DEPARTMENT OF ELECTRONICS & COMM. ENGG., B.I.T MESRA, RANCHI

Course Structure for BE (ECE) Applicable to 2011 onwards Batches

I-Semester

Code No.	Name of Subjects	L	T	P	C
	THEORY				
HU1101	Technical English	3	0	0	3
PH1201	Physics	3	1	0	4
MA1201	Engineering Mathematics	3	1	0	4
EE2201	Principles of Electrical Engineering	3	1	0	4
CH1401	Engineering Chemistry	3	0	0	3
	SESSIONAL/LABORATORY				
ME1202	Engineering Graphics	1	0	3	3
CS1302	Fundamental of Unix & C Programming	1	0	3	3
PE1202	Workshop Practice	0	0	3	2
PH1202	Physics Lab	0	0	3	2
	EXTRA CURRICULAR ACTIVITIE				
GA1002/ GA1004/ GA1006/ GA1008	NCC/ NSS/ PT & Games/ Creative Art	0	0	2	1
	TOTAL	**17**	**3**	**14**	**29**

II-Semester

Code No.	Name of Subjects	L	T	P	C
	THEORY				
EC2001	Principles of Electronics Engineering	3	0	0	3
MA2201	Advance Engineering Mathematics	3	1	0	4
CH2303	Environmental Science	3	0	0	3
CS2301	Fundamental of Data Structure	3	1	0	4
ME2001	Principles of Mechanical Engineering	3	0	0	3
AM1201	Engineering Mechanics	3	1	0	4
	SESSIONAL/LABORATORY				
CH1402	Chemistry Lab	0	0	3	2
EE3202	Basic Electrical Engineering Lab	0	0	3	2
EC2002	Basic Electronics Engineering Lab	0	0	3	2
CS2302	Data Structure Lab	0	0	3	2
	EXTRA CURRICULAR ACTIVITIES				
GA2002 GA2004 GA2006 GA2008	NCC/ NSS/ PT & Games/ Creative Art	0	0	2	1
	TOTAL	**18**	**3**	**14**	**30**

III-Semester

Code No.	Name of Subjects	L	T	P	C	
	THEORY					
EC3201	Digital Electronics	3	1	-	4	D
EC3203	Modern Instruments and Measurements	3	-	-	3	D
EC3205	Semiconductor Devices	3	-	-	3	D
EE 3205	Network Theory	3	1	-	4	D
HU4001/ BT3001	Biological science/ Language(German/Russian/French)	3	-	-	3	B
	SESSIONAL/LABORATORY					
EC3202	Digital Electronics Lab	-	-	3	2	D
EC3204	Modern Instruments and Measurements Lab	-	-	3	2	D
AM2202	Engineering Mechanics Lab	-	-	3	2	**C**
	EXTRA CURRICULAR ACTIVITIES					
GA3002 GA3004 GA3006 GA3008	NCC/ NSS/ PT & Games/ Creative Art	0	0	2	1	
	TOTAL	**15**	**2**	**11**	**24**	

IV-Semester

Code No.	Name of Subjects	L	T	P	C	
	THEORY					
EC4201	VLSI Design	3	-	-	3	D
EC4203	Analog Communication System	3	1	-	4	D
EC4205	Microprocessor and Microcontroller	3	-	-	3	D
EC4207	Electromagnetic Theory	3	-	-	3	D
HU4001/ BT3001	Biological science/ Language(German/Russian/French)	3	-	-	3	B
	SESSIONAL/LABORATORY					
EC4202	VLSI Design Lab	-	-	3	2	D
EC4204	Analog Communication Lab	-	-	3	2	D
EC4206	Microprocessor and Microcontroller Lab	-	-	3	2	D
	EXTRA CURRICULAR ACTIVITIES					
GA4002 GA4004 GA4006 GA4008	NCC/ NSS/ PT & Games/ Creative Art	0	0	2	1	
	TOTAL	**15**	**1**	**11**	**23**	

V-Semester

Code No.	Name of Subjects	L	T	P	C	
	THEORY					
EC5201	Digital Communication system	3	-	-	3	D
EC5203	Microwave Engineering	3	-	-	3	D
EC5205	Data Communication	3	-	-	3	D
EE4207	Digital Signal Processing	3	1	-	4	D
	Breadth Elective I	3	-	-	3	B
	SESSIONAL/LABORATORY					
EC5202	Digital Communication Lab	-	-	3	2	D
EC5204	Microwave Lab	-	-	3	2	D
EE4208	Digital Signal Processing Lab	-	-	3	2	D
	TOTAL	**15**	**1**	**09**	22	

