models – Instantaneous demand and no set up cost.

UNIT – VI

SIMULATION: Definition – Types of simulation – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages

Markov chains: Introduction to Markov chains, Analysis Assumptions, Input output probabilities, Applications (Only basic understanding)

TEXT BOOKS:

1. Operations research / Hira & Gupta
2. Operation Research /J.K.Sharma/Macmillan Publishers.

REFERENCES:

1. Quantitative Techniques in Management: N D Vohra, TMH

Department of Mechanical Engineering
PRINCIPALS OF MANUFACTURING PROCESSES

Code: 7BC52

Course Objective:
The main objective of the course how manufacturers use technology to change raw materials into finished products, also introduce the basic concepts of casting, pattern preparation, gating system and knowledge on basic features of various welding and cutting processes, and also to study the concepts of press working process and their applications.

Course Outcomes:
After the end of the course the students should have an:

- Ability to understand the need for manufacturing processes and various material properties
- Ability to understand the principle of casting, Patterns used, Pattern allowance and Gating systems used in casting, and various casting methods
- Ability to understand the basic principle of welding and distinguish between various welding types and their applications
- Ability to understand the principles of metal working, various types of metal working techniques, Knowledge of hot working and cold working, Ability to understand the bulk deformation processes of rolling,
- Ability to understand the bulk deformation processes of extrusion and forging, their applications and forces involved in these operations
- Ability to understand and distinguish the various press working operations with respect to their applications, advantages and disadvantages, understand the various types of plastics and their processing techniques

UNIT – I
Introduction: Concept of Manufacturing processes, its importance, classification of manufacturing processes, Selection of a manufacturing process
Engineering Properties and their measurement: Strength, Hardness, ductility, Toughness

Unit-II
CASTING: Advantage of casting and its applications, Casting terms Sand casting procedure, Patterns – Definition- uses- Types of patterns – Materials used for patterns, pattern allowances, Principles of Gating & Risers, Cores-Definition-Need-Method of making,
Special casting processes: Centrifugal, Die, Investment - Principle and Applications

UNIT – III
Metal Fabrication Processes: Introduction, classification
Welding: Classification of welding process types of welded joints
Electric Arc welding: Principle of AC & DC welding, Electrodes, Applications,
Inert Gas welding: TIG & MIG, Principle and Applications, Resistance welding: Principle, Spot welding & Seam welding Friction welding, Thermit welding Explosive welding
Gas welding and Cutting: Principle, Oxy – Acetylene welding equipment and Technique Soldering & Brazing. Heat affected zones in welding; welding defects – causes and remedies

UNIT – IV

Metal forming Process: Nature of plastic deformation, Advantages of mechanical working processes, classification - Recovery, Recrystallization and Grain growth, Hot working and cold working- Characteristics and Differences

Rolling: Rolling fundamentals – Terminology of rolled products, theory of rolling, types of Rolling mills

UNIT - V

Forging: Forging operations,Smith forging, Drop Forging, Machine forging– forging defects.

EXTRUSION: Extrusion principle, Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion, Hydrostatic extrusion.

Wire drawing, Tube drawing and Swaging

UNIT- VI

Sheet Metal Operations: Press operations**, Shearing action**Stamping, forming and other cold working processes: Blanking and piercing, Bending and forming, coining & Embossing, spinning Stretch forming, Types of presses and press tools (Brief treatment)

Plastics: Processing methods: Blow moulding, Compression moulding and Injection moulding

TEXT BOOKS :

1. Manufacturing Technology / P.N. Rao/TMH
2. Production Technology /Sarma P C

REFERENCES :

1. Manufacturing Engineering and Technology/Kalpakjian S/ Pearson Edu.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-II)	L	T	P/D	C
IV-I	7C719	CMOS Digital IC Design	3	-	-	3

PRE-REQUISITES:

A Course on Digital IC Applications and VLSI Design

COURSE DESCRIPTION:

History and overview. Integrated Circuit (IC) technology developments. Design styles and characteristics of CMOS digital circuits.

COURSE OUTCOMES:

On successful completion of this course the students will be able to

CO1: Demonstrate advanced knowledge in the MOS Design

Static and dynamic characteristics of CMOS to design and to develop the Digital Integreated Circuits for different Applications. • The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

CO2: Analyze complex engineering problems critically in the domain of CMOSDigital Integrated Circuits for conducting research.

CO3: Solve engineering problems for feasible and optimal solutions in the corearea of CMOS Digital ICs.

CO4: Apply the CMOS Digital IC concepts for usage of modern CAD tools andtheir Limitations.

The student will be able to understand the MOS Design. • In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits. • Another main object of this course is to motivate the graduate studentsto design and to develop the Digital Integreated Circuits for different Applications.

Mapping of Course Outcomes with Program Outcomes

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

DETAILED SYLLABUS:

UNIT-I: MOS Design

History and overview. Integrated Circuit (IC) technology developments.

Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II: Combinational MOS Logic Circuits:

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate,Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOSgates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing withTransmission gates.

UNIT-III: Sequential MOS Logic Circuits

Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latchand edge triggered flip-flop.

UNIT-IV: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, DynamicCMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM celland refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NORflash and NAND flash.

UNIT VI: DESIGN METHODOLOGY AND TOOLS

Introduction, Structured Design Strategies, Design Methods, Design Flows,Design Economics, Data Sheets and Documentation.

TEXT BOOKS:

1. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

2. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, YusufLeblebici, TMH, 3rd Ed., 2011.

3. CMOS VLSI Design: A Circuits And Systems Perspective, 3/E Weste, Weste Neil H.E. Pearson Education India.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011

2. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey,AnanthaChandrakasan, BorivojeNikolic, 2nd Ed., PHI.

3. Eugene D Fabricus, "Introduction to VLSI Design, "McGraw Hill International Edition, 1990.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-II)	L	T	P/D	C
IV-I	7C720	Embedded Python Programming	3	-	-	3

A	b	C	d	e	f	g	h	i	j	k	l	m
	x	X	x	x				x	x		x	x

Course Outcomes:

CO1: Gains exposure towards Python versions and their specifications.
CO2: Build programs using primitive data types.
CO3: Construct and use data structures for various applications
CO4: Write applications that include functions, modules, packages along with respective exceptional handling mechanism.
CO5: Write applications using Files – access and mnipulate
CO6: Write applications using OO features of Python

Mapping of Course Outcomes with Program Outcomes

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

Unit -I:Introduction to Python

Why Pyhton, History, Features, Modes of Execution, Setting up path, working with Python Basic Syntax, Variable and Data Types, Operators. Conditional Statements (If, If-else, Nested if-else)

Unit-II: Control Statements I/O, and String

Control Statements: Looping (for, While Nested loops) Control Statements (Break, Continue, Pass).

Input-Output: Printing on screen, Reading data from keyboard

String Manipulation: String literals, Accessing Strings, Characters and Substrings in Strings, Basic Operations, String slices, Concatenation

Unit-III: Lists, Tuples and Dictionaries

Lists: Accessing list, Operations, Working with lists Function and Methods

Tuple: Accessing tuples, Operations, Working.

Dictionaries: Accessing values in dictionaries, working with dictionaries, Properties Functions and Methods.

Unit-IV:

File Handling: Introduction to Files, File I/O - Opening & Closing files, Accessing and manipulating Files - Read, Write and Append to files, data/time operations, Working with File Structure, Directories, HandlingDirectories

Unit-V: Functions and Modules

Functions: Function and Methods Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables

Modules: Importing module,Math module, Random module, Packages

Exception Handling: Exception, Exception Handling, Except clause

Unit-VI: Classes and Objects

Basics of Object-Oriented Analysis and Design, Structuring Classes with Inheritance and Polymorphism, Overloading Overriding, Datahiding.

Regular expressions: Match function, Search function, Matching VS Searching, Modifiers Patterns.

Familiarization with Python packages -JSON, XML, HTTPLib, URLLib, SMTPLib

TEXT BOOK:

1. [Beginning Python. From Novice to Professional, 2nd ed. - [Hetland] (2008)
2. Fundamentals of Python: First Programs, Kenneth A. Lambert, Cengage Publisher, ISBN-10: 1-111-82270-0 (2012)

Reference books:

1. Introduction to Computation and Programming using Python, Revised and Expanded Edition, John V. Guttag, The MIT Press.
2. Programming Python, Fourth Edition by Mark Lutz, O'Relly
3. Python Programming using problem solving approach, Reema Thareja, Oxford Higher Education.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-II)	L	T	P/D	C
IV-I	7C721	DSP Processors and Architectures	3	-	-	3

A	B	c	d	e	f	g	h	i	j	k	l	m
X	X	x	x									x

Course Objectives:

The objectives of this course are

- To study the architecture of Digital Signal Processors and Interfacing of processor to I/O devices

Course Outcomes: After studying this course, the students will be able to

CO1	Understand the concepts of DFT,FFT digital filters
CO2	Illustrate the concepts of Computational Accuracy in DSP Implementations
CO3	Explain the Architectures for Programmable DSP Devices:
CO4	Explain Programmable Digital Signal Processors
CO5	Distinguish Analog Devices Family of DSP Devices .
CO6	Illustrate Interfacing Memory and I/O Peripherals to Programmable DSP Devices

Mapping of Course Outcomes with Program Outcomes

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

UNIT I

Introduction to DSP Processors: Differences between DSP and other μp architectures, their comparison and need for special ASPs, RISC & CISC CPUs .

