PRIST DEEMED TO BE UNIVERSITY

Vallam, Thanjavur

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

PROGRAM HANDBOOK

B.TECH – PART TIME

[REGULATION 2022]

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To enable graduates to pursue research, or have a successful career in academia or industries associated with Electronics and Communication Engineering, or as entrepreneurs.

PEO2: To provide students with strong foundational concepts and also advanced techniques and tools in order to enable them to build solutions or systems of varying complexity.

PEO3: To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

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

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

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1	3	3	2	3	2	1	1	2	1	1	3	1	3
2	3	3	3	3	3	1	1	1	1	1	1	2	2
3	3	3	3	3	3	2	2	3	1	2	2	2	2

Contribution 1: Reasonable 2: Significant 3: Strong

B.TECH (PART TIME) – ECE – R-2022

SEMESTER I – VII CURRICULUM

SEMESTER-I

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1	22148S11P	Transforms and Partial Differential Equations	3	1	0	4
2	22152C12P	Electromagnetic Fields	3	1	0	4
3	22152C13P	Digital Electronics	3	1	0	4
4	22152C14P	Electronic Circuits - I	3	0	0	3
5	22152C15P	Signals and Systems	4	0	0	4
TOTAL CREDITS						**19**

SEMESTER-II

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1	22148S21BP	Probability and Random Processes	3	1	0	4
2	22152C22P	Communication Theory	3	0	0	3
3	22152C23P	Linear Integrated Circuits	3	1	0	4
4	22152C24P	Electronic Circuits – II	3	1	0	4
5	22152C25P	Transmission Lines and Waveguides	4	0	0	4
TOTAL CREDITS						**19**

SEMESTER-III

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1.	22148S31BP	Numerical Methods	3	1	0	4
2.	22152C32P	Microprocessor and Microcontrollers	3	1	0	4
3.	22152C33P	Digital Signal Processing	3	1	0	4
4.	22152C34P	Digital Communication	3	1	0	4
5.	22152L35P	Microprocessor and Microcontrollers Lab	0	0	3	2
TOTAL CREDITS						**18**

SEMESTER-IV

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1	22152C41P	Medical Electronics	**3**	**1**	**0**	**4**
2	22152C42P	Antenna and Wave Propagation	**3**	**1**	**0**	**4**
3	22152C43P	Computer Networks	**4**	**0**	**0**	**4**
4	22152E44_P	**Elective-I**	**4**	**0**	**0**	**4**
5	22152L45P	Networks and Communication Lab	**0**	**0**	**3**	**2**
					TOTAL CREDITS	**18**

SEMESTER-V

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1	22152C51P	Optical Communication and Networks	**4**	**0**	**0**	**4**
2	22152C52P	Microwave Engineering	**4**	**0**	**0**	**4**
3	21160C53P	Principles of Management	**3**	**1**	**0**	**4**
4	22152E54_P	**Elective II**	**4**	**0**	**0**	**4**
5	22152L55P	Optical Communication and Microwave Lab	**0**	**0**	**3**	**2**
					TOTAL CREDITS	**18**

SEMESTER-VI

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1	22152C61P	Wireless Communication	**4**	**0**	**0**	**4**
2	22152C62P	VLSI Design	**3**	**1**	**0**	**4**
3	22152C63P	Embedded and Real Time Systems	**3**	**1**	**0**	**4**
4	22152E64_P	**Elective III**	**4**	**0**	**0**	**4**
5	22152L65P	VLSI and Embedded Systems Lab	**0**	**0**	**3**	**2**
					TOTAL CREDITS	**18**

SEMESTER-VII

S.NO	SUB CODE	SUBJECT NAME	Periods Per Week			C
			L	T	P	
1	21160S71P	Total Quality Management	**3**	**0**	**0**	**3**
2	22152C72P	Wireless Networks	**3**	**1**	**0**	**4**
3	22152C73P	Telecommunication Switching and Networks	**4**	**0**	**0**	**4**
4	22152E74_P	**Elective IV**	**3**	**0**	**0**	**3**
5	22152P75P	Project Work	**0**	**0**	**12**	**6**
					TOTAL CREDITS	**20**

LIST OF ELECTIVES

ELECTIVE-I (SEMESTER-IV)

S.No	Sub Code	Sub Name	Periods Per Week			C
			L	T	P	
1	22152E44AP	High Speed Networks	**4**	**0**	**0**	**4**
2	22152E44BP	Advanced Digital Signal Processing	**4**	**0**	**0**	**4**
3	22152E44CP	Speech Processing	**4**	**0**	**0**	**4**
4	22152E44DP	Fuzzy Logic and Neural Networks	**4**	**0**	**0**	**4**
5	22152E44EP	Advanced Electronic System Design	**4**	**0**	**0**	**4**

ELECTIVE-II (SEMESTER-V)

S.No	Sub Code	Sub Name	Periods Per Week			C
			L	T	P	
1	22152E54AP	Environmental Science and Engineering	**4**	**0**	**0**	**4**
2	22152E54BP	Optoelectronic Devices	**4**	**0**	**0**	**4**
3	22152E54CP	Radar and Navigational Aids	**4**	**0**	**0**	**4**
4	22152E54DP	Digital Image Processing	**4**	**0**	**0**	**4**
5.	22152E54EP	Engineering Acoustics	**4**	**0**	**0**	**4**

ELECTIVE-III (SEMESTER-VI)

S.No	Sub Code	Sub Name	Periods Per Week			C
			L	T	P	
1	22152E64AP	Professional Ethics in Engineering	**4**	**0**	**0**	**4**
2	22152E64BP	Satellite Communication	**4**	**0**	**0**	**4**
3	22152E64CP	Robotics and Automation	**4**	**0**	**0**	**4**
4	22152E64DP	Remote sensing	**4**	**0**	**0**	**4**
5.	22152E64EP	Network Security	**4**	**0**	**0**	**4**

ELECTIVE-IV (SEMESTER-VII)

S.No	Sub Code	Sub Name	Periods Per Week			C
			L	T	P	
1	22152E74AP	Power Electronics	**3**	**0**	**0**	**3**
2	22152E74BP	Advanced Microprocessors and Microcontrollers	**3**	**0**	**0**	**3**
3	22152E74CP	Electromagnetic Interference and Compatibility	**3**	**0**	**0**	**3**
4	22152E74DP	Solid State Electronic Drives	**3**	**0**	**0**	**3**
5	22152E74EP	Computer Hardware and Interfacing	**3**	**0**	**0**	**3**

B.TECH (PART TIME) – ECE – R-2022

COURSE STRUCTURE AND CREDITS DISTRIBUTION

Sem.	Core Courses				Elective Courses		Total Credits
	Theory Courses		Practical Courses				
	Nos.	Credits	Nos.	Credits	Nos.	Credits	
I	05	19	-	-	-	-	19
II	05	19	-	-	-	-	19
III	04	16	01	02	-	-	18
IV	03	12	01	02	01	04	18
V	03	12	01	02	01	04	18
VI	03	12	01	02	01	04	18
VII	03	11	01	06	01	03	20
Total Credits							130

HOD **DEAN** **DEAN - ACADEMIC AFFAIRS**

21148S11P **SEMESTER I**

TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS **3 1 0 4**

(Common to CSE, IT, ECE)

AIM

The course aims to develop the skills of the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

OBJECTIVES

At the end of the course the students would

- Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- Have gained a well founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- Have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.
- Have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair, and specialization on Fourier transform pair, their properties, the possible special cases with attention to their applications.

UNIT I FOURIER SERIES **9**

Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT II FOURIER TRANSFORM **9**

Fourier integral theorem (without proof) – Sine and Cosine transforms – Properties (without Proof) – Transforms of simple functions – Convolution theorem – Parseval's identity – Finite Fourier transform – Sine and Cosine transform.

UNIT III Z -TRANSFORM AND DIFFERENCE EQUATIONS **9**

Z-transform - Elementary properties (without proof) – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS 9

Solution of First order partial differential equation reducible to standard forms – Lagrange's linear equation – Linear partial differential equations of second order and higher order with constant coefficients.

UNIT V BOUNDARY VALUE PROBLEMS 9

Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

TUTORIAL :15 **TOTAL: 60**

TEXT BOOKS

1. Andrews, L.A., and Shivamoggi B.K., "Integral Transforms for Engineers and Applied Mathematicians", Macmillen , New York ,1988.
2. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
3. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics Volume III", S. Chand & Company ltd., New Delhi, 1996.

REFERENCES

1. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., "Advanced Mathematics for Engineering Students", Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.
2. Churchill, R.V. and Brown, J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw-Hill Book Co., Singapore, 1987.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

22152C12P **SEMESTER I**

ELECTROMAGNETIC FIELDS 3 1 0 4

AIM

To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, waveguides is possible.

OBJECTIVES

- To impart knowledge on the basics of static electric and magnetic field and the associated laws.
- To give insight into the propagation of EM waves and also to introduce the methods in computational electromagnetics.
- To make students have depth understanding of antennas, electronic devices, Waveguides is possible.

UNIT I STATIC ELECTRIC FIELD 9

Vector Algebra, Coordinate Systems, Vector differential operator, Gradient, Divergence, Curl, Divergence theorem, Stokes theorem, Coulombs law, Electric field intensity, Point, Line, Surface and Volume charge distributions, Electric flux density, Gauss law and its applications, Gauss divergence theorem, Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT II CONDUCTORS AND DIELECTRICS 9

Conductors and dielectrics in Static Electric Field, Current and current density, Continuity equation, Polarization, Boundary conditions, Method of images, Resistance of a conductor, Capacitance, Parallel plate, Coaxial and Spherical capacitors, Boundary conditions for perfect dielectric materials, Poisson‟s equation, Laplace's equation, Solution of Laplace equation, Application of Poisson‟s and Laplace‟s equations.

UNIT III STATIC MAGNETIC FIELDS 9

Biot -Savart Law, Magnetic field Intensity, Estimation of Magnetic field Intensity for straight and circular conductors, Ampere‟s Circuital Law, Point form of Ampere‟s Circuital Law, Stokes theorem, Magnetic flux and magnetic flux density, The Scalar and Vector Magnetic potentials, Derivation of Steady magnetic field Laws.

UNIT IV MAGNETIC FORCES AND MATERIALS 9

Force on a moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, The nature of magnetic materials,

Magnetization and permeability, Magnetic boundary conditions involving magnetic fields, The magnetic circuit, Potential energy and forces on magnetic materials, Inductance, Basic expressions for self and mutual inductances, Inductance evaluation for solenoid, toroid, coaxial cables and transmission lines, Energy stored in Magnetic fields.

UNIT V TIME VARYING FIELDS AND MAXWELL'S EQUATIONS 9

Fundamental relations for Electrostatic and Magnetostatic fields, Faraday‟s law for Electromagnetic induction, Transformers, Motional Electromotive forces, Differential form of Maxwell‟s equations, Integral form of Maxwell‟s equations, Potential functions, Electromagnetic boundary conditions, Wave equations and their solutions, Poynting‟s theorem, Time harmonic fields, Electromagnetic Spectrum.

TUTORIAL 15 **TOTAL : 60**

TEXTBOOKS

1. William H Hayt and Jr John A Buck, "Engineering Electromagnetics", Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, 2008
2. Sadiku MH, "Principles of Electromagnetics", Oxford University Press Inc, New Delhi, 2009

REFERENCES

1. David K Cheng, "Field and Wave Electromagnetics", Pearson Education Inc, Delhi, 2004
2. John D Kraus and Daniel A Fleisch, "Electromagnetics with Applications", Mc Graw Hill Book Co, 2005
3. Karl E Longman and Sava V Savov, "Fundamentals of Electromagnetics", Prentice Hall of India, New Delhi, 2006
4. Ashutosh Pramanic, "Electromagnetism", Prentice Hall of India , New Delhi, 2006

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2	1	1	1	-	2	1	-	-	1	-	2
2	2	2	3	3	2	2	2	-	-	1	1	2
3	2	2	3	2	2	2	1	-	-	1	1	2
4	2	2	3	2	2	2	1	-	-	1	1	2
5	2	2	2	2	2	2	1	-	-	2	2	1
CO	**2**	**2**	**2**	**2**	**2**	**2**	**1**	-	-	**1**	**1**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

22152C13P **SEMESTER I**

DIGITAL ELECTRONICS 3 1 0 4

AIM

To learn the fundamental concepts those are useful for designing digital systems or circuits.

OBJECTIVES

- To introduce number systems and codes
- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories devices.

UNIT I: BOOLEAN ALGEBRA AND MINIMIZATION 9

Basic theorems – Boolean functions – Canonical and Standard forms – Minimization techniques – K-map up to five variables – NAND and NOR implementation – Exclusive OR function - Hardware Description Language (HDL).

UNIT II: DIGITAL LOGIC FAMILIES 9

Switching operation of PN junction diode – bipolar and MOS devices – Bipolar logic families – RTL – DTL – DCTL – HTL – TTL – ECL – MOS and CMOS – Tristate logic –Interfacing of CMOS and TTL families.

UNIT III: COMBINATIONAL LOGIC DESIGN 9

Design using gates – BCD arithmetic circuits – Binary adder – Subtractor – Multiplier – Divider – Design using MSI devices – Multiplexer and Demultiplexer as logic elements – Encoder and decoder – Parity checker – Parity generator – Code converter – Magnitude comparator.

UNIT IV: SEQUENTIAL LOGIC DESIGN 9

Flip Flops and their conversions – Analysis and synthesis of synchronous sequential circuits – Excitation table – State table and state diagram – Design of synchronous counters – Analysis of asynchronous sequential circuits – Reduction of state and flow table – Race free state assignment – Design of Asynchronous counters – Timing diagram – Shift registers and their applications.