VI-Semester

Code No.	Name of Subjects	L	T	P	C	
	THEORY					
EC6201	Intelligent Instrumentation	3	-	-	3	D
EC6203	Fiber Optics Communication system	3	-	-	3	D
EC6205	Computer Networking	3	-	-	3	D
EE6201	Control Theory	3	-	-	3	D
	Breadth Elective II	3	-	-	3	B
	SESSIONAL/LABORATORY					
EC6202	Industrial Instrumentation Lab	-	-	3	2	D
EC6204	Fiber Optics Communication Lab	-	-	3	2	D
EC6206	Wireless Communication &Networking Lab	-	-	3	2	D
	TOTAL	**15**	**-**	**09**	**21**	

VII- Semester

Code No.	Name of Subjects	L	T	P	C	
	THEORY					
EC 7201	Mobile and Cellular Communication	3	-	-	3	D
EC7203	Antennas and Propagation for Wireless Communication	3	-	-	3	D
	ELECTIVE –I	3	-	-	3	D
	ELECTIVE – II	3	-	-	3	D
	Breadth Elective III	3	-	-	3	B
	SESSIONAL/LABORATORY					
EC7202 EC7204	Advanced Comm. Lab/ Embedded System Lab.	-	-	3	2	D
EC7206	Project	-	-	6	4	D
	TOTAL	**15**	**-**	**09**	**21**	

VIII-Semester

Code No.	Name of Subjects	L	T	P	C	
	THEORY					
	ELECTIVE –III	3	-	-	3	D
	SESSIONAL/LABORATORY					
EC8202	Project & Compréhensive viva	-	-	09	6	D
	TOTAL	**03**	**-**	**0**9	**09**	

Grand Total: I_{st} year+ II_{nd} year+ III_{rd} year+ IV^{th} year=59+47+43+30= 179 Credits

Elective- I (choose any one)

1. **EC7205 Telecommunication Switching Systems & Networks**
2. **MEC1011 Probability Models & Stochastic Processes**
3. **MEC1019 Microelectronic Devices and Circuits**
4. **MEC1047 Sensors and Transducers**
5. **MEC1149 Applied Bioelectronics Instrumentation**
6. **MEC2113 Real Time Embedded System Design**
7. **CS 7107 Digital Image Processing**

Elective- II (choose any one)

1. **EC7207 Satellite Communication System**
2. **EC7209 Digital Video Signal Coding**
3. **MEC1125 Information Theory and Coding**
4. **MEC2015 Optical Networking and DWDM**
5. **MEC2019 Micro-Electro Mechanical System**
6. **CS 8111 Natural Language Processing**
7. **CS 8121 Pattern Recognition**

Elective- - III (choose any one)

1. **EC8201 Digital Signal Processing Architecture**
2. **EC8203 Neural Networks and Fuzzy System**
3. **MEC1137 Radar Signal Analysis**
4. **MEC 2067 VHDL & Verilog**
5. **MEC 2075 Multi-Dimensional Signal Processing**
6. **MEC2137 Wireless Networks**
7. **MEC2163 Speech Processing and Recognition**

List of Breadth Papers:

I. Organization Behavior
II. Principles of Management/Industrial Organization and Management
III. Business Economics/ Engineering Economy
IV. Sociology and Environmental Psychology
V. Art and Culture
VI. Project Management / Entrepreneurship
VII. IPR/Business & Industrial Laws
VIII. Professional Ethics
IX. Material Science

**** L = Lecture Classes, T = Tutorial Sessions, P = Practical Sessions, C = Credit**

EC2001 PRINCIPLES OF ELECTRONICS ENGINEERING

Module – 1:

RC Filters, Diodes and their applications: RC Filters, Diode and their types, Rectifiers, Filters, Clipper, Clamper, Zener diode and its applications.

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill

Module – 2:

Bipolar Junction Transistors: CB, CE, CC Configurations, Operating point, Biasing circuits, Bias Stability, Thermal runway and thermal stability.

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill

Module – 3:

Transistor Analysis

Transistors at low frequencies: Two port devices and the Hybrid model, General analysis of an amplifier using h parameters, analysis of CE, CB and CC amplifiers.

Transistors at high frequencies: Hybrid Π model, Amplifier response at high frequencies, Gain-Bandwidth product

Text Book:

1."Integrated Electronics" Millman & Halkias, McGraw Hill

Module – 4:

Amplifiers and Oscillators:

Amplifiers: Concept of negative feedback, Voltage series, Voltage shunt, Current series and Current shunt feedbacks

Oscillators: Concept of positive feedback, Barkhausen criterion, RC Phase shift oscillator, Wein bridge oscillator, Hartley, Colpit and Crystal oscillators.

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill

Module – 5:

Field Effect Transistors and Transistor Power amplifiers

Field Effect Transistors: FET & MOSFET, characteristics, biasing and small signal low frequency analysis of CD, CS and CG configurations

Transistor Power Amplifier: Circuits and operations of class-A, Class-B and Class-C amplifiers, Push–Pull amplifiers

Text Book:

1. "Integrated Electronics" Millman & Halkias, McGraw Hill

Module – 6:

Operational amplifiers and its applications: Characteristics, Parameters, Measurements, Emitter Coupled Differential Amplifier, Transfer Characteristics, Voltage gain, Inverting and Non-inverting amplifiers, Voltage follower, Phase inverter, Scale changer, Integrator and Differentiator circuits.