UNIT II

Overview of DSP processor design: fixed point DSPs– Architecture of TMS 320C 5X, C54X Processors , addressing modes, Assembly instructions, Pipelining and on-chip peripherals. Floating point DSPs: Architecture of TMS 320 – IX.

UNIT III

Data formats, F.P. operations, addressing modes, instructions, pipelining and peripherals.

UNIT IV

DSP interfacing & software development tools: I/O interfacing with A/D converters, PCs, Dual port RAMS, EPGAs,

UNIT V

DSP tools – Assembler, debugger, c-compiler, linker, editor, code composer studio.

UNIT VI

Applications using DSPs adaptive filtering, spectrum analysis, Echo cancellation modems, voice synthesis and recognition. Brief ideas of AD, Motorola DSP CPUs and their comparison with TI CPU S.

SUGGESTED READING:

1. C. Marren & G. Ewess, “A Simple Approach to Digital Signal Processing”, WILEY Inter-science, 1996.
2. K. Shin, “DSP Applications with TMS 320 Family”, Prentice Hall, 1987.
3. B. Ventakaramani, M. Bhaskar, “Digital Signal Processes, Architecture Processing and Applications”, Tata Mc Graw Hill, 2002.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-II)	L	T	P/D	C
IV-I	7CC22	Wireless Communications and Networks	3	-	-	3

A	b	c	d	e	f	g	h	i	j	k	l	m
		x	x	x	x	x		x	x	x	x	x

Prerequisites: *CMC*

Course objectives*:*

The objectives of this course are

- *To provide an overview of Wireless Communication networks area and its applications in communication engineering.*
- *To appreciate the contribution of Wireless Communication networks to overall technological growth.*
- *To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Explain wireless communication systems and Modern wireless communication systems with examples.*
CO2	*Characterise Multiple Access Techniques for Wireless Communication and calculate capacity of cellular systems.*
CO3	*Explain Traffic routing in wireless networks, Wireless data services, Common channel signaling.*
CO4	*Describe about Mobile IP And Wireless Access Protocol*
CO5	*Develop different Wireless LAN protocols*
CO6	*Define About Fundamentals Of 3G Services, Its Protocols And Applications.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

UNIT-I

Introduction to Wireless Communication Systems: Evolution of mobile radio communications, Examples of wireless communication systems, Paging systems, Cordless telephone systems, Comparison of various wireless systems.

Modern wireless communication systems: Second generation cellular networks, Third generation wireless networks, Wireless in local loop, Wireless LAN, Bluetooth and PAN.

UNIT- II

Multiple Access Techniques for Wireless Communication: Introduction to multiple access, FDMA, TDMA, Spread spectrum multiple access, Space division multiple access, Packet Radio, Capacity of cellular systems.

UNIT-III

Wireless Networking: Differences between wireless and fixed telephone networks, Development of wireless networks, Fixed network transmission hierarchy, Traffic routing in wireless networks, Wireless data services, Common channel signaling.

UNIT- IV

Mobile IP And Wireless Access Protocol: Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol WAP Architecture-overview, WML scripts, WAP service, WAP session protocol, Wireless transaction, Wireless datagram protocol.

UNIT- V

Wireless LAN: Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum - IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX, Introduction to OFDM, Blue tooth protocol Architecture.

UNIT- VI

Wireless WAN: Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP - High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture And Protocol.

TEXT BOOKS:

1. Theodore S. Rappaport, *"Wireless Communications and applications"*, Pearson Education -2003.
2. Kaveh Pahlavan, Prashant Krishna Murthy, *"Principles of Wireless networks",* Pearson Education, 2002.
3. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012. (Unit IV, V)
4. Vijay Garg , "Wireless Communications And Networking", First Edition, Elsevier 2007.(Unit VI)

REFERENCE BOOKS:

1. P.Nicopolitidis, M.S.Obaidat, G.I.Papadimitria, A.S. Pomportsis, "*Wireless Networks",* John wily & sons, 2003.

2. Dr. Sunil kumar, S.manvi, M.S.Kakkasageri, "*Wireless and Mobile Networks, Concepts and Protocols*", Wiley India, 2010.
3. Jon W.Mark and W.Zhqung , " *Wireless Communication and Networking* ", PHI, 2005.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	PROFESSIONAL ELECTIVE-II	L	T	P/D	C
IV-I	7C723	Digital Design and Verification with System Verilog	3	-	-	3

Course Description:

This course gives a student an in-depth introduction to the main SystemVerilog enhancements to the Verilog hardware description language (HDL), discusses the benefits of the new features, and demonstrates how design and verification can be more efficient and effective when using SystemVerilog constructs.

The course is broken down into two modules: The Design module examines improvements for RTL design and synthesis; the Verification module explores verification enhancements such as object-oriented design, assertions and randomization.

Prerequisites:

- A working knowledge of Verilog HDL
- The ability to navigate a file system and use a text editor
- A basic understanding of digital hardware design and verification

Course Outcomes

CO1	*Understand the UVM concepts*
CO2	*Explore the class instances and functions*
CO3	*Comprehend the UVM Configurations*
CO4	*Analyzing UVM sequences and Modeling in UVM*
CO5	*Developing Reusable Test benches using UVM and Analyzing the Case studies of Layered test bench for SPI, APB and AXI.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Contents:

Unit-1 : Introduction to Functional Verification: What is Verification?, What do we verify?, Verification Abstractions, Behavioral level, Transaction level, Functional / RTL level, Gate level, Transaction level; Importance of (Functional) Verification in Chip design life cycle, Verification goals; Overview of various Functional Verification techniques: Simulations, FPGA Prototyping, Emulation, HW/SW Co-verification, Formal Verification, Semiformal Verification, Models of Functional Verification. Black box, White box, Gray box, Verification Hierarchy: Chip-level, Cluster / Subsystem level, IP level, Module / Unit level.

Unit- 2 : Overview of SoC Architectures and Functional Verification Environment: What is an SoC ?, Advantages of SoCs over conventional ASICs?, Typical components of an SoCs, Sample SoC Architectures, Typical SoC based Testbench environment , Stimuli Generators, Hard coded, Direct Stimuli from the environment, Stimuli from the model of the environment (BFMs), Random Stimuli Generation; Predictors: Golden/Reference Model, More Abstract (Functional, Transaction Level), Hardwired response, Response database; Transactors, Monitors , Scoreboards , Coverage Collectors - Coverpoints, Property Checkers - Assertions.

Unit-3 :SystemVerilog Language Concepts: Evolution of SystemVerilog : Differences between Verilog and System Verilog HDL, New features added in System Verilog (New Data type additions, Arrays - Fixed, Packed, Dynamic, Queues, Associated, Structures & Unions, New Operators, New additions to Subroutines, New additions to Procedural statements & Control flow, Concurrency: Fork.join, Fork..join_any, Fork..join_none, Automatic Variables, Interfaces, Program block);

Unit-4 : Object Oriented Programming Concepts-I: Classes : Encapsulating properties & methods, Object memory creation, Working with Object handles, Object copying : Shallow and Deep copy, Object cloning, Object protection, Object variables Vs Class variables: Static keyword, Object Randomization, Randomization Seed - A deep look, Randomization variables, Constraint Block, Weighted Randomization, Controlling Randomization, Solve order, Inline Constraints - with constraints, Object Inheritance, Limitations of Inheritance, Polymorphism and Methods overriding ,

Unit-5: Object Oriented Programming Concepts-II: Virtual Interfaces, Inter thread Synchronization & Communication: Events, Semaphores, Mailboxes, Packages, Assertions, Immediate assertions, Procedural assertions, Temporal operators, Boolean operators, Sequences, Properties, Functional Coverage: Cover points & Bins, Covergroups, Cross coverage, Sampling coverpoints, Calculating functional coverage, Interfacing with C - DPI, Compiler Directives.

Unit-6 : Advanced Testbench Design using SystemVerilog: Introduction to Layered testbench, architecture, Driver, Monitor, Transactor, Generator, Configurations - Device, Transaction, Scoreboard, Reference models, Bus function models.

Textbooks:

1. SystemVerilog For Verification: A Guide to Learning the Testbench Language Features *by Chris Spear & Greg Tumbush (3rd Edition/5th Edition).*
2. A Practical Guide For SystemVerilog Assertions by Srikanth Vijayaraghavan & Meyyappan Ramanathan.