UNIT V : MEMORY DEVICES 9

Classification of memories – ROM organization – PROM – EPROM – EEPROM – EAPROM – RAM organization – Write operation – Read operation – Memory cycle Timing wave forms – Memory decoding – Memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell – Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) –Field Programmable Gate Arrays (FPGA).

TUTORIAL 15 TOTAL : 60

TEXT BOOKS

1. Morris Mano M., "Digital Design", 3rd Edition, Pearson Education, 2007.
2. John M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2002.

REFERENCES

1. John F.Wakerly, "Digital Design", 4th Edition, Pearson/PHI, 2006
2. Charles H.Roth, " Fundamentals of Logic Design", Thomson Learning, 2003.
3. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2003.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	-	2	-	-	-	-	3	3	3	3	2
2	-	-	-	-	-	-	-	-	-	-	2	1	2	3	2
3	-	3	3	2	-	2	-	-	-	-	2	2	3	3	2
4	-	-	-	-	-	-	-	-	-	-	3	2	2	3	1
5	-	3	3	3	-	-	-	-	-	-	2	2	3	3	2
CO	**3**	**2.6**	**2.6**	**2.3**	**-**	**2**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**3**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

22152C14P **SEMESTER I**

ELECTRONIC CIRCUITS –I 3 0 0 3

AIM

The aim of this course is to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplies.

OBJECTIVE

On completion of this course the student will understand

- The methods of biasing transistors
- Design of simple amplifier circuits
- Mid – band analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance
- Method of calculating cutoff frequencies and to determine bandwidth
- Design of power amplifiers and heat sinks
- Analysis and design of power supplies

UNIT – I TRANSISTER BIASING & STABILIZATION 9

Biasing circuits for BJT- DC load line-AC load line – Stability factor- Methods of Transistor Biasing- Bias Compensation – Thermal runaway- heat sink- FET Biasing

UNIT-II LOW FREQUENCY AMPLIFIER ANALYSIS & DESIGN 9

Transistor- FET amplifiers - Low frequency Small signal hybrid parameter model : $C_{B,}C_{E,}$Cc Amplifier- Analysis of Transistor Amplifier Using h-parameter.

JFET as an Amplifier- Analysis of low frequency common Source & Common Drain Amplifier Using h-parameter.

UNIT – III MULTISTAGE AMPLIFIERS 9

Cascading of BJT Amplifiers- Analysis of RC coupled Amplifiers Methods of Increasing Input impedance using Darlington and Boot strapping- Emitter coupled Differential Amplifier, Differential gain, CMRR, Transfer Characteristics – Cascode amplifier.

UNIT – IV HIGH FREQUENCY ANALYSIS OF THE AMPLIFIERS 9

Frequency response-Effect of Coupling and Bypass capacitor- Effect of internal transistor capacitance-Miller Effect – High Frequency π model for C_E Amplifier-C_E Short circuit Current gain- Cut off frequencies f_α, f_β ,f_T - Gain Band Width product.

UNIT – V POWER SUPPLIES 9

Half wave, Full Wave, Rectifiers- Capacitor Filter- Linear Regulator: Shunt Regulator, Series Regulator- Shunt Regulator using Zener Diode- Switch Mode Power Supply.

TUTORIAL 15 TOTAL : 60

TEXT BOOK

1. Millman and Halkias.c."Integrated Electronics" Tata McGraw -Hill,1991

REFERENCE BOOKS

1. David A. Bell,"Electonic Devices And Circuits " Prentic Hall of India,1998.
2. Donal L. Schilling, Charles ,Belove "Electronic Circuits" Third Edition 2002.
3. Salivahanan "Electonic Devices And Circuits"
4. Boylestead, Robert L. and Louis Nasheresky- "Electonic Devices And Circuit Theory"-Pearson Education
5. J.B.Gupta - "Electonic Devices And Circuits"-S.K.Kataria and sons 2004.

CO's-PO's&PSO'sMAPPING

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

1-low,2-medium,3-high,'-'-nocorrelation

22152C15P **SEMESTER I**

SIGNALS AND SYSTEMS 4 0 0 4

(Common to ECE & IT)

AIM

To study and analyze the characteristics of continuous, discrete signals and systems.

OBJECTIVES

- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z-transforms.
- To study the analysis and synthesis of discrete time systems.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous time signals (CT signals), discrete time signals (DT signals) - step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, Random signals, Classification of systems (CT systems and DT systems) Linear time invariant systems.

UNIT II ANALYSIS OF CT SIGNALS 9

Fourier Transform and Laplace Transform in Signal Analysis. Fourier series, Fourier Transform and Laplace Transform properties, Parseval's relation.

UNIT III LTI-CT SYSTEMS 9

Differential equation, Block diagram representation, Impulse response, Convolution Integral, Frequency response, Fourier Methods and Laplace transforms in analysis.

UNIT IV SAMPLING THEOREM AND ANALYSIS OF DT- SIGNALS 9

Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals

Z-transform definition – region of convergence – properties of ROC – Properties of z transform – Poles and Zeros – inverse z-transform, Relationship between z-transform and Fourier transform.

UNIT V LTI-DT SYSTEMS 9

Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, Z-transform analysis.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOK

1. AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

REFERENCES

1. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
2. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999
3. K.Lindner, "Signals and Systems", McGraw Hill International, 1999.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	-	3	-	3	2	-	-	-	-	-	3	-	-	1
2	3	-	3	-	-	2	-	-	-	-	-	3	-	3	-
3	3	3	-	-	3	2	-	-	-	-	-	3	2	-	-
4	3	3	-	-	3	2	-	-	-	-	-	3	-	3	1
5	3	3	-	3	3	2	-	-	-	-	-	3	-	3	1
CO	**3**	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**3**	**1**

1-low,2-medium,3-high,'-'-nocorrelation

21148S21BP **SEMESTER II**

PROBABILITY AND RANDOM PROCESSES

3 1 0 4

AIM

This course aims at providing the necessary basic concepts in random processes. A knowledge of fundamentals and applications of phenomena will greatly help in the understanding of topics such a estimation and detection, pattern recognition, voice and image processing networking and queuing.

OBJECTIVES

At the end of the course, the students would

- Have a fundamental knowledge of the basic probability concepts.
- Have a well – founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Be able to analyze the response of random inputs to linear time invariant systems.

UNIT I PROBABILITY AND RANDOM VARIABLE 9

Axioms of probability - Conditional probability - Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 9

Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable (excluding theorm).

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression (for distributions only) - Transformation of random variables - Central limit theorem.

UNIT IV CLASSIFICATION OF RANDOM PROCESSES 9

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES 9

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Relationship between cross power spectrum and cross correlation function – Auto correlation and cross correlation functions of input and output.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Ross, S., "A First Course in Probability", Fifth edition, Pearson Education, Delhi, 2002.
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill Pubishers, Fourth Edition, New Delhi, 2002. (Chapters 6, 7 and 8).

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
CO2	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
CO3	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
CO4	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
CO5	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
CO6	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

22152C22P **SEMESTER II**

COMMUNICATION THEORY 3 1 0 4

AIM

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation, angle modulation and demodulation. Noise performance of various receivers and information theory with source coding theorem are also dealt.

OBJECTIVE

- To provide various Amplitude modulation and demodulation systems.
- To provide various Angle modulation and demodulation systems.
- To provide some depth analysis in noise performance of various receiver.
- To study some basic information theory with some channel coding theorem.

UNIT 1 AMPLITUDE MODULATION SYSTEMS 10

Review of spectral characteristics of periodic and non-periodic signals – Generation and demodulation of AM, DSBSC, SSB and VSB signals – Comparison of amplitude modulation systems – Frequency translation – FDM – Non-linear distortion.

UNIT II ANGLE MODULATION SYSTEMS 8

Phase and frequency modulation – Single tone – Narrow band and wideband FM – Transmission bandwidth – Generation and demodulation of FM signal.

UNIT III NOISE THEORY 8

Review of probability – Random variables and random process – Gaussian process – Noise – Shot noise – Thermal noise and white noise – Narrow band noise – Noise temperature – Noise figure.

UNIT IV PERFORMANCE OF CW MODULATION SYSTEMS 10

Superheterodyne radio receiver and its characteristic – SNR – Noise in DSBSC systems using coherent detection – Noise in AM system using envelope detection FM system – FM threshold effect – Pre-emphasis and de-emphasis in FM – Comparison of performances.

UNIT V INFORMATION THEORY 9

Discrete messages and information content – Concept of amount of information – Average information – Entropy – Information rate – Source coding to increase average information per bit – Shannon-fano coding – Huffman coding – Lempel-Ziv (LZ) coding – Shannon’s theorem – Channel capacity – Bandwidth – S/N trade-off – Mutual information and channel capacity – Rate distortion theory – Lossy source coding.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Dennis Roddy and John Coolen., "Electronic Communication", 4th Edition, PHI,1995.
2. Herbert Taub and Donald L Schilling., "Principles of Communication Systems", 3rd Edition, TMH, 2008.

REFERENCES

1. Simon Haykin., "Communication Systems", 4th Edition, John Wiley and Sons, 2001.
2. Bruce Carlson., "Communication Systems", 3rd Edition, TMH, 1996.
3. Lathi, B. P., "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford Press, 2007.
4. John G. Proakis, Masoud Salehi., "Fundamentals of Communication Systems", 5th Edition, Pearson Education, 2006.

CO's-PO's&PSO'sMAPPING

CO	Pos											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	3	3	3	2	1	1	-	-	-	1	1
2	3	3	3	3	2	1	1	-	-	-	1	1
3	3	3	3	3	3	1	1	-	-	-	1	1
4	3	3	3	3	3	1	1	-	-	-	1	1
	3	3	3	3	2	1	1	-	-	-	1	1
Avg	3	3	3	3	2.5	1	1	-	-	-	1	1

1-low,2-medium,3-high,'-'-nocorrelation

22152C23P **SEMESTER II**

LINEAR INTEGRATED CIRCUITS 3 1 0 4

AIM

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce a few special function integrated circuits.

UNIT I OP AMP CHARACTERISTICS AND APPLICATIONS 9

Ideal op amp, IC op amp, DC characteristics: bias, offset and drift, AC characteristics: bandwidth, slew rate, noise and frequency compensation, basic op amp application: scale changer, inverter and non inverter, summer & subtractor, , differentiator & integrator, instrumentation amplifier, V to I and I to V converter, RC active filters: low pass and band pass filters op amp circuits using diodes: precision rectifier, clipper and clamper,

UNIT II COMPARATORS AND SIGNAL GENERATORS 9

Comparator and applications of comparator, regenerative comparator (Schmitt trigger), square wave generator (astable multivibrator), monostable multivibrator Triangular wave generator, saw tooth wave generator sine wave generators

UNIT III ANALOG MULTIPLIER AND PLL 9

Multiplier, Applications of multiplier: multiplying DC voltages, frequency doubling, phase angle detection, AM modulation/demodulation. PLL: Basic principles, analog and digital phase detector and comparator Voltage controlled Oscillator, Applications of PLL

UNIT IV ADC AND DAC 9

Analog switches, High speed sample and hold circuits, characteristics DAC, Types of D/A converter, Current driven DAC, Switches for DAC, characteristics of A/D converter Types of A/D converter, - Single slope, Successive approximation.

UNIT V SPECIAL FUNCTION ICS 9

555 timer functional diagram,Astable and Monostable Multivibrators using 555 Timer, Voltage regulators-linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, and Isolation Amplifiers, Fiber optic ICs and Opto-couplers.

TUTORIAL 15 TOTAL : 60

TEXT BOOK

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES

1. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 2196.
2. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.
3. K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.
4. Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.
5. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits' Pearson Education, 2004.

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	2	-	-	-	-	-	-	-	-	-	1	-	2	1	1
2	2	3	3	2	-	-	-	-	-	-	-	-	2	1	1
3	1	-	-	2	-		-	-	-	-	-	-	2	1	1
4	1	-	-	2	-	-	-	-	-	-	-	-	2	1	1
5	1	2	3	3	-	-	-	-	-	-	-	3	2	1	1
C	**1.4**	**2.5**	**3**	**2.2**	-	-	-	-	-	-	**1**	**3**	**2**	**1**	**1**

1-low,2-medium,3-high,'-'-nocorrelation

22152C24P **SEMESTER II**

ELECTRONIC CIRCUITS -II 3 1 0 4

AIM

The aim of this course is to familiarize the student with the analysis and design of feed back amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators.

OBJECTIVES

On completion of this course the student will understand

- The advantages and method of analysis of feed back amplifiers
- Analysis and design of RC and LC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time based generators.

UNIT I : POWER AMPLIFIERS 9

Classification, Efficiency of Class A , RC coupled, Transformer coupled, Class B push pull, Complementary symmetry power amplifier, Power Output, Efficiency and Power Dissipation, cross over distraction & Elimination, Heat sink.

UNIT II: FEEDBACK AMPLIFIERS 9

Feedback concept, Four basic types of feedback, Equivalent Circuits of voltage amplifier, Current Amplifier ,Trans conductance, Trans resistance amplifier, Transfer ratio for negative feedback, Effect of feedback on noise, distortion gain input & output, impedance of the amplifier. Method of identifying feedback topology, Analysis of four types of feedback amplifier.

UNIT III: OSCILLATORS 9

Theory of Oscillator, Closed loop gain of the circuits, Barhausen Criterion. Analysis & Design of RC Phase Shift Oscillators, Wien Bridge Oscillator, Hartley Oscillator Colpitts Oscillator, crystal Oscillator, frequency Stability.