Text Book:

2. "Operational Amplifiers and Linear Integrated Circuits" by R. A. Gayakwad, PHI

Module – 7:

Logic circuits and Applications: Logic circuit implementation using diodes and transistors, Basic concept of TTL, ECL and CMOS logic circuits.

Text Book:

1."Digital Logic and Computer Design "M. Mano. PHI

Reference Books:

1. " The Art of Electronics", Paul Horowitz and Winfield Hill, Cambridge University Press
2. "Electronic Devices and Circuit Theory", Nashelesky & Boylestead, PHI/Low price edition.
3. "Microelectronic Circuits", Sedar and Smith

EC3201 Digital Electronics

MODULE – I

Simplification of Boolean Expressions: Gate-level minimization, NAND and NOR implementation, POS & SOP simplification, Karnaugh map, Quine McCluskey method

Text Books:

1. "Digital Logic and Design", M. Mano. PHI
2. "Modern Digital Electronics", 3/e, R.P.Jain, TMH

MODULE – II

Design of Combinational Circuits: Adders, Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, magnitude comparator, Parity Generators and Checkers, Signed number system, BCD adder/subtractor, carry look ahead adder

Text Books:

1. "Digital Logic and Design", M. Mano. PHI
2. "Modern Digital Electronics", 3/e, R.P.Jain, TMH

MODULE – III

Sequential Circuits: Basic Concepts, Flip-Flop, RS, JK, Master Slaves, T and D Flip-Flops, Controlled Registers, Shift Registers and their applications, Synchronous and asynchronous counters, Controlled Counters, Up/Down counters, Ring counter

Text Books:

1. "Digital Logic and Design", M. Mano. PHI
2. "Modern Digital Electronics", 3/e, R.P.Jain, TMH

MODULE – IV

Analysis of Clocked Sequential Circuits: State equation**,** state table and state diagram, input equations, Analysis with various flip flop, State reduction and assignment, Design of clocked sequential circuits

Text Books:

1. "Digital Logic and Design", M. Mano. PHI

MODULE – V

Introduction to Various Logic Families: Electrical characteristics of logic gates TTL gates, CMOS gates, Static CMOS Design; Dynamic hazards, Ratioed Logic, Pass-transistor logic, Transmission gate logic

Text Books:

1. "Digital Logic and Design", M. Mano. PHI
2. "Modern Digital Electronics", 3/e, R.P.Jain, TMH

MODULE – VI

Multivibrators: Types of multivibrators, AMV, MMV and BMV using transistors, AMV and MMV using OP-AMP, Schmitt Trigger

Text Books:

1. "Modern Digital Electronics", 3/e, R.P.Jain, TMH

MODULE – VI I

Memories and Programmable Logic Devices: Memory organization and operation, write and read operations, Read only memories, PROMs, EPROMs, EEPROMs, RAMs: Static RAM, Dynamic RAM, Design of an 8x4 ROM, PLA, PAL, Generic array logic, CPLD, FPGA

Text Books:

1. "Modern Digital Electronics", 3/e, R.P.Jain, TMH

EC3203 MODERN INSTRUMENTS AND MEASUREMENTS

Module – 1:

Introduction of measurements and measurement systems: Significance of measurements, different methods of measurements, Instruments used in measurements, Electronic Instruments and its classification, Elements of a Generalized Measurement System; Characteristics of instruments, Static characteristics, Errors in measurements, scale, range, and scale span, calibration, Reproducibility and drift, Noise, Accuracy and precision, Significant figures, Linearity, Hysteresis, Threshold, Dead time, Dead zone, Resolution and Loading Effects.(Visit to CIF B.I.T. Mesra)

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney

Module – 2:

Analogue Instruments: Classification and Principles of Operation, Working Details Moving Coil (PMMC) Instruments Construction, DC Ammeter, DC Voltmeter, Series and Shunt type Ohmmeter. Analogue Electronic voltmeter, DC Voltmeter with chopper type DC amplifier

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.

Module – 3:

Introduction of DC and AC Bridges: Wheatstone Bridge, Kelvin Double Bridge, Maxwell's Bridge, and Hay's Bridge, Schering's Bridge Wien's Bridge, Sources of errors in Bridges and their elimination by shielding and grounding. Q Meter (Visit to CIF B.I.T. Mesra)

Text Books:

1. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.

Module – 4:

Digital Instruments: Advantages of digital over analogue processing. Techniques of converting Digital to Analogue (D/A) and Analogue to Digital (A/D); Digital frequency Meter, Digital Voltmeter

Text Books:

1. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.
2. "Electronic Instrumentation", By H. S. Kalsi.