Reference Books:

1. A Practical Guide For SystemVerilog Assertions by Srikanth Vijayaraghavan & Meyyappan Ramanathan.
2. Logic Design and verification using System Verilog by Donald Thomas

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-III)	L	T	P/D	C
IV-I	7C724	Embedded System Design	3	-	-	3

a	b	c	d	e	f	g	h	i	j	k
X	X	X	X	X						

On completion of this course you should be able to:

1. Understand the basic architecture of Embedded System and their classification.
2. Explore the architecture of ARM processor.
3. Understand the addressing modes and data processing instructions of ARM processor.
4. Understand the ARM thumb instruction set and its capabilities.
5. Use both assembly and C language based ARM programming and Explore the memory management techniques in ARM.

Mapping of Course Outcomes with Program Outcomes

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

UNIT-I

Introduction to embedded system:

Embedded system architecture, classifications of embedded systems, challenges and design issues in embedded systems, fundamentals of embedded processor and microcontrollers, CISC vs. RISC, fundamentals of VonNeuman/Harvard architectures, types of microcontrollers, selection of microcontrollers.

UNIT –II:

ARM Architecture:

ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT –III:

ARM Programming Model – I:

Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT –IV:

ARM Programming Model – II:

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single - Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT –V:

ARM Programming:

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

UNIT –VI:

Memory Management:

Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

TEXT BOOKS:

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.

REFERENCE BOOKS:

Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-III)	L	T	P/D	C
IV-I	7C725	Artificial Neural Networks	3	-	-	3

A	B	c	d	e	f	G	h	i	j	k	l	m
X	X	x	x									x

Course Objectives:

The objectives of this course are

- *To study the concepts of Artificail intelligence and computer vision and also the applications of Neural networks*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand the concepts of Artificail Intelligence*
CO2	*Illustrate the concepts of Artificial Neural sysystem*
CO3	*L*lustrate *computer vision*
CO4	*Explain Probabilistic models and neural networks*
CO5	*Illustrate concept Neural language and Explain applications of Neural networks*

Mapping of Course Outcomes with Program Outcomes

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

UNIT - I

Artificial Intelligence: Definition, Study of AI techniques, problems and Problems space, AI characteristics, Heuristics. Problem solving Methods: Forward and backward reasoning, problem trees, problem graph, hill climbing, search method, problem reduction, constraint satisfaction, means and analysis, game playing, mini max algorithms, alphabetic heuristics.

UNIT - II:

Introduction:

Introduction to ANS (Artificial Neural systems) Technology, ANS simulation, Types of Neural Networks: Hopfield, perceptron and related models, Adaline and Madaline: Adaline and the Adaptive Linear Combiner, the Madaline and simulating the Adaline. Essential vector operations, Lateral Inhibition and Sensory Processing.

UNIT - III

Computer Vision:

Perception, early processing, representation and recognition of scenes, Guzman‟s algorithms of spurting objects in a scene, Waltz algorithm.

UNIT - IV:

Probabilistic Models, Fuzzy ARTMAP and Recurrent Networks:-Probabilistic Neural Networks, General Regression Neural Networks, Fuzzy ARTMAP, Recurrent Back propagation Neural Networks, Hybrid Learning Neural Networks:-Counter propagation Network, Radial basis Function Networks.

UNIT - V

Neural Language understanding problems, syntactic analysis, semantic analysis, augmented transition networks.

UNIT - VI

Application of Neural Networks:- Design and optimization of Systems: Non-Linear optimization, Inverse design

problems, Pattern Recognition Applications: Control Chart pattern Recognition, Recognition of Machine-Cells in a group technology layout. Complex pattern Recognition tasks: Pattern mapping, Temporal patters, pattern variability, Neocognitron, Addition of lateral inhibition and Feedback to the Neocognitron.

SUGGESTED READING:

1. Elaine Rich, Artificial Intelligence, Mc Graw Hill, 1985. 2. Nilson, Principles of Artificial Intelligence. 3. Winston, The Psychology of Computer.
2. Nilson, Principles of Artificial Intelligence. 3. Winston, The Psychology of Computer.
3. James A. Freeman and David M. Skapura,Neural Networks; Algorithms Applications and Programming Techniques, Pearson Education, India,2008.
4. James A. Anderson ,An introduction to Neural Networks ,PHI,2003.
5. B.Yegnanarayana,Artificial Neural Networks, PHI Publications India,2006.
6. M.Ananda Rao and J.Srinivas, Neural Networks: Algorithms and Applications, Narosa Publications 2009.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-III)	L	T	P/D	C
IV-I	7C726	Software defined radio	3	-	-	3

A	B	C	d	e	f	G	h	i	j	k	L	m
X	X	X	x	x								x

Prerequisites: Signals & Systems, Analog Communications, Digital Communications.

Course Objectives

1. This course describes the fundamental radio components and how these components are implemented in software.
2. The principles of software architecture to support the SDR will be developed. Policy and cooperation mechanisms that enable SDR to interoperate will be developed.
3. Basic principles of Cognitive Radio (CR) which is an extended form of SDR will be introduced.
4. In this course you will study SDR & CR and investigate their role in future communication systems.

Course Outcomes

Students who successfully complete this course will have

1. *An ability to make system-level decisions for software-defined radio technology and products*
2. *An ability to implement smart antenna algorithms*
3. *Knowledge of digital hardware architectures and understanding of development methods*
4. *An understanding of middleware in SDR*
5. *Understanding of analog RF components & Understand the basic principles of Cognitive Radio*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I

Introduction to SDR

What is a Software Radio? The need for Software Radios, Characteristics and benefits of a Software Radio, Design principles of Software Radio

UNIT-II

Radio frequency implementation issues

The purpose of the RF Front-End, Dynamic range: The principal challenge of receiver design. RF receiver front-end topologies, Enhanced flexibility of the RF Chain with Software Radios, Importance of the components to overall performance, Transmitter architectures and their Issues, noise and distortion in the RF Chain, ADC and DAC distortion

UNIT-III

Digital hardware choices

Key hardware elements, DSP Processors, Field Programmable Gate Arrays, Trade-offs in using DSPs, FPGAs and ASICs, Power management issues, Combination of DSPs, FPGAs, and ASICs.

UNIT-IV

Digital generation of signals

Comparison of direct digital synthesis with analog signal synthesis, Approaches to direct digital synthesis, Analysis of spurious signals, Spurious components due to periodic jitter, Band pass signal generation, Performance of direct digital synthesis systems, Hybrid DDS-PLL Systems, Applications of Direct Digital Synthesis, Generation of random sequences.

UNIT-V

Analog to digital and digital to analog conversion

Parameters of ideal data converters, Parameters of practical data converters, Techniques to improve data converter performance, Common ADC and DAC architectures

UNIT-VI

Introduction to Cognitive Radio

Motivation of Cognitive Radio, Dynamic Spectrum Access, User hierarchy in cognitive radio networks, Usage scenarios for cognitive radio, Cognitive Cycle, Spectrum Management: spectrum sensing, spectrum decision, spectrum mobility, spectrum sharing, Classification of spectrum sensing techniques..

Text Books:

1. J.H. Reed, '*Software-Radio, A Modern Approach to Radio Engineering* ', Prentice-Hall, 2002
2. Ezio Biglieri, Andrea. J. Goldsmith, Larry J. Greenstein, Narayan B. Mandayam,H. Vincent Poor, '*Principles of Cognitive Radio'*, Cambridge University Press.

References:

1. Joseph Mitola *'Software Radio Architecture: Object-Oriented Approaches to Wireless Systems Engineering*' Wiley-Interscience; 1st edition 2000
2. Yong Soo Cho,Jaekwon Kim, Won YoungYang, Chung G. Kang '*MIMO-OFDM Wireless Communications with MATLAB*' John Wiley & Sons (2010).
3. Mohamed Ibnkahla ' Cooperative Cognitive Radio Networks, The Complete Spectrum Cycle', CRC Press.

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
IV-I	7EC75	COMPUTER NETWORKS LAB	-	-	2	1

Course Objectives:

To provide an understanding of the design concepts of framing Error Detection & correction, Routing, Congestion concepts and Network tools.

Course Outcomes:

At the end of this course, the student will be able to

1. Implement and analyze framing methods of data link layer.
2. Implement and analyze framing methods of data link layer.
3. Illustrate and implement error detection & correction techniques.
4. Implement different Routing Algorithm.
5. Understand basic Network Commands.
6. Use of Wireshark and NS-2 tools

Computer Networks Lab Exercises:

1. Implement the data link layer framing methods such as

a) Character / Byte stuffing

b) Bit stuffing.

2. Implement on a data set of characters the three CRC polynomials

a) CRC 12

b) CRC 16

c) CRC CCITT.

3. Implement Hamming code for error detection and error correction

4. Implement Dijkstra's algorithm to compute the shortest path through a graph.

5. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table for each node using distance vector routing algorithm.