UNIT IV: TUNED AMPLIFERS 9

Tuned Circuit, Resonance, Q factor, Classification of tuned amplifier, Analysis of single tuned amplifier, Capacitance coupling, Effect of cascading single tuned amplifier on Band width, Double tuned amplifier, instability of tuned amplifiers- stabilization techniques, Narrow band neutralization using coil, Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

UNIT V: WAVE SHAPING, SWEEP & MULTIVIBRATOR CIRCUTS 9

RL & RC Integrator and Differentiator circuits. Voltage sweep circuit , Miller sweep generator, UJT saw tooth generator, current time base generator, Collector coupled Astable Multivibrator, Collector coupled Monosatble Multivibrator - Bistable Multivibrator - Schmitt trigger circuits.

TUTORIAL 15 **TOTAL : 60**

Text Books:

1. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill 1991
2. Schilling Charles Belove, " Electronic Circuits ", Third Edition, 2002.
3. Millman J. and Taub H., " Pulse Digital and Switching waveform ", McGraw Hill International.
4. Robert L. Boylest and Louis Nasheresky, "Electronic Devices and Circuits theory" 8th edn., PHI, 2002.

References:

1. Sedra / Smith, "Micro Electronic Circuits" Oxford University Press, 2004.
2. David A.Bell, "Solid State Pulse Circuits", Prentice Hall of India, 1992.

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	2	-	-	-	-	-	-	-	-	-	1	-	2	1	1
2	2	3	3	2	-	-	-	-	-	-	-	-	2	1	1
3	1	-	-	2	-		-	-	-	-	-	-	2	1	1
4	1	-	-	2	-	-	-	-	-	-	-	-	2	1	1
5	1	2	3	3	-	-	-	-	-	-	-	3	2	1	1
C	**1.4**	**2.5**	**3**	**2.2**	-	-	-	-	-	-	**1**	**3**	**2**	**1**	**1**

1-low,2-medium,3-high,'-'-nocorrelation

22152C25P **SEMESTER II**

TRANSMISSION LINES AND WAVEGUIDES 4 0 0 4

AIM

To lay a strong foundation on the theory of transmission lines and wave guides by highlighting their applications.

OBJECTIVES

- To become familiar with propagation of signals through lines
- Understand signal propagation at Radio frequencies
- Understand radio propagation in guided systems
- To become familiar with resonators

UNIT I TRANSMISSION LINE THEORY 9

Different types of transmission lines – Definition of Characteristic impedance and Propagation Constant, General Solution of the transmission line –wavelength and velocity of propagation. Waveform distortion – distortion less transmission line –Input impedance of lossless lines – reflection on a line not terminated by Z_o - reflection factor and reflection loss – Numerical problems.

UNIT II THE LINE AT RADIO FREQUENCIES 9

Standing waves and standing wave ratio on a line – One-eighth wave line – The quarter wave line and impedance matching – the half wave line – The Smith Chart – Application of the Smith Chart – Problems using smith chart (how to use smith chart and mark impedances, finding input impedance, SWR, reflection coefficient, finding load impedance) single stub matching - Numerical problems.

UNIT III GUIDED WAVES 9

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation. – Wave impedances – Numerical problems.

UNIT IV RECTANGULAR WAVEGUIDES 9

Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – cut-off wavelength and phase velocity - Dominant mode in rectangular waveguide –Wave impedance, Characteristic impedance - Numerical problems.

UNIT V CIRCULAR WAVE GUIDES AND RESONATORS 9

TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave cavities,

Rectangular cavity resonators, circular cavity resonator – Q factor of cavity resonator for TE101 mode - Numerical problems.

TUTORIAL 15 **TOTAL: 60**

TEXT BOOKS

1. J.D.Ryder "Networks, Lines and Fields", PHI, New Delhi, 2003. (Unit I & II)
2. E.C. Jordan and K.G.Balmain "Electro Magnetic Waves and Radiating System, PHI, New Delhi, 2003. (Unit III, IV & V)

REFERENCES

1. Ramo, Whineery and Van Duzer: "Fields and Waves in Communication Electronics" John Wiley, 2003.
2. David M.Pozar: Microwave Engineering – 2nd Edition – John Wiley.
3. David K.Cheng,Field and Waves in Electromagnetism, Pearson

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	2	-	-	-	-	-	-	-	-	-	1	-	2	1	1
2	2	3	3	2	-	-	-	-	-	-	-	-	2	1	1
3	1	-	-	2	-		-	-	-	-	-	-	2	1	1
4	1	-	-	2	-	-	-	-	-	-	-	-	2	1	1
5	1	2	3	3	-	-	-	-	-	-	-	3	2	1	1
C	**1.4**	**2.5**	**3**	**2.2**	-	-	-	-	-	-	**1**	**3**	**2**	**1**	**1**

1-low,2-medium,3-high,'-'-nocorrelation

22148S31BP **SEMESTER III**

NUMERICAL METHODS **3 1 0 4**

AIM

With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods.

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigenvalue problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9

Newton Raphson's method – Iteration method – Solution of linear system by Gaussian elimination and Gauss-Jordon methods- Iterative methods: Gauss Jacobi and Gauss-Seidel methods- Inverse of a matrix by Gauss Jordon method – Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION 9

Newton's forward and backward difference formulas – Central difference formula: Bessels and Stirling's formula - Lagrangian Polynomials – Divided difference method .

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Derivatives from difference tables – Divided differences and finite differences – Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor series method – Euler and modified Euler methods – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TUTORIAL 15 TOTAL : 60

TEXT BOOKS

1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.

REFERENCES

1. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.
2. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

22152C32P **SEMESTER III**

MICROPROCESSORS AND MICROCONTROLLERS

3 1 0 4

OBJECTIVES:

The student should be made to:

- Study the Architecture of 8086 microprocessor.
- Learn the design aspects of I/O and Memory Interfacing circuits.
- Study about communication and bus interfacing.
- Study the Architecture of 8051 microcontroller.

UNIT I THE 8086 MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation.

TUTORIAL: 15 Hrs **TOTAL: 45 PERIODS**

OUTCOMES:

At the end of the course, the student should be able to:

- Design and implement programs on 8086 microprocessor.
- Design I/O circuits.

- Design Memory Interfacing circuits.
- Design and implement 8051 microcontroller based systems.

TEXT BOOKS:

1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011.

REFERENCE:

1. Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware",TMH,2012

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2	PSO3
CO1	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO2	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO3	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO4	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
CO5	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

22152C33P **SEMESTER III**

DIGITAL SIGNAL PROCESSING **3 1 0 4**

AIM

To study the signal processing methods and processors.

OBJECTIVES

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

UNIT I FAST FOURIER TRANSFORM 9

Discrete Time Fourier Transform (DTFT), Introduction to DFT – Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 and Radix-4 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms

UNIT II IIR FILTER DESIGN 9

Structure of IIR – System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance. Bilinear transformation – Approximation derivatives – Design of IIR filter in the Frequency domain.

UNIT III FIR FILTER DESIGN 9

Symmetric & Antisymteric FIR filters – Linear phase filter – Windowing technique – Rectangular, Hamming– Frequency sampling techniques

UNIT IV FINITE WORD LENGTH EFFECTS 9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling

UNIT V POWER SPECTRUM ESTIMATION 9

Computation of Energy density spectrum – auto correlation and power spectrum of random signals. Periodogram – use of DFT in power spectrum estimation – Non parametric methods for power spectral estimation: Bartlett methods –Application of DSP – Model of Speech Wave Form – Vocoder.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOK

1. John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", PHI/Pearson Education, 2000, 3rd Edition.

REFERENCES

1. Alan V Oppenheim, Ronald W Schafer and John R Buck, "Discrete Time Signal Processing", PHI/Pearson Education, 2000, 2nd Edition.
2. Johny R.Johnson, "Introduction to Digital Signal Processing", Prentice Hall of India/Pearson Education, 2002.
3. Sanjit K.Mitra, "Digital Signal Processing: A Computer – Based Approach", Tata McGraw-Hill, 2001, Second Edition.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
2	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
3	3	3	**2**	2	2	2	-	-	-	-	1	1	1	2	2
4	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

22152C34P **SEMESTER III**

DIGITAL COMMUNICATION 3 1 0 4

AIM

To introduce the basic concepts of Digital Communication modulation to baseband, passband modulation and to give an exposure to error control coding and finally to discuss about the spread spectrum modulation schemes.

OBJECTIVES

- To know the principles of sampling & quantization
- To study the various waveform coding schemes
- To learn the various baseband transmission schemes
- To understand the various Band pass signaling schemes
- To know the fundamentals of channel coding

UNIT I SAMPLING & QUANTIZATION 9

Low pass sampling – Aliasing- Signal Reconstruction-Quantization - Uniform & non-uniform quantization - quantization noise - Logarithmic Companding of speech signal-PCM - TDM

UNIT II WAVEFORM CODING 9

Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles-Linear Predictive Coding

UNIT III BASEBAND TRANSMISSION 9

Properties of Line codes- Power Spectral Density of Unipolar / Polar RZ & NRZ – Bipolar NRZ - Manchester- ISI – Nyquist criterion for distortionless transmission – Pulse shaping – Correlative coding - Mary schemes – Eye pattern - Equalization

UNIT IV DIGITAL MODULATION SCHEME 9

Geometric Representation of signals - Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM - Carrier Synchronization - structure of Non-coherent Receivers - Principle of DPSK.

UNIT V ERROR CONTROL CODING 9

Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutional codes - Vitterbi Decoder

TUTORIAL 15 **TOTAL: 60**

Textbook:

1. S. Haykin, "Digital Communications", John Wiley, 2005.

Reference:

1. B. Sklar, "Digital Communication Fundamentals and Applications", 2nd Edition, Pearson Education, 2009
2. B.P.Lathi, "Modern Digital and Analog Communication Systems" 3rd Edition, Oxford University Press 2007.
3. H P Hsu, Schaum Outline Series - "Analog and Digital Communications", TMH 2006
4. J.G Proakis, "Digital Communication", 4th Edition, Tata Mc Graw Hill Company, 2001.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
2	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
3	3	3	**2**	2	2	2	-	-	-	-	1	1	1	2	2
4	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

22152L35P **SEMESTER III**

L	T	P	C
0	0	3	2

MICROPROCESSOR AND MICROCONTROLLER LABORATORY

OBJECTIVES:

The student should be made to:

- Introduce ALP concepts and features
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors
- Be familiar with MASM

LIST OF EXPERIMENTS:

8086 Programs using kits and MASM

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic and Matrix operations.
4. Floating point operations, string manipulations, sorting and searching
5. Password checking, Print RAM size and system date
6. Counters and Time Delay

Peripherals and Interfacing Experiments

7. Traffic light control
8. Stepper motor control
9. Digital clock
10. Key board and Display
11. Printer status
12. Serial interface and Parallel interface
13. A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM

14. Basic arithmetic and Logical operations
15. Square and Cube program, Find 2"s complement of a number
16. Unpacked BCD to ASCII

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course, the student should be able to:

- Write ALP Programmes for fixed and Floating Point and Arithmetic
- Interface different I/Os with processor
- Generate waveforms using Microprocessors
- Execute Programs in 8051
- Explain the difference between simulator and Emulator

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
1	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
2	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
3	3	3	**2**	2	2	2	-	-	-	-	1	1	1	2	2
4	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

22152C41P **SEMESTER IV**

MEDICAL ELECTRONICS 3 1 0 4

AIM

To make students to understand the applications of electronics in diagnostic and therapeutic area.

OBJECTIVE

- To study the methods of recording various biopotentials
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To understand the need and technique of electrical safety in Hospitals

UNIT I ELECTRO– PHYSIOLOGY AND BIO– POTENTIAL RECORDING 9

The origin of bio-potentials – Bio-potential electrodes – Biological amplifiers – ECG – EEG – EMG – PCG – EOG – Lead systems and recording methods – Typical waveforms and signal characteristics.

UNIT II BIO– CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

PH – PO2 – PCO2 – PHCO3 – Electrophoresis – Colorimeter – Photometer – Auto analyzer – Blood flow meter – Cardiac output – Respiratory measurement – Blood pressure – Temperature – Pulse – Blood cell counters.

UNIT III ASSIST DEVICES AND BIO– TELEMETRY 9

Cardiac pacemakers – DC defibrillator – Telemetry principles – Frequency selection – Bio-telemetry – Radio – Pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS 9

Ionosing radiation – Diagnostic X-ray equipments – Use of radio isotope in diagnosis – Radiation therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermo graph – Endoscopy unit – Laser in medicine – Diathermy units – Electrical safety in medical equipment.

TUTORIAL 15 **TOTAL: 60**

TEXTBOOK

1. Leislie Cromwell, "Biomedical Instrumentation and Measurement", PHI, 2002.

REFERENCES

1. Khandpur R.S., "Handbook of Biomedical Instrumentation", TATA McGraw-Hill, 1997.

2. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", John Wiley and Sons, 1997.

CO's-PO's&PSO'sMAPPING

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

1-low,2-medium,3-high,'-'-nocorrelation

22152C42P **SEMESTER IV**

ANTENNA AND WAVE PROPAGATION 3 1 0 4

AIM

To enable the student to study the various types of antennas and wave propagation.

OBJECTIVES

- To study radiation from a current element.
- To study antenna arrays
- To study aperture antennas
- To learn special antennas such as frequency independent and broad band antennas.
- To study radio wave propagation.

UNIT I : RADIATION 9

Concept of Vector potentials- Modification for Time varying , retarded case- Fields and radiation resistance of an alternating current element- -Radiation resistance –Effective length – Radiation intensity-Gain and Directivity-Field patterns- Beamwidth – Effective area-Relation between gain, effective length and radiation resistance.