Module – 5:

Oscilloscopes: Basic Subsystems of general purpose CRO, Focusing and deflection in CRO, Dual trace CRO, Storage type Oscilloscope, Application of CRO

Text Books:

1. "Modern Electronic Instrumentation & Measurement Techniques' by Helfrick & Cooper.
2. "Electronic Instrumentation", By H. S. Kalsi.

Module – 6:

Transducers: Definition, Classification, Principle of Analogue transducer: Resistive (Strain Gauge, POT, Thermistor and RTD), Capacitive, Piezoelectric, Thermocouple and Inductive (LVDT) and RVDT) transducer, Working principle of Digital Transducer and Optical transducer. Application of above transducers to be discussed on the basis of Pressure, Displacement, Level, Flow and Temperature measurements (Visit to CIF B.I.T. Mesra)

Text Books:

1. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.
2. "Electronic Instrumentation", by H. S. Kalsi.
3. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
4. "Sensors and Transducers", 2/E by D. Patranabis

Module – 7:

Analog and Digital Signal conditioners: Analog signal conditioners, Voltage divider, Bridge circuits, , Direct Current amplifier, Inverting and non inverting amplifiers, Integrator and differentiator, Adder and Subtractor, Differential amplifier, Instrumentation amplifier, Digital Signal Conditioners, Comparators, Schimitt Trigger, Voltage to frequency converter, Frequency based ADC

Analysers: Wave analyser and Spectrum analyser. (Visit to CIF B.I.T. Mesra)

Text Books:

1. "Electrical and Electronic Measurements and Instrumentation" by A. K. Sawhney.
2. "Modern Electronic Instrumentation & Measurement Techniques" by Helfrick & Cooper.
3. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed

EC3205 SEMICONDUCTOR DEVICES

Module – 1:

CARRIER CONCENTRATIONS: Effective mass, Formation of Energy band, E-K diagram, The Fermi level, Carrier concentration at equilibrium, Direct and Indirect recombination of electrons and holes, Hall effect, Steady-state carrier generation, Quasi-Fermi levels

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Semiconductor Devices"- Jusprit Singh, Jhon Wiley Eastern.
3. "Semiconductor Devices"- Kanaan Kano, Pearson.
4. "Physics of Semiconductor Devices" – S. M. Sze.

Module – 2:

TRANSPORT PHENOMENA: Drift and Diffusion of Carriers, Semiconductor in Equilibrium, Einstein Equation, Excess carrier generation and Recombination, carrier lifetime, Continuity and Diffusion equations, Hynes-Shockley experiment

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Semiconductor Devices"- Jusprit Singh, Jhon Wiley Eastern
3. "Physics of Semiconductor Devices" – S. M. Sze.

Module – 3 :

P-N JUNCTIONS: Space Charge at a junction, Steady state condition, The Contact Potential, Depletion Region, Current at a junction, Carrier injection, Junction breakdown phenomena, Time variation of stored charge, Reverse recovery transient, junction diode switching characteristics, P-N junction Capacitance

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Semiconductor Devices"- Jusprit Singh, John Wiley Eastern
3. "Solid State Electronic Devices" – D.K.Bhattacharya and Rajnish sharma, Oxford University Press

Module – 4:

JUNCTION DIODES: Metal-Semiconductor Junction, Graded junction, R F and Microwave Diodes: Types, Varactor Diodes, PIN diodes, Step Recovery Diodes, Mixer diodes, Detector Diodes, Gunn Diodes, IMPATT diodes, Tunnel Diode, Parametric Amplifier diodes, Current and Voltage in an illuminated junction, Photo Diode, Photo detector, Solar Cells, Light Emitting Diode

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Solid State Electronic Devices" – D.K.Bhattacharya and Rajnish sharma, Oxford University Press

Module – 5:

Bipolar Junction Transistor (BJT): Structure and basic operation, Charge transport and current in a BJT, Terminal currents, generalised biasing, Ebers-Moll Model, Charge control analysis, BJT switching: Turn-on and Turn-off transients, Base narrowing

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Physics of Semiconductor Devices" – S. M. Sze.

Model – 6:

FET, MOSFET: Construction and Operation of FET, I-V Characteristics of FET, Pinch-off and Transconductance
MESFET, MOSFET, Band bending, Effect of bias voltage, Threshold voltage, accumulation, Depletion, Inversion, MOS Capacitor, Threshold voltage in MOSFET

Text Book:

"Solid State Electronic Devices" – B. G. Streetman, PHI

Module – 7:

CCD & FABRICATION: The basic CCD, Improved CCD structure, p-n junction fabrication steps and fabrication technology

Text Books:

1. "Solid State Electronic Devices" – B. G. Streetman, PHI
2. "Integrated Electronics" – Millman & Halkies, Tata McGraw

BT3001Biological Sciences/ ~~Language~~

Nature of living things: Definition of life, Miller's experiment, theories and evidences about origin of life, levels of biological organization, classification of living world.