6. Implement Congestion control using Leaky-Bucket Algorithm

7. Execute the basic Networking Commands

i.	Arp	ii.	Hostname
iii.	ipconfig	iv.	ipconfig/all
v.	Ipconfig/renew	vi.	Ipconfig/release

Vii. Ipconfig/flushdns viii. Pathping

ix. Ping x. Route

xi. tracert

Beyond Syllabus

1. Installation of NS-2

2. Demonstration of NS-2

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
IV-I	7C781	ANTENNA SIMULATION LAB	-	-	2	1

Prerequisites:

AWP, EMTL

Course Objectives:

The objectives of this lab is

- *To perform laboratory experiments on designing of various antennas and measure the performance parameters.*

***Course Outcomes**: After studying this laboratory course, the students will be able to*

CO1	*Understand the design of dipole antenna for various frequencies.*
CO2	*Understand the design of monopole antenna for variation in radius of the wire*
CO3	*Design of Microstrip patch antenna in different shapes*
CO4	*Understand the design of standard horn antenna*
CO5	*Analyze the characteristics of yagi-uda antenna*
CO6	*Verify the radiation pattern of different types of antenna*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus content:

1. Dipole antenna
2. Dipole antenna with lambda variation
3. Monopole antenna
4. Monopole antenna with wire radius variation
5. Microstrip rectangular patch antenna
6. Microstrip circular patch antenna
7. Horn antenna
8. Yagi-uda antenna
9. Radiation pattern measurement of dipole antenna
10. Radiation pattern measurement of patch antenna
11. Radiation pattern measurement of yagi-uda antenna

12. Radiation pattern of broad side antenna array
13. Radiation pattern of End fire antenna array

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
IV-I	7C782	Micro Wave and Optical Communications Lab	-	-	2	1

a	b	c	d	e	f	g	h	i	j	k	l	m
	x	x	x	x	x	x		x		x	x	

Prerequisites: *MWOC*

Course Objectives:

The objective of this course is to provide the students an in-depth knowledge and practice about the microwave and optical components and in analyzing the microwave and optical equipments.

Course Objectives*: After studying this course, the students will be able to*

CO1	*Analyze the characteristics of RKO and GUNN diode*
CO2	*Understand the principles governing attenuation and working of DC*
CO3	*Measure the K, S, Z and f at microwave frequencies.*
CO4	*Analyse the design principles of circulator and magic Tee*
CO5	*Understand the basic characteristics of LED and LASER*
CO6	*Measure the DR,NA and Losses for Digital and Analog Links*

Mapping of Course Outcomes with Program Outcomes

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

Part – A (Any 8 Experiments)

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.

6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.

Part-B

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of NA

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
IV-I	7C764	Project -I	-	-	4	2

A	b	C	d	e	f	g	h	i	j	k	l	M
	x	X	x	x	x	x		x		x	x	

Course Objective

To enhance the knowledge on selecting a projcet , learn related tools and enhance programming and communication skills for employabilty.

Course Outcomes:

At the end of this course, the student will be able to

- Students identify vast application areas for mobile / wireless communication / computing.
- They also understand the working principle of GSM technology.
- Students understand various media access control methods that are meant for wireless communication, each methods' pros and cons
- Understand the issues in the Network layer in the wireless communication and identifying suitable solutions for the same
- Understand the issues in the Transport layer in the wireless communication and identifying suitable solutions for the same
- Understand MANETs with an example like Bluetooth technology.
- Understand Security Issues related to mobile computing and various solutions to mitigate the security problems.
- Prepare for the Project Phase_II

The evaluation is for 100 marks. It is internal evaluation only.

The committee consists of HOD, a Senior Faculty member and Internal Guide.

Mapping of Course Outcomes with Program Outcomes

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

Division of marks for internal assessment – 100 marks

- Progress of Project work and the corresponding interim report as evaluated by internal guides at the end of 5 weeks : 10 Marks
- Seminar at the end of 5 weeks : 10 Marks
- Progress of Project work as evaluated by guides at the end of 10 weeks : 10 Marks

- Seminar at the end of 10 weeks : 10 Marks
- Evaluation by the Guides (at the end of 15 weeks) : 20 Marks
- Project Report : 10 Marks
- Final presentation and defense of the project : 30 Marks

100 Marks

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
III-I	7C662	Summer Industry Internship – II	**-**	**-**	**-**	**1**

Course Objective:

The students undergo industrial training so that he/she become industry-ready.

Course Outcomes:

At the end of the training, the student is able to

1. Select the real-time problem in the industry.
2. Analyze the requirements with respect to the problem statement
3. Design the optimal solution for the problem.
4. Implement the solution using the appropriate modern tools.
5. Present and submit the report

Mapping of Course Outcomes with Program Outcomes

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

Student shall carryout the project in industry during summer vacation for 3-6 weeks. There is internal and external Evaluation. Internal Evaluation carries 30 marks and external Evaluation carries 70 marks, Total 100 marks. Evaluation is carried out in B.Tech IV year I semester (7^{th} Semester).

1	2	3	4	5	6	7	8	9	10	11	12
	M	M									

Syllabus for B. Tech. IV Year I semester
Electronics and Communication Engineering

ARTIFICIAL INTELLIGENCE

(Mandatory Course)

L	T	P	C
2	-	-	0

Code: 7EC20
Course objective:

To learn the distinction between optimal reasoning Vs. human like reasoning. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities. To learn different knowledge representation techniques. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

COURSE OUTCOMES:

At the end of this course the student will be able to

1. Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
2. Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
3. Learn different knowledge representation techniques.
4. Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and spacecomplexities.
5. Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.
6. Analyze Supervised Learning Vs. Learning DecisionTrees

UNIT - I

Introduction to AI, Intelligent Agents, Problem-Solving Agents, Searching for Solutions, Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT-II

Games, Optimal Decisions in Games, Alpha–Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT-III

Representation, Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution. **Knowledge Representation:** Ontological Engineering, Categories and Objects, Events.

UNIT-IV

Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT-V

Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The

Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

Unit-VI

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees.

TEXT BOOKS:

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCES:

1. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight(TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, PearsonEducation.
3. Artificial Intelligence, Shivani Goel, PearsonEducation.
4. Artificial Intelligence and Expert systems – Patterson, PearsonEducation.

IV-II SUBJECTS

a	b	c	d	e	f	g	h	i	j	k
x			x					x		

L	T	P/D	C
3	0	0	3

7ZC15 FINANCIAL INSTITUTIONS, MARKETS AND SERVICES

Course Objective: The objective of the course is to provide to students an understanding of Financial Markets, the major Institutions involved and the Services offered within this framework.

Course Outcomes:

1. 1.This unit enables the students to understand the financial structure and the financial sector reforms after 1991.
2. The unit gives the exposure on the role of RBI and the Regulating and credit policies adopted by the RBI.
3. The students get awareness on the role of Non-Banking financial institutions and the role of financial institutions in India.
4. The unit educates the students to know the role of regulatory bodies like SEBI and also to know the capital and money market instruments
5. The unit equips the students to understand about the asset fund based financial services
6. The students will get exposure about the investment banking and merchant banking.

UNIT I

INTRODUCTION: The structure of financial system, Equilibrium in financial markets, Indicators of Financial Development, Financial system and Economic Development, Financial Sector Reforms after 1991.

UNIT II

BANKING INSTITUTIONS: Structure and Comparative performance, Functions and Role of RBI, Competition, Interest rates, Spread; Bank Capital Adequacy norms; Banking Innovations – BPLR to Base rate, Core Banking System, Financial Inclusion, Current rates: Policy rates, Reserve Ratios, Exchange rates, Lending/ Deposit rates.

UNIT III

NON BANKING FINANCIAL INSTITUTIONS: Structure and functioning of Unit Trust of India and Mutual Funds, Growth of Indian Mutual funds and their Regulation, Role of AMFI. Performance of Non-Statutory Financial Organizations: IFCI, IRBI, NABARD, SIDBI and SFCs.

UNIT IV

FINANCIAL AND SECURITIES MARKETS: -, Role and functions of SEBI, Structure and functions of Call Money Market, Government Securities Market – T-bills Market, Commercial Bills Market, Commercial paper and Certificate of Deposits; Securities Market – Organization and Structure, Listing, Trading and Settlement, SEBI and Regulation of Primary and Secondary Markets.

UNIT V

ASSET/FUND BASED FINANCIAL SERVICES: Lease Finance, Consumer Credit and Hire purchase Finance, Factoring - Definition, Functions, Advantages, Evaluation, Forfeiting, Bills Discounting, Housing Finance, Venture Capital Financing. Fee-based Advisory services: Stock Broking, Credit Rating.

UNIT VI

INVESTMENT BANKING AND MERCHANT BANKING:

Investment Banking: Introduction, Functions and Activities, Underwriting, Banker to an Issue, Debenture Trustees and Portfolio managers, Challenges faced by Investment Bankers.

Merchant Banking: Definition, Merchant Banks Vs Commercial Banks, Services of Merchant Banks.