UNIT II: ANTENNA ARRRAYS 9

Arrays of two point sources- Broadside array and End fire arrays – Binomial arrays - Pattern multiplication- Uniform linear array-

UNIT III : SPECIAL PURPOSE ANTENNAS 9

Radiation from traveling wave on wire- Rhombic antenna – Loop antennas- Three element Yagi antenna- Log periodic antenna- Horn antenna -

UNIT IV: PROPAGATION 9

Ground wave propagation: Attenuation characteristics – Calculation of field strength – Sky wave Propagation: Structure of Ionosphere – Effective dielectric constant of ionized region-Mechanism of Refraction and Refractive index- Critical Frequeny- Skip distance-Maximum usable frequency –Fading and Diversity Techniques.

Space Wave Propagation: Calculation of Field strength –-Duct propagation.

UNIT V : MEASUREMENTS 9

Impedance – Field Pattern and Gain of Antennas- Radiation Pattern –Ionospheric measurements-Vertical incidence measurements of the ionosphere- Relation between oblique and vertical incidence transmission.

TUTORIAL 15 **TOTAL: 60**

Text Books:

1. EDWARD C.JORDAN- Electromagnetic waves and Radiation systems – Asia Publication House, PHI, 1978, Reprint 2003.

Reference Books:

1. Jhon .D. Kraus and Ronalatory Marhefka- Antenna-T McGraw Hill – 2002
2. R.E.Collins-Antennas and Radio Propagation- McGrawhill- 1987
3. Ballany – Antenna Theory- Jhon wiley & sons – 2nd edition 2003.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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4	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

22152C43P **SEMESTER IV**

COMPUTER NETWORKS 4 0 0 4

AIM

To introduce the concept, terminologies, and technologies used in modern data communication and computer networking.

OBJECTIVES

- To introduce the students the functions of different layers.
- To introduce IEEE standard employed in computer networking.
- To make students to get familiarized with different protocols and network components.

UNIT I DATA COMMUNICATIONS 8

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DATA LINK LAYER 12

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.

LAN: Ethernet IEEE 802.3, IEEE 802.4, and IEEE 802.5 – IEEE 802.11–FDDI, SONET – Bridges.

UNIT III NETWORK LAYER 10

Internetworks - Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER 8

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER 7

Domain Name Space (DNS) – SMTP, FDP, HTTP, WWW – Security – Cryptography.

TOTAL : 45

TEXT BOOKS

1. Behrouz A. Foruzan, "Data communication and Networking", Tata McGraw-Hill, 2004.

REFERENCES

1. James .F. Kurouse & W. Rouse, "Computer Networking: A Topdown Approach Featuring", Pearson Education.
2. Larry L.Peterson & Peter S. Davie, "COMPUTER NETWORKS", Harcourt Asia Pvt. Ltd., Second Edition.
3. Andrew S. Tannenbaum, "Computer Networks", PHI, Fourth Edition, 2003.
4. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson Education, 2000.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

NETWORKS AND COMMUNICATION LAB 0 0 3 2

COURSEOBJECTIVES:

- To study the AM&FMModulationand Demodulation.
- To learn and realizetheeffectsofsamplingandTDM.
- To underst and thePCM&DigitalModulation.
- To Simulate DigitalModulationSchemes.
- To Implement Equalization Algorithms and Error Control Coding Schemes.

Part I: NETWORKS

1. PC to PC Communication
   Parallel Communication using 8 bit parallel cable
   Serial communication using RS 232C
2. Ethernet LAN protocol
   To create scenario and study the performance of CSMA/CD protocol ethrol simulation
3. Token bus and token ring protocols
   To create scenario and study the performance of token bus and token ring protocols through simulation
4. Wireless LAN protocols
   To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
5. Implementation and study of stop and wait protocol

Part II: COMMUNICATION

1. Modulation and Demodulation Characteristics of AM/FM Transmitter And Reciever.
2. Pulse modulation- PAM / PWM /PPM
3. Pulse code modulation
4. Digital modulation –ASK, PSK, QPSK, FSK
5. Experiments on Antenna:
   To plot and analyse the radiation patterns of the following antennas.
   Dipole
   Half Wave Dipole
   Monopole
   Yagi Antenna
6. Experiments on Coaxial Line Section:
   Measurement of VSWR

. Stub matching

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
2	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
3	3	3	**2**	2	2	2	-	-	-	-	1	1	1	2	2
4	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE - I

22152E44AP **SEMESTER IV**

HIGH SPEED NETWORKS 4 0 0 4

AIM

To highlight the features of different technologies involved in High Speed Networking and their performance.

OBJECTIVES

- Students will get an introduction about ATM and Frame relay.
- Students will be provided with an up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.

Students will be provided with different levels of quality of service (Q.S) to different applications.

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM Cell – ATM Service Categories – AAL.

High Speed LANs: Fast Ethernet, Gigabit Ethernet, Wireless LANs: applications, requirements – Architecture of 802.11

UNIT II LAN SWITCHING TECHNOLOGY 9

Switching concepts, switch forwarding techniques, switch path control, LAN switching, cut through forwarding, store and forward, Virtual LANs

UNIT III TCP AND ATM CONGESTION CONTROL 9

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm — Performance of TCP over ATM.

Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats,– GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V IP SWITCHING 9

Addressing model, IP Switching types-flow driven and topology driven solutions, IP Over ATM address and next hop resolution, multicasting,

TOTAL : 45

TEXT BOOK

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
1	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
2	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
3	3	3	**2**	2	2	2	-	-	-	-	1	1	1	2	2
4	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE - I

22152E44BP **SEMESTER IV**

ADVANCED DIGITAL SIGNAL PROCESSING 4 0 0 4

AIM

To introduce the student to advanced digital signal processing techniques.

OBJECTIVES

- To study the parametric methods for power spectrum estimation.
- To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
- To study multirate signal processing fundamentals.
- To study the analysis of speech signals.
- To introduce the student to wavelet transforms.

UNIT I DISCRETE RANDOM SIGNAL PROCESSING

Discrete Random Processes-, Autocorrelation and Auto covariance matrices. Parseval's Theorem, Wiener - Khintchine Relation- Power Spectral Density-Periodogram - Parameter estimation: Bias and consistency.

UNIT II SPECTRUM ESTIMATION

Non-Parametric Methods-Correlation Method, Periodogram Estimator, Performance Analysis of Estimators –Unbiased Consistent Estimators-; Bartlett, Blackman –Tukey method.

Parametric Methods - AR, MA, and ARMA model based spectral estimation.

UNIT III LINEAR ESTIMATION AND PREDICTION

Linear prediction- Forward and backward predictions, - Levinson-Durbin algorithms. Least mean squared error criterion -Wiener filter for filtering and prediction, FIR Wiener filter and Wiener IIR filters, Discrete Kalman filter

UNIT IV ADAPTIVE FILTERS

FIR adaptive filters -adaptive filter based on steepest descent method-Widrow-Hoff LMS adaptive algorithm Adaptive recursive filters (IIR). RLS adaptive filters-Exponentially weighted RLS-sliding window RLS.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING

Mathematical description of change of sampling rate - Interpolation and Decimation, Decimation by an integer factor - Interpolation by an integer factor, Filter implementation

for sampling rate conversion- Application to sub band coding and Filter bank implementation of wavelet expansion of signals.

REFERENCES:

1. Monson H.Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons, Inc., Singapore, 2002.
2. John G. Proakis, Dimitris G.Manolakis, Digital Signal Processing Pearson Education, 2002.
3. John G. Proakis et.al.,'Algorithms for Statistical Signal Processing', Pearson Education, 2002.
4. Dimitris G.Manolakis et.al.,'Statistical and adaptive signal Processing', McGraw Hill, Newyork,2000.

CO's-PO's&PSO'sMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
2	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
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5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE - I

22152E44CP **SEMESTER IV**

SPEECH PROCESSING 4 0 0 4

AIM

To introduce the characteristics of Speech signals and the related time and frequency domain methods for speech analysis and speech compression

OBJECTIVE

- To introduce the models for speech production
- To develop time and frequency domain techniques for estimating speech parameters
- To introduce a predictive technique for speech compression
- To understand speech recognition, synthesis and speaker identification.

UNIT I: NATURE OF SPEECH SIGNAL 9

Speech production mechanism – Classification of speech – Sounds – Nature of speech signal – Models of speech production

Speech Signal Processing: Purpose of speech processing – Digital models for speech signal – Digital processing of speech signals – Significance – Short time analysis.

UNIT II: TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time domain parameters of speech – Methods for extracting the parameters – Zero crossings – Auto correlation function – Pitch estimation.

UNIT III: FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9

Short time fourier analysis – Filter bank analysis – Spectrographic analysis – Format extraction – Pitch extraction – Analysis – Synthesis systems.

UNIT IV: LINEAR PREDICTIVE CODING OF SPEECH 9

Formulation of linear prediction problem in time domain – Solution of normal equations – Interpretation of linear prediction in auto correlation and spectral domains.

UNIT V: HOMOMORPHIC SPEECH ANALYSIS 9

Central analysis of speech – Format and pitch estimation – Applications of speech processing – Speech recognition – Speech synthesis and speaker verification.

Total: 45

TEXTBOOK

1. Rabiner L.R. and Schafer R.E, “Digital Processing of Speech Signals”, Prentice Hall, 1978.

REFERENCES

1. Flanagan J.L, "Speech Analysis Synthesis and Perception", 2nd Edition, Springer Vertag, 1972.
2. Witten I.H., "Principles of Computer Speech", Academic Press, 1983.

CO's-PO's&PSO'sMAPPING

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5	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE - I

22152E44DP **SEMESTER IV**

FUZZY LOGIC AND NEURAL NETWORKS 4 0 0 4

AIM

To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing

UNIT I: Primer on Fuzzy Sets **9**

Crisp sets, from crisp sets to fuzzy sets , Linguistic variables ,Membership functions Some terminology , Set theoretic operations for crisp sets , Set theoretic operations for fuzzy sets , membership functions

UNIT II: Fuzzy Logic Systems **9**

Introduction , Rules , Fuzzy Inference Engine , Fuzzification and Its Effect on Inference Fuzzifier , Fuzzy inference engine, Defuzzification, Centroid defuzzifier , Center-of-sums defuzzifier

UNIT III: Neural Nets Introduction and Overview **9**

Perceptrons,Least Mean Square Learning Systems , Multilayer Neural Networks Back-Propagation The Practical Application of Back-Propagation

Error Rate and Complexity Fit Estimation Improving on Standard Back-Propagation

UNIT IV: Radial Basis Function Networks **9**

Ill-Posed Problems and the Regularization Technique , Stabilizers and Basis Functions, Generalized Radial Basis Function Networks, Moving Centers Learning, Regularization

with Nonradial Basis Functions, Orthogonal Least Squares, Optimal Subset Selection by Linear

UNIT V: ANFIS: Adaptive Neuro-Fuzzy Inference Systems 9

Introduction , ANFIS Architecture , Hybrid Learning Algorithm , Learning Methods that Cross-fertilize ANFIS and RBFN , ANFIS as a Universal Approximator

TOTAL : 45

Textbook:

1. Bart Kosko, Neural networks and fuzzy systems: a dynamical systems approach to machine intelligence, Prentice-Hall, Inc., Upper Saddle River, NJ, 1991

Reference:

1. Kin, S. (1999), Neural Networks: A Comprehensive Foundation, 2nd ed.,Upper Saddle River, NJ: Prentice Hall, ISBN 0-13-273350-1.
2. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani (1997)" Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, | Prentice Hall

CO's-PO's&PSO'sMAPPING

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CO	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**2**	**2**

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE - I

22152E44EP **SEMESTER IV**

ADVANCED ELECTRONIC SYSTEM DESIGN 4 0 0 4

AIM

To get knowledge about usage of electronic devices in Communication Engineering and Power supplies.

OBJECTIVE

- To study RF component such as resonator, filter, transmission lines, etc…
- To learn design of RF amplifiers using transistors.
- To study modern Power Supplies using SCR and SMPS technology
- To learn about signal shielding & grounding techniques and study of A/D and D/A Converters.
- To learn knowledge about fabrication of PCBs using CAD.

UNIT I: INTRODUCTION TO RF DESIGN 9

RF behaviour of passive components – Chip components and circuit board considerations – Review of transmission lines – Impedance and admittance transformation – Parallel and series connection of networks – ABCD and scattering parameters – Analysis of amplifier using scattering parameter – RF filter – Basic resonator and filter configurations – Butterworth and chebyshev filters – Implementation of microstrip filter design – Band pass filter and cascading of band pass filter elements.

UNIT II: RF TRANSISTOR AMPLIFIER DESIGN 9

Impedance matching using discrete components – Microstrip line matching networks – Amplifier classes of operation and biasing networks – Amplifier power gain– Unilateral design(S_{12} =0) – Simple input and output matching networks – Bilateral design – Stability circle and conditional stability – Simultaneous conjugate matching for unconditionally stable transistors – Broadband amplifiers – High power amplifiers and multistage amplifiers.

UNIT III: DESIGN OF POWER SUPPLIES 9

DC power supply design using transistors and SCR's – Design of crowbar and foldback protection circuits – Switched Mode Power Supplies(SMPS) – Forward – Fly back-buck and boost converters – Design of transformers and control circuits for SMPS.

UNIT IV: DESIGN OF DATA ACQUISITION SYSTEMS 9

Amplification of low level signals – Grounding – Shielding and guarding techniques – Dual slope – Quad slope and high speed A/D converters – Microprocessors compatible

A/D converters – Multiplying A/D converters and logarithmic A/D converters – Sample and hold – Design of two and four wire transmitters.

UNIT V: DESIGN OF PRINTED CIRCUIT BOARDS 9

Introduction to technology of Printed Circuit Boards (PCB) – General lay out and rules and parameters – PCB design rules for digital – High frequency – Analog – Power electronics and microwave circuits – Computer Aided Design(CAD) of PCB's.