Biomolecules: composition of living matter, water, carbohydrates, lipids, proteins, nucleic acids, vitamins and minerals.

Biochemistry: Bioenergetics and thermodynamics, biological oxidation-reduction reactions, glycolysis, citric acid cycle, fatty acid metabolism, electron transport chain, aerobic and anaerobic respiration

Molecular organization of cell: Viruses, cellular structure of microorganism, animal and plant, salient features of intracellular organelles, cell division and cell cycle, structure of chromosomes, difference between prokaryotes and eukaryotes.

Molecular biology: Structure of DNA and RNA, DNA as genetic material, central dogma of molecular biology, DNA replication, transcription and translation, Introduction to bioinformatics and drug designing.

Enzymology:, Mechanism of enzyme action, Lock and key model and induced fit model, active site, Michaelis Menten equation, reversible and irreversible inhibitors, competitive, non-competitive and uncompetitive inhibition.

Techniques in biological sciences: Centrifugation, chromatography, gel electrophoresis, spectroscopy, thermal analysis,.

Books Recommended

1. Purves et al, Life: The Science of Biology

2. R. Dulbecco, The Design of Life.

3. Lehninger A, Principals of Biochemistry

4. Stryer L, Biochemistry

5. K. Wilson & K.H. Goulding, A biologist's guide to Principles and Techniques of Practical Biochemistry.

EE 3205 NETWORK THEORY

MODULE – I
Network Theorem: Substitution theorem, Tellegen's theorem, Reciprocity theorem
(3)

MODULE – II
Network Topology: Definition and properties, Matrices of Graph, Network Equations & Solutions : Node and Mesh transformation, Generalized element, Source transformation, Formulation of network equations, Network with controlled sources, Transform networks, Properties of network matrices, Solution of equations. Linear time-invariant networks, Evaluation of initial conditions, Frequency and impedance scaling.
(10)

MODULE – III
Multi-terminal Networks: Natural frequency, Network functions, Two-port parameters, Equivalent networks.
(6)

MODULE – IV
Elements of Network Synthesis: Positive real function, Reactance functions, RC functions, RL Network, Two-port functions, Minimum phase networks.
(7)

MODULE – V
Approximation: Filter specifications, Butterworth approximation, Chebyshev approximation, Comparison between Butterworth and chebyshev transfer functions.
(6)

MODULE – VI
Bandpass filter approximation, Frequency transformation, Insertion Loss Synthesis: Co-efficient matching technique, Darlington's method.
(6)

MODULE – VII
Active Networks and Filters: Active elements, Single amplifier filters, State variable realization, All pass and notch filter, Higher order filter.
(7)

Text Book:

1. V.K. Aatre, Network Theory & Filter Design

Reference Book:

1. M.E. Van Valkenberg, Introduction to Modern Network Synthesis
2. Balabanian, N. and T.A. Bickart, "Electric Network Theory", John Wiley & Sons, New York, 1969.
3. C. L. Wadhwa, Network Analysis and Synthesis

EC4201 VLSI DESIGN

Module – 1:

Circuits and System Representation: Behavioral, structural and physical representation, example of a triangular waveform generator and its behavioural, structural and physical description

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 2:

Basic CMOS Technology: Basic n-well CMOS Process, p-well process, twin-tub process, silicon on insulator, CMOS process enhancements, metal interconnect, polysilicon / refractory metal interconnect, local interconnect, circuit elements like resistors, capacitors, EAROM, bipolar transistors and thin film transistor.

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 3:

Layout Design Rules: Layer representations, CMOS n-well rules, design rule backgrounder, layer assignment, latch-up problem, latch-up triggering, internal latch-up prevention techniques, resistance estimation, and capacitance estimation.

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 4:

Basic Physical Design of Simple Logic Gates: Inverter, NAND and NOR gates, complex logic gates layout, CMOS standard cell design, gate array layout, sea-of-gates layout, general CMOS logic gate layout guidelines, layout optimisation for performance, transmission gate layout consideration, 2-input multiplexers, I/O structures, V_{DD} and V_{SS} pads, output & input pads, tri-state and bi-directional pads, miscellaneous pads.

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 5:

CMOS Analogue Design Method: Opamp design, opamp as a comparator, sample and hold, analogue layout considerations, transistor layouts, centroid design, capacitor matching, resistor layout, noise consideration.

Text Book:

Analog Integrated Circuits Deisgn, Johns Dand Martin K, John Wiley & Sons, 1997.

Module – 6:

CMOS Digital Design Methods: Structured design strategies, hierarchy, regularity, modularity, locality, design options like PL, re-programmable gate arrays, Standard Cell design, behavioural synthesis, RTL synthesis, logic optimisation, structural to layout synthesis, placement, routing

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

Module – 7:

CMOS Subsystem Design: Single bit address, bit parallel adder, transmission gate adder, asynchronous counter, synchronous counter, RAM, finite state machines, multilevel logic.