ESSENTIAL READINGS:

- L.M. Bhole: Financial Institutions and Markets, TMH, 2009.
- E. Gordon, K. Natarajan: Financial Markets and Services, Himalaya Publishing House, 2013.
- Vasant Desai: Financial Markets and Financial Services, Himalaya,2009

SUGGESTED READINGS:

- Pathak: Indian Financial Systems, Pearson, 2009
- M.Y. Khan: Financial Services, TMH, 2009.
- S. Gurusamy: Financial Services and System, Cengage,2009
- Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services, Pearson, 2009.
- Gomez, Financial Markets, Institutions and Financial Services, PHI, 2012.
- R M Srivatsava: Dynamics of Financial Markets and Institutions in India, Excel, 2013.

OPERATING SYSTEMS CONCEPTS (7EC67)

Course Objectives:

Learn the basics of operating Systems. Understand process management and synchronization. Learn principles of memory, I/O and file management in a secured environment.

Course Outcomes:

At the end of this course, the student will be able to

1. Describe the basic functionalities and structure of the Operating System
2. Explain the concepts and implementations of: Processes, Process Scheduling. Describe, contrast and compare various types of Operating systems like Windows and Linux.
3. Comprehend the concepts of Synchronization and Deadlocks in the Operating System
4. Discuss the concepts of Memory Management(Physical and Virtual memory)
5. Explain the concepts of File System with regard to directory and disk management algorithms.
6. Students understand the concepts of I/O systems, protection and security in a case study given

UNIT 1:

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, Types of OS Services, System Calls, Types of System Calls, Structure of an OS- single structure, layered approach.

UNIT 2:

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Process Vs Thread **Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor
Scheduling

UNIT 3:

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, , Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

UNIT 4:

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT 5:

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures –Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT 6:

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table),

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

Suggested books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Suggested reference books:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing

2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India

4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

a	b	c	d	e	f	g	h	i	j	k	l
				x		**x**					

L	T	P/D	C
3	**0**	**0**	**3**

7ZC24 INNOVATION & DESIGN THINKING

(Common to all Branches)

Course Objective: The objective of the course is to make students understand the nature of Innovation, creativity and IPRs, and to motivate the student to start his/her own enterprise with innovative skills.

Course Outcomes:

1. The students gain the knowledge on the inputs required for innovation and also gain familiarity on Entrepreneurship.
2. The students will get exposure on creative methods of ideation and the importance of protecting the ideas.
3. The students gain knowledge on design thinking and types of thinking.
4. The students gain familiarity on emerging technologies like Internet of things (IoT).
5. The students understand the process of building the startup.
6. The students gain knowledge on various startup funding and also to branding building for the startup.

Unit – I: Introduction to Innovation: - Meaning of Innovation, Difference between innovation and invention, Difference between Innovation and Creativity, Need to be Creative , Importance of Innovation, Innovation as a Competitive Advantage, Innovation Continuum, Innovation Cycle, Disruptive Innovation, , Breakthrough innovations and its consequences on the society, Challenges in Innovation.

Unit – II: Creative Thinking : - Types of Creative Thinking, Creative Thinking Process, Components of Creativity, Characteristics of a Creative Mindset, New product ideas, Idea generation methods, Principles of Idea Generation, Difference between Idea Generation and Brainstorming, Killing the ideas through Stage Gate Models, Process of Reverse Thinking. Intellectual Property Rights, Importance of IPR, Role of WIPO, Case Studies on Patents and Infringement of Rights.

Unit – III: Design Thinking & Liberal Art: - Concept of Design Thinking, Difference between Designer and Scientist, Stages of Design Thinking, Difference between Convergent Thinking and Divergent Thinking. Definition of Liberal Art and its Importance of Liberal Art , Role of Art and Culture to Innovate Business.

Unit – IV: Emerging Technologies: - Meaning of Internet of Things, Components of IoT, Benefits of IoT, Types of Product – Service hybrid, examples of IoT enabled Innovations, Impact of IoT on Business, Future of IoT. Case Study on IoT. Innovation Leadership & Network: - Leadership, Skills and Characteristics of an Innovation Leadership, Meaning of Innovation Network, Significant of Innovation Network, Define Social Media Analysis, Steps to Build an Innovation Network.

Unit –V: Building Startup

Kelly Johnsons KISS Principle, Road map for building a startup, identify, analyze and evaluate funding, advantages of crowd funding. Pricing strategies. Determining factors for Monetizing Innovation, Process of Monetization, Fixing the price of an Innovative Project. Detailed study on market potential,

pitfalls and Negative effects of Monetizing innovation. Reasons for failure of Monetization of Innovation.

Unit-VI: Startup Funding & Branding

Sources of funding: Bootstrapping, Angel Investors, Crowd funding, Venture capitalists, Advantages of crowd funding, Schemes of Government through Startup India, role of Institutional support and Commercial Banks. Introduction to branding a startup and developing branding strategies.

ESSENTIAL READINGS:

- Peter Drucker (1993), "Innovation and Entrepreneurship", Hyper Business Book.
- C.K. Prahalad, M.S. Krishnan, The new age of Innovation – TATA McGRAW-HILL Edition 2008.
- "Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002

SUGGESTED READINGS:

- Bholanath Dutta: Entrepreneurship – Text and cases, Excel, 2009.
- Vasanth Desai: Entrepreneurship, HPH, 2009
- Barringer: Entrepreneurship, Pearson, 2009.
- H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.
- John M Nicholas "Project Management for Business and Technology" Prentice Hall of India Pvt. Ltd.
- Stay Hungry Stay Foolish, Rashmi Bansal and published by IIM., Ahmedabad

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Open Elective-III)	L	T	P/D	C
IV-II	7CC39	**Introduction to VLSI and Embedded Systems**	3	-	-	3

Prerequisites: *STLD, Programmaing concepts of any language*

Course Objectives:

The objectives of this course are

- *To provide basic knowledge in embedded system design using Embedded C.*
- *To introduce syntax, lexical conventions, data types and memory related to Verilog HDL.*
- *To design, test and implementation of thedigital hardware using various modeling styles.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand levels of design description, concurrency, simulation and synthesis.*
CO2	*Apply language constructs, data types, operators available in verilog HDL.*
CO3	*Design combinational logic and sequential logic in gate level modeling.*
CO4	*Demonstrate the use of development software for a particular application and choosing appropriate OS.*
CO5	*Understanding and building basic embedded system using 8051.Understanding its design*
CO6	*Design of embedded systems and implementation of switch reading.*

Mapping of Course Outcomes with Program Outcomes

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

UNIT – I:

LANGUAGE CONSTRUCTS AND CONVENTIONS: Introduction, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators. Verilog Module structure.

UNIT – II

MODELING AT DATA FLOW LEVEL: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

BEHAVIORAL MODELING: Introduction, Initial Construct, Always Construct, Assignments with delays, Blocking and Non blocking Assignments

UNIT – III

MODELING AT DATA FLOW LEVEL: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

BEHAVIORAL MODELING: Introduction, Initial Construct, Always Construct, Assignments with delays, Blocking and Non blocking Assignments

UNIT – IV

Programming Embedded Systems in C

Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions

UNIT – V

The 8051 Architecture: Architecture of 8051 Micro controller, Memory Organization. Special Function Registers. Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT – VI

Reading Switches

Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version),

Adding Structure to the Code

Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

TEXT BOOKS:

2. T.R. Padmanabhan and B. Bala Tripura Sundari, Design through Verilog HDL – WSE, 2004 IEEE Press.
3. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008

REFERENCE BOOKS:

2. J. Bhaskar, A Verilog Primier, BSP, 2003.
3. PICmicro MCU C-An introduction to programming, The Microchip PIC in CCS C - Nigel Gardner

FUNDAMENTALS OF RENEWABLE ENERGY SOURCES

	L	T	P	C
7AC45	3	-	-	3

a	b	c	d	e	f	g	h	i	j	k	l
	x	x	x							x	

Course Objectives:

Becomes familiar with solar energy, its radiation, Collection, storage and application and also gets introduced to other forms of Renewable Energy sources viz., the Wind energy, Biomass energy, geothermal energy and ocean energy.

Course Outcomes:

The student should be able to

1. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.
2. Demonstrates the knowledge of different techniques of solar collection and storage.
3. The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.
4. Aware of the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.
5. Aware of the different methods of kinetic energy extraction from Ocean waves and tides and thermal energy extraction from Oceans.
6. Demonstrates the knowledge of Direct Energy Conversion in different phenomena viz., Joule Thomson effect, Seebeck effect, Peltier effect etc. and the principle of operation of Fuel Cells.

UNIT – I -PRINCIPLES OF SOLAR RADIATION:

Role and potential of new and renewable source, The solar energy option, Environmental impact of solar power, Physics of the sun, the solar constant, Extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, Solar radiation data.