Total: 45

TEXT BOOKS:

1. Reinhold Luduig and Pavel Bretchko, "RF Circuit Design – Theory and Applications", Pearson Education, 2000.
2. Sydney Soclof, "Applications of Analog Integrated Circuits", PHI, 1990.
3. Walter C. Bosshart, "Printed Circuit Boards – Design and Technology", TMH, 1983.

REFERENCES

1. Keith H. Billings, "Handbook of Switched Mode Supplies", TMH Publishing Co., 1989.
2. Michael Jaacob, "Applications and Design with Analog Integrated Circuits", PHI, 1991.
3. Otmar Kigenstein, "Switched Mode Power Supplies in Practice", John Wiley and Sons, 1989.
4. Muhammad H. Rashid, "Power Electronics – Circuits, Devices and Applications",

CO's-PO's&PSO'sMAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

22152C51P **SEMESTER V**

OPTICAL COMMUNICATION AND NEWORKS 4 0 0 4

AIM

- To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- To study about various optical sources and optical detectors and their use in the optical communication system. Finally to discuss about digital transmission and its associated parameters on system performance.

OBJECTIVES

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

UNIT I INTRODUCTION TO OPTICAL FIBERS 9

Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –fiber types Mode theory of Circular Wave guides- Overview of Modes- Key model concepts- Linearly Polarized Modes – Single Mode Fibers-

UNIT II SIGNAL DEGRADATION OPTICAL FIBERS 9

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination – Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers -Mode Coupling

UNIT III FIBER OPTICAL SOURCES AND COUPLING 9

Direct and indirect Band gap materials-LED structures –Quantum efficiency Modulation of a LED, lasers Diodes-Modes and Threshold condition Fiber amplifiers- Power Fibre – to- Fibre joints, Fibre splicing.

UNIT IV FIBER OPTICAL RECEIVERS 9

PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error

UNIT V DIGITAL TRANSMISSION SYSTEM 9

Point-to-Point links System considerations –Link Power budget –Rise - time budget – Noise Effects on System Performance-Operational Principles of WDM, Solitons-. Basic on concepts of SONET/SDH Network.

TOTAL : 45

TEXT BOOK

1. Gerd Keiser, "Optical Fiber Communication" McGraw –Hill International, Singapore, 3rd ed., 2000

REFERENCES

1. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.
2. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

CO's-PO's&PSO'sMAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
2	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
3	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
4	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
5	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
Avg.	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-

1-low,2-medium,3-high,'-'-nocorrelation

22152C52P **SEMESTER V**

MICROWAVE ENGINEERING 4 0 0 4

Aim

To enable the student to become familiar with active & passive microwave devices & components used in Microwave communication systems.

Objectives

- To study passive microwave components and their S- Parameters.
- To study Microwave semiconductor devices & applications.
- To study Microwave sources and amplifiers.

Unit – I: Introduction **9**

Radio Spectrum – Microwave Frequency and its characteristics – Transmission media for microwave signals – Waveguides – Scattering Parameters for microwave network (two ports)

Unit – II: Passive Microwave Devices **9**

Isolators, Attenuators, Directional Couplers – Waveguide Tees – E- plane, H-Plane and Magic Tee –- Matched Terminators – S – parameters for all the components

Unit – III: Microwave Sources **9**

Klystron Oscillator – Magnetron Oscillator– TWTA Amplifier – Power output and efficiency equations for all the devices

Unit – IV: Semiconductor Microwave Devices **9**

PIN Diode – Varactor Diode (Manley – Rowe Power Relation) – Tunnel Diode – Gunn Diode – Applications of all the diodes –

Unit – V Microwave Measurements **9**

Power Measurements – Frequency Measurements – VSWR Measurements (High and Low VSWR) – Attenuation Measurements – Insertion Loss Measurements

TOTAL : 45

Text Book:

1. Samuel Y.LIAO : Microwave Devices and Circuits – Prentice Hall of India – 3rd Edition (2003)
2. Annapurna Das and Sisir K.Das: Microwave Engineering – Tata McGraw-Hill (2000) (UNIT V)

Reference:

1. R.E. Collin : Foundations for Microwave Engg. – IEEE Press Second Edition (2002)
2. David M.POZAR : Microwave Engg. – John Wiley & Sons – 2nd Edition (2003)
3. P.A.RIZZI – Microwave Engg. (Passive)

CO's-PO's&PSO'sMAPPING

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

1-low,2-medium,3-high,'-'-nocorrelation

22160C53P **SEMESTER V**

PRINCIPLES OF MANAGEMENT

4 0 0 4

COURSEOBJECTIVES:

- Sketch the Evolution of Management.
- Extract the functions and principles of management.
- Learn the application of the principles in an organization.
- Study the various related activities.
- Analyze the position of self and company goals to wards business.

UNIT I - Nature of Management **9**

Definitions, meaning, scope, administration and management - Science and art Mgmt as a profession, University of management Hierarchy (Top, middle and supervisory, Levels), Principles of Management

UNIT II - Development of Management Thought **9**

Taylor and Scientific Management, Principles of Scientific Management Contributions of fayol,Barnard and social system theory, Contributions of Herbert Simon, Contributions of Peter Drucker, Contributions of behavioral scientists ,Contribution of system scientists

UNIT III - Planning and organizing **9**

Definition and features of planning, Nature of planning, Importance of planning
Types of planning, Steps in planning. Management by objectives, Strategies and policies, Definition of organization, Importance of organization, Principles of organization, Span of management

UNIT IV - Direction and Coordination **9**

Meaning, definition, principles of direction, Techniques of direction - Meaning of supervision, Functions of supervisor, Meaning of coordination Element and features of coordination, Importance of coordination Cooperation and coordination systems approach Steps for effective coordination Meaning and causes of conflicts, Management of conflicts

UNIT V – Controlling **9**

Definition, Meaning .elements, steps in establishing control procedure Control Techniques, Requirements of good control systems Budget –meaning, definitions, types Zero based budgeting, responsibility accounting, budgetary control, Report –meaning types PERT and CPM Management by Exception

TOTAL : 45

Textbooks:

1. Prasad L.M ., Principles and practice of Management ,New Delhi Sultan Chand and sons ,1998

References:

1. Saxena ,S.C principles and practice of management Agra : sahitya bhawan 1998
2. Koontz Harold and others ,Management New York :McGraw Hill 1980
3. Stoner James and others ,Management ,New Delhi :PHI ,1997
4. Dale Yoder : Personnel Management and industrial Relations ,New Delhi, PHI 1974

CO's-
PO's&PSO'sMAPPING

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

1-low,2-medium,3-high,'-'-nocorrelation

22152L55P **SEMESTER V**

OPTICAL COMMUNICATION AND MICROWAVE LAB

0 0 3 2

COURSEOBJECTIVES:

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyze concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to communicate effectively through formal and informal writing.
- To be able to use appropriate language structures to write emails ,reports and essays
- To give instructions and recommendations that are clear and relevant to the context

Part I: Experiments pertaining to Fiber optics

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.
2. Mode Characteristics of Fibers – SM Fibers.
3. Coupling Fibers to Semi-Conductor Sources – Connectors & Splices.
4. Fiber optic communication links.
5. LED & Photo Diode Characteristics.

Part II: Experiments pertaining to Microwave

1. VSWR Measurements – Determination of terminated impedance
2. Determination of guide wavelength, frequency measurement.
3. Radiation Pattern of Horns, Paraboloids.
4. Microwave Power Measurement.
5. Characteristics of Gunn diode Oscillator.

LEARNINGOUTCOMES

CO1:Speak effectively in group discussion she ldinformal /semiformal contexts.

CO2:Discuss ,analyse and present concepts and problems from various perspectives to arriveat suitable solutions

CO3:Writeemails, lettersandeffectivejobapplications.

CO4:Write critical reports to convey data and information with clarity and precision

CO5:Give appropriate instructions and recommendations for safe execution of tasks

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

ELECTIVE- II

22152E54AP **SEMESTER V**

ENVIRONMENTAL SCIENCE AND ENGINEERING 4 0 0 4

UNIT:I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Definition, Scope and importance − Need for public awareness − Forest resources −Water resources − Energy resources − Land resources − Role of an individual in conservation of natural resources − Equitable use of resource for sustainable life styles.

UNIT:II ECOSYSTEM AND BIODIVERSITY 9

Concept of an ecosystem − structure and Function of An ecosystem - Producers, consumers and decomposers − Energy flow in the ecosystem − Ecological succession − Food chains Food web and ecological pyramids. Introduction to Biodiversity − Value of Biodiversity − Biodiversity at global, National and local levels − India as a mega − diversity nation Hot spots of Biodiversity − Threats to Biodiversity Endangered and endemic species of India − Insitu and Excitu conservation of Biodiversity.

UNIT:III ENVIRONMENTAL POLLUTION 9

Definition − Causes, effects and control measure of **: -** Air pollution **-** Water Pollution **-** Soil Pollution **-** Marine Pollution **-** Noise Pollution **-**Thermal Pollution **-** Nuclear hazard − Solid Waste management − Role of Individual in prevention of pollution − Disaster management.

UNIT:IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From Un sustainable to sustainable development − water conservation,Rain water harvesting, water shed Management − Global warming − Ozone layer Depletion − Acid rain − Nuclear Accidents and holocaust − Environment Protection Act, Issues involved in enforcement legislation.

UNIT :V HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth − Population explosion − Family welfare programme − Environment and human health − Human rights − value education − HIV/AIDS− Role of Information Technology in Environment and human health.

Total = 45

TEXT BOOK

1. Gilbert M Masters,“ Introduction to Environmental Engineering and science, ”Second Edition , Pearson Education Pvt, Ltd, 2007.
2. Miller T.G.Jr. “ Environmental science,”, Wadworth Publishing Co.

REFERENCES

1. Kurian Joseph, "Essentials of Environmental studies", First edition, Pearson Education, 2004.
2. BharuchaErach, " The Biodiversity of India ," Mapin Publishing Pvt,Ltd.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1		3										3	2		3
2						3						3		2	
3					3				3					2	3
4		2			3	2	3	2				3	3	2	
5			3			3	3	2							
AVg.		2.5	3		3	2.6	3	2	3			3	2.5	2	3

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE- II

22152E54BP **SEMESTER V**

OPTO ELECTRONIC DEVICES 4 0 0 4

AIM

To learn different types of optical emission, detection, modulation and opto electronic integrated circuits and their applications.

OBJECTIVE

- To know the basics of solid state physics and understand the nature and characteristics of light.
- To understand different methods of luminescence, display devices and laser types and their applications.
- To learn the principle of optical detection mechanism in different detection devices.
- To understand different light modulation techniques and the concepts and applications of optical switching.
- To study the integration process and application of opto electronic integrated circuits in transmitters and receivers.

UNIT I: ELEMENTS OF LIGHT AND SOLID STATE PHYSICS 9

Wave nature of light – Polarization – Interference – Diffraction – Light source – Review of quantum mechanical concept – Review of solid state physics – Review of semiconductor physics and semiconductor junction device.

UNIT II: DISPLAY DEVICES AND LASERS 9

Introduction – Photo luminescence – Cathode luminescence – Electro luminescence – Injection luminescence – Injection luminescence – LED – Plasma display – Liquid Crystal Display (LCD) – Numeric displays – Laser emission – Absorption – Radiation – Population inversion – Optical feedback – Threshold condition – Laser modes – Classes of lasers – Mode locking – Laser applications.

UNIT III: OPTICAL DETECTION DEVICES 9

Photo detector – Thermal detector – Photo devices – Photo conductors – Photo diodes – Detector performance.

UNIT IV: OPTOELECTRONIC MODULATOR 9

Introduction – Analog and digital modulation – Electro-optic modulators – Magneto optic devices – Acoustoptic devices – Optical – Switching and logic devices.

UNIT V: OPTOELECTRONIC INTEGRATED CIRCUITS 9

Introduction – Hybrid and monolithic integration – Application of opto electronic integrated circuits – Integrated transmitters and receivers – Guided wave devices.

Total: 45

TEXTBOOK

1. Wilson J and Haukes J., "Opto Electronics – An Introduction", PHI Pvt. Ltd., 1995.

REFERENCES

1. Bhattacharya, "Semiconductor Opto Electronic Devices", PHI Pvt Ltd., 1995.
2. Jasprit Singh, "Opto Electronics – As Introduction to Materials and Devices", TMH International Edition, 1998.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE- II

22152E54CP **SEMESTER V**

RADAR AND NAVIGATIONAL AIDS 4 0 0 4

AIM

To make the student understand the principles of Radar and its use in military and civilian environment

Also to make the student familiar with navigational aids available for navigation of aircrafts and ships.

OBJECTIVES

- To derive and discuss the Range equation and the nature of detection.
- To apply doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars
- To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
- To understand principles of navigation, in addition to approach and landing aids as related to navigation
- To understand navigation of ships from shore to shore.

UNIT I INTRODUCTION TO RADAR 9

Basic radar – The simple form of the radar equation – Radar block diagram – Radar frequencies – Applications of radar – The origins of radar – The radar equation – Introduction – Detection of signals in noise – Receiver noise and the signal-to-noise ratio – Probability density functions – Probabilities of detection and false alarm – Integration of radar pulses – Radar cross section of targets – Radar cross section fluctuations – Transmitter power – Pulse repetition frequency – Antenna parameters – System losses – Other radar equation considerations

UNIT II: MTI AND PULSE DOPPLER RADAR 9

Introduction to Doppler and MTI radar – Delay-line cancellers – Staggered pulse repetition frequencies – Doppler filter banks – Digital MTI processing – Moving target detector – Limitations to MTI performance – MTI from a moving platform (AMIT) – Pulse Doppler radar – Other Doppler radar topics – Tracking with radar – Mono pulse tracking – Conical scan and sequential lobing – Limitations to tracking accuracy – Low – Angle tracking – Tracking in range – Other tracking radar topics – Comparison of trackers – Automatic tracking with surveillance radars (ADT).