Text Book:

Principle of CMOS VLSI Design A System Perspective, Weste Neil H E & Eshraghian K, Pearson Education, 1993.

EC4203 ANALOG COMMUNICATION SYSTEM

MODULE – I

Signal Analysis: Time domain and Frequency domain representation of a signal.Fourier series, Complex Fourier spectrum (Discrete spectrum or line spectrum), Fourier Transform, Properties of Fourier Transform.

Text Books:

1. "Communication Systems", 2/e, S. Haykin, (Chapter – 1 & Chapter – 2).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – II

Representations of Signals and Systems: Energy and power spectral density spectrum, Distortion less transmission, Causality and Physical realizability, pre-envelope and canonical representation of band pass signals.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 2).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – III

Amplitude Modulation Systems: Basics of Amplitude modulation, Square law modulator, Switching modulator, Square law demodulator, Envelope Detector, Double side band suppressed carrier modulation. Balanced and Ring Modulators, Coherent modulator, Quadrature Amplitude Modulation.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 3).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – IV

Amplitude Modulation Systems (Continued): Single side band modulation, Frequency Discrimination and Phase Discrimination modulators, Coherent detection of SSB, Introduction to Frequency Division Multiplexing and Time Division Multiplexing, Superheterodyne AM receiver and its characteristics.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 3 & 7).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – V

Angle Modulation Systems: Basics of Frequency and phase modulation, Single tone frequency modulation, NBFM, WBFM, Transmission bandwidth of FM wave, Indirect and direct methods of FM generation, Frequency Discriminator, Phase Locked Loop demodulator, Superheterodyne F.M. receiver.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 4).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – VI

Pulse Modulation Systems: Introduction to sampling process, Pulse amplitude modulation, Pulse duration modulation, Pulse Position Modulation

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 7).
2. "Communication Systems", B. P. Lathi, 1968

MODULE – VII

Noise in Communication Systems: Noise, Shot noise, Thermal noise, White noise, Noise Equivalent Bandwidth, Signal to Noise Ratio for coherent detection of DSBSC, SNR for coherent reception with SSB modulation, SNR for AM receiver using envelope detection, Noise in FM reception, FM threshold effect, Pre Emphasis & de-emphasis in FM.

Text Books:

1. "Communication Systems", 2/e, S. Haykin (Chapter – 6).
2. "Communication Systems", B. P. Lathi, 1968

Reference Book:

1 Communication System Engineering by John G. Proakis and Masoud Salehi, Pearson Education.

2 Communication Systems, An Introduction to signals and Noise in Electrical Communication by A. Bruce Carlson and Paul B. Crilly, Mc Graw Hill.

EC4207 ELECTROMAGNETIC THEORY

Module – 1:
Introduction to Maxwell's Equations, Faraday's Law, Transformer & Motional EMF, Displacement Current ,Maxwell's Equations(Generalized form)
Text Book:
1. Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-9)
Module – 2:
Boundary Conditions and Wave Equation: Electromagnetic Boundary Conditions, Time varying Potentials, Time harmonic fields, Time harmonics Maxwell's Equations.
Text Books:
1. Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-9)
Module – 3:
Electromagnetic Wave Propagation(Part-1): Wave Equation & Plane Waves in unbounded homogeneous ,plane waves in free space and lossy media, Skin depth, Poynting vector and Power considerations.
Text Books:
1.Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-9)
Module – 4:
Electromagnetic Wave Propagation (Part-2): Polarization of Electromagnetic waves,Reflection of a plane wave at Normal incidence and Oblique incidence.Parallel & Perpendicular Polarization at perfect conducting & dielectric boundaries, , Brewster's Angle.
Text Book:
1. "Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-10)
Module – 5:
Theory of Transmission Line (Part – 1):
Transmission line parameters & Equations,Input Impedance ,SWR and Power ,TheSmith Char. **Text Book:**
1. Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-11)
Module – 6:
Applications of Transmission Lines (Part – 2):
Quarter Wave Transformer Matching,Single Stub Tuner(Matching),Slotted line (Impedance Measurement,Transients on transmission lines, Microstrip Transmission
Text Book:
1. Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-11)
Module – 7:
Waveguides and Cavity Resonators:
Transverse Electric and Transverse Magnetic wave propagation in Rectangular Waveguide, Rectangular Cavity Resonator, Circular Cavity Resonator, Quality factor of the rectangular Cavity Resonator
Text Book:
1. Elements of Electromagnetics", Mathew N.O.Sadiku 3rd edition (Oxford) (Chapter-12)

Reference Books:
1. "Engineering Electromagnetics", W.A Hayt Jr. and John A. Buck, McGraw Hill International.
2. "Field Theroy of Guided Waves", R. E. Collins, McGraw Hill International.
3. "Electromagnetics field Theory and Transmission Line", G.S.N Raju,Pearson Education
4. "Electromagnetic Waves and Radiating Systems", 2/e, E. C. Jordan and K. G.Balmain, PHI.