UNIT-II- SOLAR ENERGY COLLECTION STORAGE AND APPLICATIONS: Flat plate and concentrating collectors, Classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Different methods, Sensible, Latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT – III WIND ENERGY:

Sources and potentials, Horizontal and vertical axis windmills, Performance characteristics, Betz criteria

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas digesters, Gas yield, Combustion characteristics of bio-gas, Utilization for cooking, I.C.Engine operation and economic aspects.

UNIT – IV GEOTHERMAL ENERGY:

Resources, types of wells, methods of harnessing the energy, Potential in India.

UNIT-V OCEAN ENERGY:

OTEC, Principles utilization, Setting of OTEC plants, Thermodynamic cycles. Tidal and wave energy, Potential and conversion techniques, Mini-hydel power plants and their economics.

UNIT-VI DIRECT ENERGY CONVERSION:
Need for DEC, Carnot cycle, Limitations, principles of DEC. Thermoelectric generators, seebeck, Peltier and joul Thomson effects, Figure of merit, materials, Applications, MHD generators, Principles, Dissociation and ionization, Hall effect, Magnetic flux, MHD accelerator, MHD Engine, Power generation systems, Electron gas dynamic conversion, economic aspects. Fuel cells – principles - Faraday's law's - Thermodynamic aspects - selection of fuels and operating conditions.

TEXT BOOKS:
1. Non-Conventional Energy Sources - G.D. Rai
2. Renewable Energy Technologies - Ramesh & Kumar /Narosa.

REFERENCE BOOKS:
1. Renewable energy resources - Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy - Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems - K Mittal /Wheeler

PRINCIPALS OF AUTOMATION AND ROBOTICS

Code: 7BC55

Course Outcomes:

After completing the subject, students will be able to:

- Understand a production system, principles of automobile
- understand the methods of work part transfer mechanical buffer storage control functions
- understand the implementation of automated flow lines
- know the analysis and design of material handling systems, automated guided vehicle system
- understand adaptive control systems and Applications.
- understanding the business process Engineering. Concept of concurrent Engineering, techniques of rapid prototype.

UNIT – I

Introduction: Production system, Automated manufacturing systems, Reasons, Principles and strategies of automation, Basic elements of automated system, pneumatic and hydraulic circuit components, Assembly system and line balancing: Manual Assembly process, and work transport systems, Line pacing, Analysis of manual assembly lines, line balancing methods-problems, ways of improving line balance
lines.

UNIT – II

Analysis of Automated flow lines: System configuration, Workpart transfer, General terminology and analysis of transfer lines without and with buffer storage.
Automated Assembly systems: Fundamentals and Design of assembly systems.

UNIT – III

Automated material handling: Principles, Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems-technology, Analysis of material transport systems.
Automated storage systems: Basic terminology, AS/RS; Carousel storage, work in process storage,

UNIT – IV

Adaptive control systems: Introduction, Adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperature, vibration and acoustic emission. Concept of Concurrent Engineering, MRP,MRP II, Techniques of Rapid Proto typing.

Unit – V: **Robotics**:

Classification and structure of Robotic systems, structure of continuous path robot systems, drives and control systems, control approaches for robots.

Unit – VII

Robot arm kinematics, the direct kinematics problem and inverse kinematic solutions, planning of manipulator trajectories, robot sensors, range sensors, proximity sensors, touch sensors, force and torque sensors, programming, manual teaching, lead through teaching, programming languages, storing and operating task programmes, robot selection and application.

TEXT BOOK:

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./PE/PHI
2. Mittal and Nagrath, 'Robotics and Control', Tata Mc Graw Hill.

REFERENCES:

1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.

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Year/Sem	Sub. Code	Subject Name (Professional Elective-IV)	L	T	P/D	C
IV-II	7C827	Digital Design and Verification with Universal Verification Methodology	3	-	-	3

Course Description:

This course gives a student an in-depth introduction to the Universal Verification Methodology, discusses the benefits of the new features, and demonstrates how design and verification can be more efficient and effective when using UVM.

- Prerequisites:
  - A working knowledge of Verilog and System Verilog.
  - Basic idea of verification methods

Course Outcomes

CO1	*Understand the UVM concepts*
CO2	*Explore the class instances and functions*
CO3	*Comprehend the UVM Configurations*
CO4	*Analyzing UVM sequences and Modeling in UVM*
CO5	*Developing Reusable Test benches using UVM*
CO6	*Analyzing the Case studies of Layered test bench for SPI, APB and AXI.*

Mapping of Course Outcomes with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1		*1*	*1*	*1*	*2*							*2*		*2*	*2*
CO 2		*2*	*2*	*2*	*2*							*2*		*2*	*2*
CO 3		*2*	*2*	*2*	*2*							*2*		*2*	*2*
CO 4		*3*	*3*	*2*	*3*							*2*		*3*	*2*
CO 5		*3*	*3*	*2*	*3*							*2*		*3*	*2*
CO 6		*3*	*2*	*2*	*3*							*2*		*3*	*2*
Over all		*3*	*3*	*2*	*3*							*2*		*3*	*2*

Syllabus Contents:

Chapter1 : UVM Methodology Concepts:What are methodologies? Why?,Evolution of Verification methodologies, Introduction to UVM, Overview of UVM Environment, UVM Library, UVM Phasing, UVM Reporting , UVM Transactions, TLM Basics.

Chapter2 : Declaring and using class instances, including static members,Class inheritance and aggregation (composite classes), Class property randomization, Randomization constraints—relational, distribution, and conditional Subprograms, including void functions.

Chapter3 : UVM Configuration, UVM Driver, UVM Sequence, Sequencer and Virtual Sequencers, UVM Monitor, UVM Agent, UVM Factory, UVM Callbacks, UVM Register layer.

Chapter 4 : UVM sequences, Connecting to a DUT, Interface and module UVCs, Multichannel sequences (virtual sequences), Building a scoreboard, Transaction-level modeling (TLM), Functional coverage modeling, Register Modeling in UVM.

Chapter 5: Developing Reusable Testbenches using UVM:Modeling Data Items for Generation, Creating the Driver, Creating the Sequencer, Creating the Monitor, Instantiating Components, Creating the Agent, Creating the Environment, Transaction-Level Components, Enabling Scenario Creation, Managing End of Test, Implementing Checks and Coverage.

Chapter6 : Case studies of Layered testbench for SPI, APB and AXI.

Textbooks:

1. **The UVM Primer: A Step-by-Step Introduction to the Universal Verification Methodology** by Ray Salemi.
2. A Practical Guide to Adopting Universal Verification Methodology (UVM) by Sharon Rosenberg & Kathleen A Meade (2nd Edition.

References:

1. Universal Verification Methodology (UVM) 1.2 User's Guide
   url: https://www.accellera.org/images//downloads/standards/uvm/uvm_users_guide_1.2.pdf.
2. A Practical Guide to Adopting the Universal Verification Methodology (UVM) Second Edition Paperback – by Sharon Rosenberg , Kathleen Meade .

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-IV)	L	T	P/D	C
IV-II	7C828	EMBEDDED REAL TIME OPERATING SYSTEMS	3	-	-	3

a	b	c	d	e	f	g	h	i	j	k	l	m
	x	x	x	x				x	x		x	x

Course outcomes:

1. Understand the Basic concepts of UNIX operating Systems and files, commands usage.
2. Understand the Real time Systems concepts and classification of Real time systems.
3. Design concepts of scheduling algorithms and its applications.
4. Understand the Interprocess communications and its applications in Real time systems.
5. Understand the Exceptional handling and Interrupts and Timers
6. Understand the case study of RTOS.

Mapping of Course Outcomes with Program Outcomes

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

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use.

Unit III: Scheduling

Commonly used Approaches to Real Time Scheduling Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs State Systems, Effective release time and Dead lines, Offline Vs Online Scheduling.

UNIT - IV

Inter-process Communication

Inter-process Communication and Synchronization of Processes, Tasks and Threads- Multiple Process. Problem of Sharing data by multiple tasks & routines, Inter-process communication

UNIT - V

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT - VI

Case Studies of RTOS: RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOK:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2nd ed., 2008,TMH.
2. Real Time Systems- Jane W. S. Liu- PHI.
3. Real Time Systems- C.M.Krishna, KANG G. Shin, 1996, TMH
4. Qing Li, "Real Time Concepts for Embedded Systems", 2011, Elsevier.

REFERENCE BOOKS:

1. Rajkamal, "Embedded Systems- Architecture, Programming, and Design", 2007, TMH.
2. W. Richard Stevens, Stephan A. Rago, "Advanced UNIX Programming", 2006, 2nd Edition, Pearson.
3. Dr. Craig Hollabaugh, "Embedded Linux: Hardware, Software and Interfacing", 2008, 1st Edition, Pearson.