UNIT III **9**

Detection of signals in noise – Introduction – Matched – Filter receiver – Detection – Detectors – Automatic detector – Integrators – Constant – False – Alarm rate receivers – The radar operator – Signal management – Propagation radar waves – Atmospheric – Standard propagation – Nonstandard propagation – The radar antenna – Reflector antennas – Electronically steered phased array antennas – Phase shifters – Frequency – Scan arrays – Radar transmitters – Introduction – Linear beam power tubes – Solid state RF power sources – Magnetron – Crossed field amplifiers – Other RF power sources – Other aspects of radar transmitter – Radar receivers – The radar receiver – Receiver noise figure – Super heterodyne receiver – Duplexers and receiver protectors – Radar displays.

UNIT IV **9**

Introduction – Four methods of navigation – Radio direction finding – The loop antenna – Loop input circuits – An aural null direction finder – The goniometer – Errors in direction finding – Adcock direction finders – Direction finding at very high frequencies – Automatic direction finders – The commutated aerial direction finder – Range and accuracy of direction finders – Radio ranges **–** The Lf/Mf four course radio range – Vhf omni directional range (Vor) – Vor receiving equipment – Range and accuracy of Vor – Recent developments – Hyperbolic systems of navigation (loran and decca) **–** Loran-A equipment – Range and precision of standard loran – Loran-C – The decca navigation system – Decca receivers – Range and accuracy of decca – The omega system

UNIT V **9**

DME and TACAN – Distance measuring equipment – Operation of DME – TACAN – TACAN equipment – Aids to approach and landing – Instrument landing system – Ground controlled approach system – Microwave Landing System (MLS) – Doppler navigation – The Doppler effect – Beam configurations – Doppler frequency equations – Track stabilization – Doppler spectrum – Components of the Doppler navigation system – Doppler range equation – Accuracy of Doppler navigation systems –Inertial navigation – Principles of operation – Navigation over the earth – Components of an inertial navigation system – Earth co-ordinate mechanization – Strapped – Down systems – Accuracy of inertial navigation systems – Satellite navigation system – The transit system – Navstar Global Positioning System (GPS)

Total: 45

TEXTBOOK

1. Merrill I. Skolnik , “Introduction to Radar Systems”, 3rd Edition, TMH, 2003.

REFERENCES

1. Peyton Z. Peebles, “Radar Principles”, John wiley, 2004
2. Toomay J.C, “Principles of Radar”, 2nd Edition, PHI, 2004

CO's-PO's&PSO'sMAPPING

1-low,2-medium,3-high,'-'-nocorrelation

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

ELECTIVE- II

22152E54DP **SEMESTER V**

DIGITAL IMAGE PROCESSING 4 0 0 4

AIM

To introduce the student to various image processing techniques.

OBJECTIVES

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

UNIT - I: DIGITAL IMAGE FUNDAMENTALS 9

Elements of visual perception – Image sampling, Quantization – Basic relationship between pixels- monochrome vision model- color space model-convolution.

UNIT – II IMAGE TRANSFORM 9

Basic geometric transforms-Introduction to Fourier transform and DFT – properties of 2D Fourier transform – FFT- Separable image transforms – Walsh – Hadamard- Discrete cosine and Haar Transfroms

UNIT-III: IMAGE ENHANCEMENT AND RESTORATION TECHNIQUES 9

Spatial domain methods- Basic gray level transformation-Histogram equalization-Spatial filtering-Laplacian filtering- Frequency Domain filters- homomorphic filtering-Model of image degradation/Restoration process- Noise models.

UNIT IV:IMAGE COMPRESSION 9

Lossless compression-: Variable length coding- LZW coding- -Predictive coding-DPCM. Lossy compression- Transform coding-– Image compression standards-JPEG,MPEG.

UNIT – V:IMAGE SEGMENTATION & REPRESENTATION 9

Edge detection – Thresholding- region based segmentation- Boundary representation – chair codes- Boundary segments – boundary descriptors-: simple descriptors-Fourier descriptors- Regional descriptors- Texture.

TOTAL : 45

Text Book:

2. Rafeel C. Gonzalez,Richard E woods 2nd edition – Digital Image processing – Pearson education 2003.

Reference books:

1. William K.Pratt, Digital Image processing, John Wiley (2001)
2. Image processing Analysis and Machine Vision - Millman Sonka ,Vaclav hlavac,Roger Boyle,Broos/Colic,Thompson Learnfy(1999)
3. A.K.Jain PHI,(1995) – Fundamentals of Digital Image processing

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE- II

22152E54EP **SEMESTER V**

ENGINEERING ACOUSTICS **4 0 0 4**

AIM

This course aims at providing an overview of engineering acoustics.

OBJECTIVE

- To provide mathematical basis for acoustics waves
- To introduce the concept of radiation reception absorption and attenuation of acoustic waves.
- To present the characteristic behaviour of sound in pipes, resonators and filters.
- To introduce the properties of hearing and speech
- To describe the architecture and environmental inclusive of reverberation and noise.
- To give a detailed study on loud speakers and microphones.

UNIT I:

Acoustics waves – Linear wave equation – Sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – Spherical waves – Describer scales.

Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence – Method of images.

UNIT II: RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

Radiation from pulsating sphere – Acoustic reciprocity – Continuous line source – Radiation impedance – Fundamental properties of transducers.

Absorption and attenuation of sound: Absorption from viscosity – Complex sound speed and absorption – Classical absorption co-efficient

UNIT III: PIPE RESONATORS AND FILTERS 9

Resonance in pipes – Standing wave pattern absorption of sound in pipes – Long wavelength limit – Helmoltz resonator – Acoustic impedance – Reflection and transmission of waves in pipe – Acoustic filters – Low pass, high pass and band pass.

Noise, Signal detection, Hearing and speech: Noise, spectrum level and band level – Combing band levels and tones – Detecting signals in noise – Detection threshold – The ear – Fundamental properties of hearing – Loudness level and loudness – Pitch and frequency – Voice.

UNIT IV: ARCHITECTURAL ACOUSTICS 9

Sound in endosure – A simple model for the growth of sound in a room – Reverberation time – Sabine, sound absorption materials – Measurement of the acoustic output of sound sources in live rooms – Acoustics factor in architectural design.

Environmental Acoustics: Weighted sound levels speech interference – Highway noise Noise induced hearing loss – Noise and architectural design specification and measurement of some isolation design of portions.

UNIT V: TRANSDUCTION 9

Transducer as an electives network – Canonical equation for the two simple transducers transmitters – Moving coil loud speaker – Loudspeaker cabinets – Horn loud speaker, receivers – Condenser – Microphone – Moving coil electrodynamics microphone Piezoelectric microphone – Calibration of receivers.

Total: 45

TEXT BOOK

1. Lawerence E. Kinsler, Austin R. Frey, Alan B. Coppens and James V. Sanders, "Fundamentals of Acoustics", 4th Edition, Wiley, 2000.

REFERENCE

1. Berarek L., "Acoustics", TMH, 2002.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

22152C61P **SEMESTER VI**

WIRELESS COMMUNICATION **4 0 0 4**

Objectives

- Know the characteristic of wireless channel
- Learn the various cellular architectures
- Understand the concepts behind various digital signaling schemes for fading channels
- Be familiar the various multipath mitigation techniques
- Understand the various multiple antenna systems

UNIT I WIRELESS CHANNELS 9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II CELLULAR ARCHITECTURE 9

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS 9

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V MULTIPLE ANTENNA TECHNIQUES 9

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

Total: 45

TEXT BOOKS:

1. Rappaport,T.S., "Wireless communications", Second Edition, Pearson Education, 2010.
2. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.

REFERENCES:

1. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
2. Upena Dalal, " Wireless Communication", Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, "OFDM for wireless multimedia communications", Artech House, 2000.

CO's-PO's&PSO'sMAPPING

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

1-low,2-medium,3-high,'-'-nocorrelation

22152C62P **SEMESTER VI**

VLSI DESIGN **3 1 0 4**

AIM

To introduce the technology, design concepts and testing of Very Large Scale Integrated Circuits.

OBJECTIVES

- In this course, the MOS circuit realization of the various building blocks that is common to any microprocessor or digital VLSI circuit is studied.
- Architectural choices and performance tradeoffs involved in designing and realizing the circuits in CMOS technology are discussed.
- The main focus in this course is on the transistor circuit level design and realization for digital operation and the issues involved as well as the topics covered are quite distinct from those encountered in courses on CMOS Analog IC design.

UNIT I MOS TRANSISTOR PRINCIPLE 9

NMOS and PMOS transistors, Process parameters for MOS and CMOS, Electrical properties of CMOS circuits and device modeling, Scaling principles and fundamental limits, CMOS inverter scaling, propagation delays, Stick diagram, Layout diagrams

UNIT II COMBINATIONAL LOGIC CIRCUITS 9

Examples of Combinational Logic Design, Elmore‟s constant, Pass transistor Logic, Transmission gates, static and dynamic CMOS design, Power dissipation – Low power design principles

UNIT III SEQUENTIAL LOGIC CIRCUITS 9

Static and Dynamic Latches and Registers, Timing issues, pipelines, clock strategies, Memory architecture and memory control circuits, Low power memory circuits, Synchronous and Asynchronous design

UNIT IV DESIGNING ARITHMETIC BUILDING BLOCKS 9

Data path circuits, Architectures for ripple carry adders, carry look ahead adders, High speed adders, accumulators, Multipliers, dividers, Barrel shifters, speed and area tradeoff

UNIT V IMPLEMENTATION STRATEGIES 9

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TUTORIAL 15 **TOTAL : 60**

TEXTBOOKS:

1. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated Circuits: A Design Perspective", Second Edition, Prentice Hall of India, 2003.
2. M.J. Smith, "Application Specific Integrated Circuits", Addisson Wesley, 1997

REFERENCES:

1. N.Weste, K.Eshraghian, "Principles of CMOS VLSI Design", Second Edition, Addision Wesley 1993
3. R.Jacob Baker, Harry W.LI., David E.Boyee, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India 2005
4. A.Pucknell, Kamran Eshraghian, "BASIC VLSI Design", Third Edition, Prentice Hall of India, 2007.

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	1	1	-	-	-	-	-	-	-	-	-	-	3	3	3
2	3	2	3	2	-	-	-	-	-	-	-	1	3	3	3
3	2	3	2	3	1	1	-	-	-	-	-	2	3	2	3
4	-	-	1	1	-	-	-	-	-	-	-	3	3	3	2
5	-	-	-	-	-	2	-	-	-	-	1	-	3	2	2
C	**2**	**2**	**2**	**2**	**1**	**1.5**	-	-	-	-	**1**	**2**	**3**	**3**	**3**

1-low,2-medium,3-high,'-'-nocorrelation

22152C63P **SEMESTER VI**

3 1 0 4

EMBEDDED AND REAL TIME SYSTEMS

OBJECTIVES:

The student should be made to:

- Understand the concepts of embedded system design and analysis
- Learn the architecture and programming of ARM processor
- Be exposed to the basic concepts of embedded programming
- Learn the real time operating systems

UNIT I INTRODUCTION TO EMBEDDEDSYSTEM DESIGN 9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT II ARM PROCESSOR AND PERIPHERALS 9

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT III EMBEDDED PROGRAMMING 9

Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT IV REAL TIME SYSTEMS 9

Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronisation.

UNIT V PROCESSES AND OPERATING SYSTEMS 9

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

Tutorial: 15 Hrs **TOTAL: 45 PERIODS**

OUTCOMES:

At the end of the course, the student should be able to:

- Describe the architecture and programming of ARM processor
- Outline the concepts of embedded systems
- Explain the basic concepts of real time operating system design
- Model real-time applications using embedded-system concepts

TEXT BOOKS:

1. Marilyn Wolf, ―Computers as Components - Principles of Embedded Computing System
2. Design‖, Third Edition ―Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)
3. Jane W.S.Liu,‖ Real Time Systems‖, Pearson Education, Third Indian Reprint, 2003. (UNIT IV)

REFERENCES:

1. Lyla B.Das, ―Embedded Systems : An Integrated Approach‖ Pearson Education, 2013.
2. Jonathan W.Valvano, ―Embedded Microcomputer Systems Real Time Interfacing‖, Third Edition Cengage Learning, 2012.
3. David. E. Simon, ―An Embedded Software Primer‖, 1st Edition, Fifth Impression, Addison Wesley Professional, 2007.
4. Raymond J.A. Buhr, Donald L.Bailey, ―An Introduction to Real-Time Systems-From Design to Networking with C/C++‖, Prentice Hall, 1999.
5. C.M. Krishna, Kang G. Shin, ―Real-Time Systems‖, International Editions, Mc Graw Hill 1997
6. K.V.K.K.Prasad, ―Embedded Real-Time Systems: Concepts, Design & Programming‖, Dream Tech Press, 2005.
7. Sriram V Iyer, Pankaj Gupta, ―Embedded Real Time Systems Programming‖, Tata Mc Graw Hill, 2004.

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	3	3	3	2	2	-	-	-	-	-	-	-	3	2	1
2	3	3	3	2	2	-	-	-	-	-	-	-	3	2	1
3	3	3	2	2	2	-	-	-	-	-	-	-	2	1	1
4	3	3	2	2	2	-	-	-	-	-	-	-	3	3	2
5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
C	**3**	**3**	**2.6**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.8**	**2.2**	**1.4**

1-low,2-medium,3-high,'-'-nocorrelation

22152L65P **SEMESTER VI**

VLSI AND EMBEDDED SYSTEMS LAB **0 0 3 2**

COURSEOBJECTIVES:

- Learn the architectureandfeaturesof8051.
- Study the design process of an embedded system.
- Understand the real–time processing in an embedded system.
- Learn the architecture and design flow of IoT.