EC4205 MICROPROCESSOR AND MICOCONTROLLER

Module – 1:

Revision of logic circuits with emphasis on control lines, SAP concepts with stress on timing diagrams, Microinstructions, Microprogramming, Variable machine cycle, Architecture of 8085 Processor , Functions of all signals, Bus concepts, Multiplexed and De-multiplexed Bus, Minimum system.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

Module – 2:

Instruction set, Addressing modes, Stack operation, Timing diagrams, Programming examples like Time delay, Looping, Sorting, Code conversions like BCD to Binary, Binary to BCD, HEX to ASCII, ASCII to HEX, BCD Arithmetic etc.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

Module – 3:

8085 based Microcomputer system, Memory Organization, Memory Interfacing, Memory Mapped I/O, I/O Mapped I/O, Interrupts, Hardware and Software Interrupts, Interrupt instructions, Programmed I/O, Interrupt driven I/O, DMA.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085" by R. S. Gaonkar.

Module – 4:

Architecture of 8255 I/O peripheral chip, Modes of operation, Hand shake mode operation, BSR mode, ADC 0801 and ADC 0808 Interfacing with microprocessor, Analogue multiplexed ADC, DAC 0808 specifications, DAC Interfacing, Programming examples for Generation of square wave, positive and negatives ramps, triangular and sine waves, Sample and Hold circuit, LF 398 and its applications in Data Acquisition.

Text Books:

1. "Digital Computer Electronics", 2/e. by A. P. Malvino.
2. "Microprocessor Architecture, Programming and Applications with 8085". by R. S. Gaonkar.

3. “Microprocessor and Interfacing, Programming of Hardware” by Douglas Hall.
4. “Microprocessor and Peripherals” by S. P. Chowdhury and Sunetra Chowdhury.

Module – 5:

8253 timer, Modes of operation, Applications, 8279 Keyboard/Display Interface, Different modes of operation, Interfacing, Programming examples.

Text Books:

1. “Microprocessor and Interfacing, Programming of Hardware” by Douglas Hall.
2. “Microprocessor and Peripherals” by S. P. Chowdhury and Sunetra Chowdhury.
3. “The INTEL 8086/8088 Microprocessor, Architecture, Programming, Design and Interfacing”, 3/e. by Bhupendra Singh Chhabra.

Module – 6:

Evolution of Microprocessors, Introduction (Architecture and Instruction set only) of 8086 and 8088, Evolutionary steps and Additional features of 80186, 80286, 80386, 80486 and Pentium Processors, Concept of CISC and RISC processors.

Text Books:

1. “Microprocessor, Microcomputer and their Applications”, 2/e. by A, K. Mukhopadhyay.
2. “Advanced Microprocessor” by Y. Rajasree.
3. “The INTEL 8086/8088 Microprocessor, Architecture, Programming, Design and Interfacing”, 3/e. by Bhupendra Singh Chhabra.

Module - 7 :

Introduction to Microcontrollers, 8051 Microcontroller, Memory Organization, Programming techniques, Addressing modes, Instruction set, Interrupt structure, Port structure, Different modes of operation, Programming examples.

Text Books:

1. “Advanced Microprocessors and Microcontrollers” by S. K. Venkata Ram.
2. “Microprocessor, Microcomputer and their Applications”, 2/e. by A, K. Mukhopadhyay.
3. “Advanced Microprocessors” by Y. Rajasree.
4. “Microprocessor and Peripherals” by S. P. Chowdhury and Sunetra Chowdhury.

EC5201 DIGITAL COMMUNICATION SYSTEM

MODULE- I

Random Signal Theory: Probability, Mutually Exclusive events, Joint Probability, Statistical independence, Random variables, Cumulative Distribution function, Probability Density function, Mean and variance of random variables, Error function, Rayleigh Probability Density, Gaussian Probability Density.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND

MODULE- II

Random Process: Stationary and Ergodic Process, Autocorrelation, Power Spectral Density of digital data.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND

MODULE- III

Sampling theory and Pulse Modulation Systems: Sampling Theorem, Quantization of Signals, Quantization Error, Companding, PCM, PCM system, DPCM, DM, ADM.

Text Books:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND
2. "Communication Systems", 4/e by Simon Haykin, John Wiley and Sons, Delhi.

MODULE- IV

Optimal Reception of Digital Signal: Base band Signal receiver, Probability of error, Optimum filter, Matched filter, Coherent reception.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.

MODULE- V

Digital Modulation Techniques: Orthogonal representation of signal, The Gram-Schmidt procedure, BPSK, DPSK, QPSK, M-ary PSK, BFSK, M-ary FSK, MSK.