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Year/Sem	Sub. Code	Subject Name (Professional Elective-V)	L	T	P/D	C
IV-II	7CC29	Machine Learning	3	-	-	3

Course Objectives :

CO1. introduce basic concepts and techniques of Machine Learning

CO2. have a thorough understanding of the Supervised and Unsupervised learning techniques

CO3. study the various probability based learning techniques

CO4. analyze the dimensionality reduction models

CO5. Tunderstand graphical models of machine learning algorithms

CO6. Apply analytical learning algorithms

Mapping of Course Outcomes with Program Outcomes

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

UNIT I: INTRODUCTION:

Learning(Book-1) – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System(Book-2) – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: (Book-1) – Perceptron – Linear Separability – Linear Regression.

UNIT II: LINEAR MODELS:

Multi-layer Perceptron(Book-1) – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT III: TREE AND PROBABILISTIC MODELS:

Learning with Trees (Book-1) – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT IV: DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS:

Dimensionality Reduction(Book-1) – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example

UNIT V: GRAPHICAL MODELS:

Markov Chain Monte Carlo Methods (Book-1) – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

UNIT – VI ANALYTICAL LEARNING

Learning with perfect domain theory (Book-2) – Explanation based Learning – Inductive analytical approach to learning – KBANN algorithm

TEXT BOOKS:

1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, ―Machine Learning‖, First Edition, McGraw Hill Education, 2013.

REFERENCES:

1. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
2. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
3. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014

OUTCOMES: Upon completion of the course, the students will be able to:

- Distinguish between, supervised, unsupervised and semi-supervised learning
- Apply the apt machine learning strategy for any given problem
- Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
- Design systems that uses the appropriate graph models of machine learning
- Modify existing machine learning algorithms to improve classification efficiency

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-IV)	L	T	P/D	C
IV-II	7C830	Satellite Communications	3	-	-	3

Prerequisites: *MWOC*

Course objectives*:*

The course objectives of this course are

- *To introduce the working principles and various design aspects of satellite sub-systems.*
- *To get acquinted with the multiple access techniques and the working principle of GPS systems.*

Course Objectives*: After studying this course, the students will be able to*

CO1	*Demonstrate the orbital mechanics.*
CO2	*Design the satellite subsystem.*
CO3	*Estimate the C/N and able to measure the relevant values.*
CO4	*Evaluate the satellite link.*
CO5	*Recall Multiple access concepts and discuss earth station technology*
CO6	*Apply the knowledge of GPS in real time applications.*

Mapping of Course Outcomes with Program Outcomes

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

Syllabus Content

UNIT-I

INTRODUCTION

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Kepler's laws of orbital motion. Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

ORBITAL MECHANICS AND LAUNCHERS

Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems' performance

UNIT-II

SATELLITE SUBSYSTEMS

Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT-III

SATELLITE LINK DESIGN

Basic transmission theory, system noise temperature and G/T ratio, Design of down link and up link.

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UNIT-IV

MULTIPLE ACCESS

Frequency division multiple access (FDMA) Intermediation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA. Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread Spectrum transmission and reception.

Applications: Design of a Remote sensing satellite in IRS-4.

UNIT-V

EARTH STATION TECHNOLOGY

Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

Low Earth Orbit And Geo-Stationary Satellite Systems: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations.

UNIT VI

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM

Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, *Satellite Communications* – WSE, Wiley Publications, 2nd Edition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, *Satellite Communications Engineering* –2nd Edition, Pearson Publications, 2003.

REFERENCES

1. M. Richharia, *Satellite Communications Design Principles* – BS Publications, 2nd Edition, 2003.
2. D.C Agarwal, *Satellite Communication* - Khanna Publications, 5th Ed.
3. 3K.N. Raja Rao, . *Fundamentals of Satellite Communications* – PHI, 2004
4. Dennis Roddy, *Satellite Communications* – McGraw Hill, 2nd Edition.

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H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-IV)	L	T	P/D	C
IV-II	7C831	Radar Communications	3	-	-	3

Prerequisites: *MWE*

Course Objectives*:*

The objectives of this course are

- *Be acquainted with the principle and working of various types of Radar Systems.*
- *To study the principles of phased arrays.*

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Recognise the basics of Radar systems and its applications and its frequencies (Understand)*
CO2	*Differentiate the Radar parameters, how it affects the Range measurement. (Analyse)*
CO3	*Recall the Doppler Effect, and draw backs of CW radars. (Remember)*
CO4	*Discuss the basic concepts of Moving target indicators and evaluate the draw backs of MTI Radars.(Understand)*
CO5	*Differentiate concept of scanning and tracking. (Analyse)*
CO6	*Understand various types of displays and different phased arrays.*

Mapping of Course Outcomes with Program Outcomes

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

SYLLABUS CONTENT

Unit-I

Nature of Radar, Maximum Range, Radar equation. Block diagram. Radar frequencies and applications. Prediction of Range performance. MDS, Rx Noise, Modified range equation. Related problems.

Unit-II

SNR

Envelope Detectors. Integration of Radar Pulses. RCS of Targets (simple targets-sphere, cone-sphere. PRF and Range Ambiguities. System losses.

Unit-III

CW AND FMCW RADAR:

Doppler Effect. CW Radar, Block diagram, Applications of CW Radar. Rx bandwidth requirements. FM CW Radar, Block diagram and characteristics. FM- CW Altimeter.

UNIT-IV

MTI RADAR

Block diagram of MTI Radar with Power Amplifier and Power Oscillators. Non Coherent MTI Radar. Delay line Cancellers. Double Cancellation. Blind Speeds. Filter Characteristics, Limitations to MTI performance. MTI vs Pulse Doppler Radar. Staggered PRF, Range gated Doppler Filters.

.UNIT – V

TRACKING RADARS

Tracking Radars: Sequential lobing. Conical Scan. Mono Pulse tracking Radars. Phase Comparison Mono Pulse.

Matched filter Receiver: MFR Response Characteristics & derivation. Correlation Functions & Cross Correlation Receiver, Efficiency of Matched Filter, Matched Filter with Non White Noise.

UNIT – VI

RADAR RECEIVERS

Noise Figure & Noise Temperature, Radar Displays, Types of Duplexers.

Phased arrays: basic concepts, Beam steering and beam width changes. Series Vs parallel feeds. Applications, Advantages & limitations. ECCM.

TEXT BOOKS

1. Merrill I. Skolnik, *Introduction to Radar Systems*, McGraw-Hill, 2nd Edition, 1981.

REFERENCES

1. Merrill I.Skolnik,*Introduction to Radar systems,McGraw-Hill,3rd* Edition ,2001.
2. Byron Edde, *Radar Principles,Technology,Applications.* Pearson Edition, 2004.

1	2	3	4	5	6	7	8	9	10	11	12
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Year/Sem	Sub. Code	Subject Name (Professional Elective-V)	L	T	P/D	C
IV-II	7C832	Mixed Signal Design	3	-	-	3

Course Objectives:

This course will introduce design and analysis of mixed-signal integrated circuits. Apply principles of hierarchical mixed signal CMOS VLSI, from the transistor up to the system level, to the understanding of CMOS circuits and systems

Course Outcomes*: After studying this course, the students will be able to*

CO1	*Understand the concepts of Switched capacitors Circuits*
CO2	*know the concepts of PLLS*
CO3	*study concepts of Data Converter Fundamentals*
CO4	*Explore the concepts of Nyquist Rate A/D Converters and develop its applications*
CO5	*Understand concepts of the Oversampling Converters and Continuous-Time Filters*
CO6	*Understand concepts of concepts of Continuous-Time Filters, CMOS Trans conductors*

Mapping of Course Outcomes with Program Outcomes

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

UNIT I

Switched Capacitor Circuits: Introduction to Switched Capacitor circuits basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, Biquad filters.

UNIT II

Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT III

Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.

UNIT IV

Nyquist Rate A/D Converters: Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT V

Oversampling Converters: Noise shaping modulators, Decimating filters and Interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A.

UNIT VI

Continuous-Time Filters: Introduction to Gm-C Filters, Bipolar Trans conductors, CMOS Trans conductors Using Triode and Active Transistors, Bi CMOS Tran conductors, MOSFET-C Filters.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002

2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books:

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.

2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

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Year/Sem	Sub. Code	Subject Name (Professional Elective-V)	L	T	P/D	C
IV-II	7C833	System On-chip Architecture	3	-	-	3

A	b	C	d	e	f	g	h	i	j	k	m
	X	X	X	X						X	X

OBJECTIVES

After going through this course the student will be able to

- Understand the System Architecture and Processor Architecture, approach for a SOC Design.
- Learn the, Basic concepts in Processor Micro Architecture, and Learn Different Types of Processors like VLIW Processors, Superscalar Processors etc.
- Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.
- Learn the SOC Design approach, Design and evaluation, Applications Like Image compression etc

After studying this course, the students will be able to

1. Know basics of System Architecture
2. Understand the various types of Processors like VLIW Processors, Superscalar Processors.
3. Distinguish Cache memory and Multilevel Caches, SOC external memory.
4. Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.
5. Know the concepts and issues related to Interconnect Configuration.
6. Explore the SOC Design approach and develop its applications.