PART –I: VLSI LAB

1. Study of Simulation using tools using Digital Logic Circuits.
2. Study of Synthesis tools using Digital Logic Circuits.
3. Study of development tool for FPGA using Verilog and Schematic Entry.
4. Design and Simulation of 8bit Signed Multiplier.
5. Place and Root and back annotation for FPGA.

PART-II: EMBEDDED LAB

1. Programming using Arithmetic, instruction of 8051microcontroller.
2. Programming and verifying Timer operations in 8051 microcontroller.
3. ARM-7 based On board LED testing
4. ARM 7 Based ADC testing
5. ARM 7 based DAC testing

OUTCOMES:

At the end of the course, the student should be able to:

- Describe the architecture and programming of ARM processor
- Outline the concepts of embedded systems
- Explain the basic concepts of real time operating system design
- Model real-time applications using embedded-system concepts

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	3	3	3	2	2	-	-	-	-	-	-	-	3	2	1
2	3	3	3	2	2	-	-	-	-	-	-	-	3	2	1
3	3	3	2	2	2	-	-	-	-	-	-	-	2	1	1
4	3	3	2	2	2	-	-	-	-	-	-	-	3	3	2
5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
C	**3**	**3**	**2.6**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.8**	**2.2**	**1.4**

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE -III

22152E64AP **SEMESTER VI**

PROFESSIONAL ETHICS IN ENGINEERING 4 0 0 4

OBJECTIVES:

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES 10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS 9

Senses of „Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata Mc Graw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
3. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
4. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
5. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001
6. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,New Delhi 2013.
7. World Community Service Centre, "Value Education", Vethathiri publications, Erode, 2011

Web sources:

www.onlineethics.org
www.nspe.org
www.globalethics.org
www.ethics.org

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

ELECTIVE -III

22152E64BP **SEMESTER VI**

SATELLITE COMMUNICATION 4 0 0 4

AIM

To enable the student to become familiar with satellites and satellite services.

OBJECTIVES

- Overview of satellite systems in relation to other terrestrial systems.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- Study of DTH and compression standards.

UNIT I : ELEMENTS OF ORBITAL MECHANICS 9

Equation of motion – Orbital elements – Orbital perturbation – Tracking and orbit determination – orbit control.

Satellite Launch systems: Fundamentals of Rocket propulsion – Multistage rockets – Huffman transfer orbit circularization

UNIT II: ELEMETS OF COMMUNICATION SATELLITE DESIGN 9

Space environment – Spacecraft configuration – Spacecraft subsystems – Payload – Reliability consideration – Spacecraft integration – Testing facilities – Spacecraft operations.

UNIT – III : SATELLITE COMMUNICATION SYSTEMS 9

Types of systems – FSS,BSS- Noise interference ,inter modulation –CDMA- Packet satellite networks – The INSAT system - The INTELSAT/INMARSAT system.

UNIT – IV:EARTH STATION DESIGN 9

Earth station configuration option – Site selection – Antenna systems – Tracking systems – Receiver subsystems – Low noise amplifiers – Down converters – Transmitter subsystems – Up converters- High power amplifiers - Terminal equipment .

UNIT - V: PERFORMANCE MEASUREMENTS 9

Spacecraft checkout – Ground station measurements –System coordination and control .Elements of Frequency coordination and management : The ITU/IFRB requirements – Satellite system characterization – Ground system characteristics .

TOTAL : 45

Text book:

1. B.N.AGARWAL :Deign of Geosynchronous spacecraft, Prentice Hall

Reference Books:

1. R.F.FILIPOWASKY and E.K.MUCHIDORF: Space communication Systems Mcgraw Hill
2. DENNIS RODDY – Satellite communication
3. K.MIYA :Satellite communication technology – Lattice and company

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

ELECTIVE -III

22152E64CP **SEMESTER VI**

ROBOTICS AND AUTOMATION **4 0 0 4**

AIM

Robots are slowly and steadily replacing human beings in many fields. The aim of this course is to introduce the students into this area so that they could use the same when they enter the industries.

OBJECTIVES

- To study the various parts of robots and fields of robotics.
- To study the various kinematics and inverse kinematics of robots.
- To study the Euler, Lagrangian formulation of Robot dynamics.
- To study the trajectory planning for robot.
- To study the control of robots for some specific applications.

UNIT I BASIC CONCEPTS 9

Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Asimov‟s laws of robotics – dynamic stabilization of robots.

UNIT II POWER SOURCES AND SENSORS 9

Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – variable speed arrangements – path determination – micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.

UNIT III MANIPULATORS, ACTUATORS AND GRIPPERS 9

Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – U various types of grippers – design considerations.

UNIT IV KINEMATICS AND PATH PLANNING 9

Solution of inverse kinematics problem – multiple solution jacobian work envelop – hill Climbing Techniques – robot programming languages

UNIT V CASE STUDIES 9

Mutiple robots – machine interface – robots in manufacturing and non- manufacturing applications – robot cell design – selection of robot.

Total: 45

TEXT BOOKS:

1. Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., “Industrial Robotics”, Mc Graw-Hill Singapore, 1996.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1998.

REFERENCES:

1. Deb. S.R.,"Robotics Technology and flexible Automation", John Wiley, USA 1992.
2. 2.Klafter R.D., Chimielewski T.A., Negin M., "Robotic Engineering – An integrated approach", Prentice Hall of India, New Delhi, 1994.
3. Mc Kerrow P.J. "Introduction to Robotics", Addison Wesley, USA, 1991.
4. Issac Asimov "Robot", Ballantine Books, New York, 1986.
5. Barry Leatham - Jones, "Elements of industrial Robotics" PITMAN Publishing, 1987.
6. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, "Industrial Robotics Technology, Programming and Applications ", McGraw Hill Book Company 1986.
7. Fu K.S. Gonzaleaz R.C. and Lee C.S.G., "Robotics Control Sensing, Vision and Intelligence" McGraw Hill International Editions, 1987.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

ELECTIVE -III

22152E64DP **SEMESTER VI**

REMOTE SENSING **4 0 0 4**

AIM:

To understand the basics for remote sensing.

OBJECTIVES:

- Introduce the principles of remote sensing and fundamental knowledge on the physics of remote sensing, aerial photographic techniques, photogrammetry, multispectral, hyperspectral and thermal imaging, and RADAR and LIDAR image analysis.
- The newest technology in the field will also be discussed.
- The course will be taught with an emphasis on the geographical applications of remote sensing; however, in certain instances other disciplines will be introduced as well.

UNIT I : REMOTE SENSING 9

Definition – Components of Remote Sensing - Energy, Sensor, Interacting Body – Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation – Planck's law – Stefan-Boltzman law.

UNIT II: EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Material – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces – Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT – III : OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites – Classification – Based on Orbits and purpose – Satellite Sensors – Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Land sat, SPOT, IRS series – Current Satellites – Radar

Speckle – Back Scattering – Side Looking Airbome Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT – IV: GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection – Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparition of Raster and Vector data structure – Analysis using Raster and Vector data –Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters.

UNIT - V: MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation – Interpretation Keys Characteristics of Digital Satellite Image –Image enhancement – Filtering – Classification – Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications – Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Global positioning system – an introduction.

TOTAL : 45 PERIODS

TEXT BOOK:

1. M.G. Srinivas(Edited By), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1& 2).
2. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications, 2001 (Units 3, 4, & 5).

REFERENCE BOOKS:

1. Jensen, J.R., Remote Sensing of the environment, Prentice Hall, 2000.
2. Kang-Tsung Chang, “Introduction to Geographic Information Systems” , TMH, 2002.
3. Lillesand T.M. and Kiefer R.W., “Remote Sensing and Image Interpretation”, John Wiley and Sons, Inc, New York, 1987.
4. Burrough P A, “Priciples of GIS for land resource assessment”, Oxford.
5. Mischael Hord, “Remote Sensing and Methods and Applications” , John Wiley & Sons, New York, 1986.
6. Signal, “Remote Sensing”, Tata McGraw-Hill, NewDelhi, 1990.
7. Floyd F. Sabins, Remote Sensing, “Priciples and interpretation”, W H Freeman and Company 1996.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

ELECTIVE -III

22150E64EP **SEMESTER VI**

NETWORK SECURITY 4 0 0 4

AIM

To understand the principles of encryption algorithms; conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

OBJECTIVES

- To know the methods of conventional encryption.
- To understand the concepts of public key encryption and number theory
- To understand authentication and Hash functions
- To know the network security tools and applications.
- To understand the system level security used.

UNIT I: SYMMETRIC CIPHERS 9

Overview – Classical encryption techniques – Block ciphers and data encryption standard – Finite fields – Advanced encryption standard – Contemporary symmetric ciphers – Confidentiality using symmetric encryption.

UNIT II: PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS 9

Number theory – Public-key cryptography and RSA – Keym – Diffie-hellman key exchange – Elliptic curve cryptography – Message authentication and hash functions – Hash algorithms – Digital signatures and authentication protocols.

UNIT III: NETWORK SECURITY PRACTICE 9

Authentication applications – Kerberos-X.509 authentication service – Electronic mail security – Pretty good privacy – S/MIME – IP security – IP security architecture – Authentication header – Encapsulating security payload – Key management.

UNIT IV: SYSTEM SECURITY 9

Intruders – Intrusion detection – Password management – Malicious software – Firewalls – Firewall design principles – Trusted systems.

UNIT V: WIRELESS SECURITY 9

Wireless LAN security standards – Wireless LAN security factors and issues.

Total: 45

TEXT BOOK

1. William Stallings, "Cryptography and Network Security – Principles and Practices", 3rd Edition, Pearson Education, 2003.

REFERENCES

1. Atul Kahate, "Cryptography and Network Security", 2nd Edition, TMH, 2007.
2. Bruce Schneier, "Applied Cryptography", 2nd Edition, John Wiley and Sons Inc, 2001.
3. Stewart S. Miller, "Wi-Fi Security", TMH, 2003.
4. Charles B. Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", 3rd Edition, Pearson Education, 2003.

CO's-PO's&PSO'sMAPPING

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO
1	2	-	-	-	-	-	-	-	-	-	1	-	2	1	1
2	2	3	3	2	-	-	-	-	-	-	-	-	2	1	1
3	1	-	-	2	-		-	-	-	-	-	-	2	1	1
4	1	-	-	2	-	-	-	-	-	-	-	-	2	1	1
5	1	2	3	3	-	-	-	-	-	-	-	3	2	1	1
C	**1.4**	**2.5**	**3**	**2.2**	-	-	-	-	-	-	**1**	**3**	**2**	**1**	**1**

1-low,2-medium,3-high,'-'-nocorrelation

22160S71P **SEMESTER VII**

TOTAL QUALITY MANAGEMENT 3 0 0 3

OBJECTIVE

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

1. INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES 9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS 9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS 9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

TOTAL : 45

TEXT BOOK

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5^{th} Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

22152C72P **SEMESTER VII**

WIRELESS NETWORKS 3 1 0 4

OBJECTIVES

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

UNIT I WIRELESS LAN 9

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

UNIT II MOBILE NETWORK LAYER 9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT III MOBILE TRANSPORT LAYER 9

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks**.**

UNIT IV WIRELESS WIDE AREA NETWORK 9

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.

UNIT V 4G NETWORKS 9

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TOTAL : 45

TEXT BOOKS:

1. Jochen Schiller, ”Mobile Communications”, Second Edition, Pearson Education 2012.(Unit I,II,III)
2. Vijay Garg , “Wireless Communications and networking”, First Edition, Elsevier 2007.(Unit IV,V)

REFERENCES:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband”, Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, “Wireless Networking”, First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, “Modern Wireless Communications”, First Edition, Pearson Education 2013

CO’s-PO’s&PSO’sMAPPING

CO’s	PO’s												PSO’s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,‘-'-nocorrelation

22152C73P **SEMESTER VII**

TELECOMMUNICATION SWITCHING AND NETWORKS

4 0 0 4

AIM

- To introduce fundamentals functions of a telecom switching office, namely, digital multiplexing, digital switching and digital subscriber access.
- To introduce a mathematical model for the analysis of telecommunication traffic.

OBJECTIVES

- To introduce the concepts of Frequency and Time division multiplexing.
- To introduce digital multiplexing and digital hierarchy namely SONET / SDH
- To introduce the concepts of space switching, time switching and combination switching, example of a switch namely No.4 ESS Toll switch.
- To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
- To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
- To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.
- To characterize blocking probability holding service time distributions for in speech and data networks.

UNIT I EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUITS 9

Evolution of Public Switched Telecommunication Networks Strowger exchange, Crossbar exchange,– Basic Tele communication equipments – Telephone handset, , Echo suppressors and cancellors, PCM coders, Modems and Relays.

UNIT II ELECTRONIC SWITCHING 9

Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Space switching – Digital switching system hardware configuration,

UNIT III TELECOMMUNICATION SIGNALLING AND TRAFFIC 9

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Grade of service, Modeling switching systems, Blocking models and Delay systems.

UNIT IV INTEGRATED DIGITAL NETWORKS 9

Subscriber loop characteristics, Local access wire line and wire less PCM / TDM carrier standards transmission line codes, Synchronous, Asynchronous, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN)

UNIT V DATA NET WORKS 9

Data transmission in PSTN – Connection oriented and Connection less protocols – packet switching – ISO-OSI architecture-Satellite based data networks –LAN, WAN – standards – TCP / IP – Internet

TOTAL : 45

TEXT BOOKS:

1. Viswanathan. T, "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.
2. Behrouz Forouzan, "Introduction to Data Communication and Networking", McGraw-Hill, 1998.