Mapping of Course Outcomes with Program Outcomes

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

UNIT-I: Introduction

Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, System Architecture and Complexity.

UNIT-II: Processors :

Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III: Memory Design for SOC:
Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV: Interconnect Customization and Configuration:
Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor.

UNIT-V: Interconnect Configuration:
Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration – overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-VI: Application Studies / Case Studies:
SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

Text Books

- Computer System Design System-on-Chip – Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
- Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

Reference Books

- ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.
- System on Chip Verification – Methodologies and Techniques – Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

Year/Sem	Sub. Code	Subject Name (Professional Elective-V)	L	T	P/D	C
IV-II	7C834	Deep Learning	3	-	-	3

Pre-Requisites: Signals & Systems, Basics of Probability Theory, Linear Algebra & Calculus, Statistics and Machine Learning

Course Objectives:

The objective of this course is to provide the learners with a comprehensive understanding of Deep Learning Methods, Recurrent Neural Netwok and their applications.

Course Outcomes:

By the end of the course, students will be able to

CO1. understand the basics and complexity of Deep Learning algorithms and their limitations

CO2. Learn modern notions in data analysis oriented computing

CO3. Confidently apply common Deep Learning algorithms in practice and implementing their own and

CO4. Differentiate various algorithms for sequence of data

Mapping of Course Outcomes with Program Outcomes

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

Syllabus

UNIT – I Basics to Deep Learning

Introduction, History, Perceptron, MLP, review of Neural Network- Feedforward Neural Networks and Back Propagation- Gradient Decent and varients, Batch-normalization.

Activation Functions : Sigmoid, ReLU, Hyperbolic Tangent Functions, Softmax

UNIT – II Introduction to TensorFlow (Python will be used for understanding)

Computational Graph, Creating a Graph, Regression example, Handwritten digit classification using TensorFlow, TensorBoard, Keras Library

UNIT – III Deep Learning

Deep Feed Forward network, Training Deep Neural Networks using Back Propagation-Setup and initialization issues, vanishing and exploding Gradient problems, Gradient- Descent Strategies, Overfitting and Generalizaton, Cross Validation, Feature Selection, Regularizations, Dropouts, Hyperparameters.

UNIT – IV : CNN (Convolutional Neural Networks)

Basic structure of Convolutional Network, Shortcomings of Feature Selection - Full Description of the Convolutional Layer - Max Pooling-Full Architectural Description of Convolution Networks, Backpropagation in CNNs, Evolution of CNN Architectures for Image Classification, Fine tuning in CNN.

UNIT – III Auto-encoders

Auto-encoders Neural Networks, Training, Undercomplete and Overcomplete autoencoders, Convolutional auto-encoders, De-convolution layer, Transposed convolution, Sparsely Regulated auto-encoders, Denoising auto-encoders, Stacked auto-encoders, Variational auto-encoders.

UNIT – VI Recurrent Neural Networks

Introduction to RNN, Unfolding Computational Graph, Recurrent hidden units and Training Loss, Recurrence through output only, Forward Propagation, Teacher Forcing, Seq2Seq RNN, LSTM, GRU – Comparison of LSTM and GRUs, RNN applications.

BOOKS

1. Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning (Adaptive omputation and Machine Learning series", MIT Press, 2017.
3. Charu C. Aggarwal "Neural Networks and Deep learning" Springer International Publishing, 2018

Reference Books

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Educatio2004.

1	2	3	4	5	6	7	8	9	10	11	12
H											M

Year/Sem	Sub. Code	Subject Name (Professional Elective-V)	L	T	P/D	C
IV-II	7C835	5G Communications	3	-	-	3

Pre-requisites:
Probability & Stochastic process, Cellular mobile Communications

Course Objectives:

This course is intended to impart to the students the principles of

- The fundamental concepts and design principles in "Multiple-Input Multiple-Output" (MIMO) wireless communications –channel capacity, antenna diversity, space-time coding.
- The fundamental concepts in "Orthogonal Frequency-Division Multiplexing" (OFDM) communications – transmission, synchronization, peak-to-average power ratio (PAPR) reduction.
- This fundamental concepts of massive MIMO will present a comprehensive analytical development of the various concepts in massive MIMO and mmWave MIMO technologies for 5G together with practical insights and problem solving.

Course Outcome:

After Learning this course, the student will be able to gain knowledge and understanding of:-

- OFDM's transceiver architecture
- The problem of PAPR and how to reduce the PAPR.
- To understand how the OFDM receiver performs synchronization
- Channel modeling and propagation
- MIMO Capacity, space-time coding
- Massive MIMO and mmWave MIMO technologies for 5G

Mapping of Course Outcomes with Program Outcomes

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

UNIT 1: Fast Fading Wireless Channel Modeling ,Rayleigh/Ricean Fading Channels ,BER Performance in Fading Channels ,Diversity modeling for Wireless Communications ,BER Performance Improvement with diversity ,Types of Diversity – Frequency, Time, Space.

UNIT 2: OFDM Basics I: Introduction to OFDM Effect- Multicarrier Modulation and Cyclic Prefix-Channel model and SNR performance- OFDM Issues of PAPR- Frequency and Timing Offset Issues.

UNIT 3: Bit Error Rate Analysis: BER Analysis for Space Time Coding, Transmit Beamforming , Receiver Selection Combining, Receiver Equal Combining, Receiver Maximal Ratio Combining.

UNIT 4: Introduction to MIMO, Beam forming Antennas, Diversity: Receive- antenna diversity; Transmit-antenna diversity, MIMO Diversity and applications ,MIMO Channel Capacity of ZF,LMMSE,MMSE .

UNIT 5: Introduction to MIMO: MIMO Channel Capacity-SVD and Eigen modes of the MIMO Channel-MIMO Spatial Multiplexing – BLAST-MIMO Diversity – Alamouti, OSTBC, MRT-MIMO - OFDM.

UNIT 6: Introduction to 5G Wireless Technologies: Key specs and New Techniques for 5G,Introduction to MIMO Wireless Communication Systems ,Channel Estimation for MIMO Systems, Multi-user MIMO Wireless Systems ,Introduction to Massive MIMO Wireless Systems ,Generalized Spatial Modulation, mmWave MIMO Wireless Systems and Challenges.

Text Books:

1. MIMO-OFDM for LTE, WiFi and WiMAX Li Wang, Ming Jiang, Lajos L. Hanzo, YosefAkhtman Weily 2011
2. MIMO-OFDM Wireless Communications with MATLAB Yong Soo Cho,Jaekwon Kim, Won YoungYang, hung G. Kang John Wiley & Sons (2010)

References:

1. OFDM for Wireless Communications Systems Ramjee Prasad, Artech House Publishers (2004).
2. MIMO Wireless Communications EzioBiglieri Robert Calderbank Anthony Constantinides Andrea Goldsmith ArogyaswamiPaulraj H. Vincent Cambridge University Press (2007)

3.

Year/Sem	Sub. Code	Subject Name	L	T	P/D	C
IV-II	7C865	PROJECT –II	-	-	10	5

A	B	c	d	e	f	g	h	i	j	k	l
X	X	X	X	X	X		X	X	X	X	x

Course Objective

To enhance the knowledge on selecting a projcet , learn related tools and enhance programming and communication skills for employabilty.

Course Outcomes:

At the end of this course, the student will be able to

- Identify vast application areas for mobile / wireless communication / computing.
- They also understand the working principle of GSM technology.
- Students understand various media access control methods that are meant for wireless communication, each methods' pros and cons
- Understand the issues in the Network layer in the wireless communication and identifying suitable solutions for the same
- Understand the issues in the Transport layer in the wireless communication and identifying suitable solutions for the same
- Understand MANETs with an example like Bluetooth technology.
- Understand Security Issues related to mobile computing and various solutions to mitigate the security problems.

Mapping of Course Outcomes with Program Outcomes

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

Out of total 200 marks for project work (in the final year second semester), 50 marks shall be for Internal Evaluation and 150 marks for the External Evaluation at the end of the Semester.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The committee consists of an external examiner, HOD, a Senior Faculty Member and Internal Guide.

The pattern of Internal Evaluation is as follows:

Division of marks for internal assessment – 50 marks

- Progress of Project work and the corresponding interim report as evaluated by internal guides at the end of 5 weeks : 05 Marks
- Seminar at the end of 5 weeks : 05 Marks
- Progress of Project work as evaluated by guides at the end of 10 weeks : 05 Marks
- Seminar at the end of 10 weeks : 05 Marks
- Evaluation by the Guides (at the end of 15 weeks) : 10 Marks
- Project Report : 05 Marks

- Final presentation and defense of the project : 15 Marks

If the project is conducted internally the marks will be given by Internal Guide himself.

Division of Marks for External Evaluation – 150 Marks

Pattern of External Evaluation for Project

1. Final Project Report : 30 Marks
2. Presentation : 20 Marks
3. Demonstration / Defense of Project : 100 Marks