REFERENCES

1. L.S.Lawton, "Integrated Digital Networks, Galgotta Publication Pvt., Ltd., New Delhi,1996.
2. Syed R. Ali, "Digital Switching Systems", McGraw-Hill Inc., New York, 1998.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE – IV

22152E74AP **SEMESTER VII**

POWER ELECTRONICS 3 0 0 3

AIM

Application of Electronic knowledge in industry for rectification of polyphase supply voltage and for control of motor speed and for thermal heating.

OBJECTIVES

- To study about power electronic circuits for voltage and current control and protection.
- To learn the switching characteristics of transistors and SCRs. Series and parallel functions of SCRs, Programmable triggering methods of SCR.
- To learn controlled rectification AC supplies.
- To study of converters and inverters.
- To learn about motor control, charges, SMPS and UPS.

UNIT I POWER SEMICONDUCTOR DEVICES 9

Power transistors, Thyristors, Power TRIAC, MOSFET, IGBT, GTO characteristics, rating, Protection circuits.

UNIT II POWER SUPPLIES 9

Single Phase and Three Phase Controlled rectifiers, Design of Trigger circuits, Switching mode regulators – Boost, Buck, Buck-Boost and Cuk regulators, AC voltage regulator.

UNIT III INVERTERS 9

Voltage and current source inverters, Resonant, Series inverter, PWM inverter.

UNIT IV CHOPPERS 9

Type A, B, C and D choppers, Pulse width modulation - Gating requirements.

UNIT V MOTOR CONTROL & Applications 9

Single Phase DC series motor drives, Induction and Synchronous motor drives, Switched reluctance motor Drive, SMPS and UPS

TOTAL: 45

TEXT BOOK:

1. M.D.Singh, K.B. Khanchandani, “Power Electronics”, Tata McGraw-Hill, 1998.

REFERENCES:

1. Ned Mohan, Tore M.Undeland, William P.Robbins, "Power Electronics, Converters, Applications and Design", John Wiley & Sons, 1994.
2. Muhamed H.Roshid, "Power Electronics Circuits, Devices and Application", Prentice Hall of India, 1995.
3. B.K.Bose, "Modern Power Electronics", Jaico Publishing House, 1999.
4. Sen, Power Electronics", Tata McGraw-Hill, 1987

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE – IV

22152E74BP **SEMESTER VII**

ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

3 0 0 3

OBJECTIVES

- To expose the students to the fundamentals of microprocessor architecture.
- To introduce the advanced features in microprocessors and microcontrollers.
- To enable the students to understand various microcontroller architectures.

UNIT I HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM 9

CPU Architecture- Bus Operations – Pipelining – Brach predication – floating point unit- Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set – addressing modes – Programming the Pentium processor.

UNIT II HIGH PERFORMANCE RISC ARCHITECTURE – ARM 9

Arcon RISC Machine – Architectural Inheritance – Core & Architectures - Registers – Pipeline - Interrupts – ARM organization - ARM processor family – Co-processors - ARM instruction set- Thumb Instruction set - Instruction cycle timings - The ARM Programmer‟s model – ARM Development tools – ARM Assembly Language Programming - C programming – Optimizing ARM Assembly Code – Optimized Primitives.

UNIT III ARM APPLICATION DEVELOPMENT 9

Introduction to DSP on ARM –FIR filter – IIR filter – Discrete fourier transform – Exception handling – Interrupts – Interrupt handling schemes- Firmware and bootloader – Embedded Operating systems – Integrated Development Environment- STDIO Libraries – Peripheral Interface – Application of ARM Processor - Caches – Memory protection Units – Memory Management units – Future ARM Technologies.

UNIT IV MOTOROLA 68HC11 MICROCONTROLLERS 9

Instruction set addressing modes – operating modes- Interrupt system- RTC-Serial Communication Interface – A/D Converter PWM and UART.

UNIT V PIC MICROCONTROLLER 9

CPU Architecture – Instruction set – interrupts- Timers- I2C Interfacing –UART- A/D Converter –PWM and introduction to C-Compilers.

TOTAL: 45

TEXT BOOK:

1. Andrew N.Sloss, Dominic Symes and Chris Wright " ARM System Developer's Guide : Designing and Optimizing System Software" , First edition, Morgan Kaufmann Publishers, 2004.

REFERENCES:

1. Steve Furber , "ARM System –On –Chip architecture", Addision Wesley, 2000.
2. Daniel Tabak , "Advanced Microprocessors", Mc Graw Hill. Inc., 1995
3. James L. Antonakos , " The Pentium Microprocessor", Pearson Education, 1997.
4. Gene .H.Miller, "Micro Computer Engineering", Pearson Education , 2003.
5. John .B.Peatman , "Design with PIC Microcontroller", Prentice Hall, 1997.
6. James L.Antonakos, "An Introduction to the Intel family of Microprocessors", Pearson Education, 1999.
7. Barry.B.Brey,"The Intel Microprocessors Architecture, Programming and Interfacing", PHI,2002.
8. Valvano, "Embedded Microcomputer Systems", Thomson Asia PVT LTD first reprint 2001. Readings: Web links www.ocw.nit.edu www.arm.com

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE – IV

22152E74CP **SEMESTER VII**

ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

3 0 0 3

AIM

To understand different electromagnetic Interference problems occurring in Intersystem and in inter system and their possible mitigation techniques in Electronic design

OBJECTIVES

- To understand EMI Sources, EMI problems and their solution methods in PCB level / Subsystem and system level design.
- To measure the emission. immunity level from different systems to couple with the prescribed EMC standards

UNIT I BASIC CONCEPTS 9

Definition of EMI and EMC with examples – Classification of EMI/EMC – CE – RE – CS – RS – Units of parameters – Sources of EMI – EMI coupling modes – CM and DM – ESD phenomena and effects – Transient phenomena and suppression.

UNIT II EMI MEASUREMENTS 9

Basic principles of RE, CE, RS and CS measurements – EMI measuring instruments – Antennas – LISN – Feed through capacitor – Current probe – EMC analyzer and detection technique open area site – Shielded anechoic chamber – TEM cell.

UNIT III EMC STANDARD AND REGULATIONS 8

National and intentional standardizing organizations – FCC – CISPR – ANSI – DOD – IEC – CENEEC – FCC – CE and RE standards – CISPR – CE and RE standards – IEC/EN – CS standards – Frequency assignment – Spectrum conversion.

UNIT IV EMI CONTROL METHODS AND FIXES 10

Shielding – Grounding – Bonding – Filtering – EMI gasket – Isolation transformer – Opto-isolator.

UNIT V EMC DESIGN AND INTERCONNECTION TECHNIQUES 9

Cable routing and connection – Component selection and mounting – PCB design – Trace routing – Impedance control – Decoupling – Zoning and grounding

TOTAL: 45

TEXT BOOKS

1. Prasad Kodali V., "Engineering Electromagnetic Compatibility", S. Chand and Co, 2000.
2. Clayton R. Paul, "Introduction to Electromagnetic Compatibility" , Wiley and Sons, 1992.

REFERENCES

1. Keiser, "Principles of Electromagnetic Compatibility", 3rd Edition, Artech House, 1994.
2. Donwhite Consultant Incorporate , "Handbook Of EMI / EMC" , Vol I , 1985

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE – IV

22152E74DP **SEMESTER VII**

SOLID STATE ELECTRONIC DRIVES 3 0 0 3

AIM

To have fundamental knowledge about structure of devices, VI characteristics of devices like PN Junction diode, Zener diode, MOSFET, BJT and Opto electronic.

OBJECTIVES:

- To learn crystal structures of elements used for fabrication of semiconductor devices.
- To study energy band structure of semiconductor devices.
- To understand fermi levels, movement of charge carriers, Diffusion current and Drift current.
- To study behavior of semiconductor junction under different biasing conditions. Fabrication of different semiconductor devices, Varactor diode, Zener diode, Schottky diode, BJT, MOSFET, etc.
- To study the VI Characteristics of devices and their limitations in factors like current, power frequency.
- To learn photoelectric effect and fabrication of opto electronic devices.

UNIT I: CRYYSTAL PROPERTIES AND GROWTH SEMICONDUCTORS 9

Semiconductor materials – periodic Structures – Crystal Lattices – Cubic lattices – Planes and Directions – Diamond lattice – Bulk Crystal Growth – Starting Material – Growth of Single Crystal Ingots – Wafers – Doping – Epitaxial Growth – Lattice Matching in Epitaxial Growth – Vapor – Phase Epitaxy – Atoms and Electronics – Introduction to Physical Models – Experimental Observations – Photoelectric Effect – Atomic spectra – Bhr model – Quantum Mechanics – Probability and Uncertainty Principle – Schrodinger Wave Equation – Potential Well Equation – Potential well Problem – Tunneling.

UNIT II: ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS AND JUNCTIONS 9

Energy bands in Solids, Energy Bands in Metals, Semiconductors, and Insulators – Direct and Indirect Semiconductors – Variation of Energy Bands with Alloy Composition - Charge Carriers in Semiconductors – Electrons and Holes – Electrons and holes in Quantum Wells – Carrier Concentrations –Femi Level – Electron and Hole Concentrations at Equilibrium – Temperature Dependence of Carrier Concentrations – Compensation and Space Charge Neutrality – Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility – Drift and Resistance – Effects of Temperature and Doping on Mobility – High Field effects – Hall Effect – invariance of Fermi level at equilibrium – Fabrication of p-n junctions, Metal semiconductor junctions.

UNIT III: METAL OXIDE SEMICONDUCTOR FET 9

GaAS MESFET – High Electron Mobility Transistor – Short channel Effects – Metal Insulator Semiconductor FET – Basic Operation and Fabrication – Effects of Real Surfaces – Threshold Voltage – MOS capacitance Measurements – Current – Voltage Characteristics of MOS Gate Oxides – MOS Field Effect Transistor – Output Characteristics – Transfer characteristics - Short Channel MOSFET V-I characteristics – Control of Threshold Voltage – Substrate Bias Effects - Sub threshold characteristics – Equivalent Circuit for MOSFET –MOSFET Scaling and Hot Electron Effects – Drain – Induced Barrier Lowering – short channel and Narrow width Effect – Gate Induced Drain Leakage.

UNIT IV: OPTO ELECTRON DEVICES 9

Photodiodes – Current and Voltage in illuminated Junction – Solar Cells – Photo detectors – Noise and Bandwidth of Photo detectors – Light Emitting Diodes – Light Emitting Material – Fiber Optic Communication Multilayer Heterojunctions for LEDS – Lasers – Semiconductor lasers – Population Inversion at a Junction Emission Spectra for p-n junction – Basic Semiconductor laser – Materials for Semiconductor laser.

UNIT V HIGH FREQUENCY AND HIGH POWER DEVICES 9

Tunnel Diode, IMPATT Diode, operation of TRAPATT and BARITT Diodes, Gunn Diode – transferred – electron mechanism, formation and drift of space charge domains, p-n-p-n diode, Semiconductor Controlled Rectifier, Insulated Gate Bipolar Transistor.

TOTAL: 45

TEXT BOOKS

1. Ben. G. Streetman & Sanjan Banerjee, Solid State Electronic Devices, 5th Edition, PHI, 2003.

REFERENCES

1. Donald A. Neaman, Semiconductor Physics and Devices, 3rd Edition, TMH, 2002.
2. Yannis Tsividis, Operation & Mode line of MOS Transistor, 2nd Edition, Oxford University Press, 1999.
3. Nandita Das Gupta & aamitava Das Gupta, Semiconductor Devices Modeling Technology, PHI, 2004.
4. D.K. Bhattacharya & Rajinish Sharma, Solid State Electronic Devices, Oxford University Press, 2007.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation

ELECTIVE – IV

22152E74EP **SEMESTER VII**

COMPUTER HARDWARE AND INTERFACING 3 0 0 3

AIM

To enable the student to get a detailed knowledge of all the hardware components that make up a computer and to understand the different interfaces required for connecting these hardware devices.

OBJECTIVES

- To introduce issues related to CPU and memory.
- To understand the components on the motherboard
- To understand different storage media
- To introduce the features of different I/O peripheral devices and their interfaces.

UNIT I CPU AND MEMORY 9

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules –memory.

UNIT II MOTHERBOARDS 9

Pentium4 mother board -form factor – upgrading a mother board – chipsets – north bridge – south bridge –motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III STORAGE DEVICES 9

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout –CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT IV I/O PERIPHERALS 9

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues

UNIT V BUS ARCHITECTURE 9

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TOTAL: 45

TEXT BOOK

1. Stephen J.Bigelow, "Trouble Shooting, maintaining and Repairing PCs", Tata McGraw-Hill, New Delhi, 2001.

REFERENCES

1. Craig Zacker & John Rourke, "The complete reference:PC hardware", Tata McGraw-Hill, New Delhi, 2001.
2. Mike Meyers, "Introduction to PC Hardware and Trouble shooting", Tata McGraw-Hill, New Delhi, 2003.
3. B.Govindarajulu, "IBM PC and Clones hardware trouble shooting and maintenance", Tata McGraw-Hill, New Delhi, 2002.

CO's-PO's&PSO'sMAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	3	-	-	-	-	-	-	-	2	-	-	1	3	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	2	2
3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	3	-	2	-	-	-	-	-	-	-	2	3	-
5	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
AVg.	2.5	2.4	3	-	2	-	-	-	-	2	-	-	1.8	2.6	2

1-low,2-medium,3-high,'-'-nocorrelation