Text Books:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.
2. "Communication Systems", 4/e by Simon Haykin, John Wiley and Sons, Delhi.

MODULE- VI

Element of Information Theory: Entropy, Information rate, Shannon's theorem, Channel capacity, Capacity of Gaussian Channel, Bandwidth-S/N Trade off.

Text Book:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.

MODULE- VII

Spread Spectrum Modulation: Introduction, Direct sequence spread spectrum, PN Sequence, CDMA, Frequency hop Spread spectrum, Time hop-spread spectrum.

Text Books:

1. "Principles of Communication Systems", 2/e, by H. Taub and DL Schilling, Tata McGraw Hills, ND.
2. "Communication Systems", 4/e by Simon Haykin, John Wiley and Sons, Delhi.

Reference Book:

1. Communication System Engineering by John G. Proakis and Masoud Salehi, Pearson Education.

2. Digital Communications Fundamental and Applications by Bernard Sklar, Pearson Education.

EC5203 MICROWAVE ENGINEERING

Module – 1:
Introduction to Microwaves and Mathematical model of Microwave Transmission: History of Microwaves, Microwave Frequency bands, Applications of Microwaves: Civil and Military, Medical, EMI/ EMC, Concept of Mode, Characteristics of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission

Module – 2:
Analysis of RF and Microwave Transmission Lines: Coaxial Line, Rectangular Waveguide, Circular waveguide, Stripline, Microstrip Line

Module – 3:
Microwave Network Analysis: Equivalent Voltages and currents for non-TEM lines, Network parameters for microwave Circuits, Scattering Parameters

Module – 4:
Passive and Active microwave Devices: Microwave Passive components: Directional Coupler, Power Divider, Microwave Passive components: Magic Tee, attenuator, resonator, Microwave Active components: Diodes, Transistors, Microwave Act)ve components: oscillators, mixers, Microwave Semiconductor Dev)ces: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes, Microwave tubes: Klystron, TWT, Magnetron

Module – 5:
Mic2owave Design Principles: Impedance transformation, ImpedancE Ma4ching, Microwave Filter Design, RF and Microwave Am@lifier Desi'n, Microwave Power amplifier Design, Low Noise AmplIfier Design, Microwave Mixer Design, Microwave Oscillator Design

Module – 6:
Microwave Measurements: Power, Frequency and impedance measurement at microwave frequency, Network Analyser and measurement of scattering parameters, Spectrum Analyser and measurement of spectrum of a microwave signal, Noise at microwave frequency and measurement of noise figure, Measurement of Microwave antenna parameters

Module – 7:
Modern Trends in Microwaves Engineering: Effect of Microwaves on human body, Medical and Civil applications of microwaves, Electromagnetic interference / Electromagnetic Compatibility (EMI / EMC), Monolithic Microwave IC fabrication, RFMEMS for microwave components, Microwave Imaging

References:
1. David M. Pozar, "Microwave Engineering", Third Edition, Wiley India.
2. S. Ramo, J.R.Whinnery and T.V.Duzer, "Fields and Waves in Communication Electronics", Third Edition, Wiley India.
3. R.E.Collin, "Foundations for Microwave Engineering", Second edition, IEEE Press.

EC5205 DATA COMMUNICATION

Module – 1:

Data Transmission: Basic Concepts, Analog and Digital Transmission, Transmission line Impairments, Channel Capacity, Guided Transmission media, The need for a Protocol Architecture, OSI layered structure, TCP/IP Protocol Suite, Fundamental differences between OSI and TCP/IP, Primitives and PDUs

Text Book:

Data and Computer Communication, 7/e. by William Stallings

Module – 2:

Data Encoding: Digital data to Digital Signal, Different encoding schemes like NRZ, Multilevel Binary, Bi phase, Differential Manchester, Scrambling techniques, Self clocking codes, Digital Data to Analog Signals, ASK, FSK, PSK, QPSK etc., Analog Data to Digital Signals like PCM, DM etc., Companding, Analog data to Analog Signals, CODEC and MODEM

Text Books:

1. Data and Computer Communication, 7/e. by William Stallings.
2. Data Communication and Networking, 3/e. by Behrouz. A. Forouzan.

Module – 3:

Digital Data Communication Techniques: Synchronous and Asynchronous transmission, Backward and Forward Error Control, Error detection techniques like CRC, Shift register implementation, Error correction, Block Code principles, Hamming distance, Interfacing standards like V.24/EIA-232.F, CCITT-X.21 Interface

Text Books:

1. Data and Computer Communication, 7/e. by William Stallings.
2. Data Communication and Networking, 3/e. by Behrouz. A. Forouzan.
3. Data Communication by Prakash C. Gupta.

Module – 4:

Data Link Control: Line Configurations, Flow Control using Stop and Wait ARQ, Sliding window protocol, Error control using Stop and Wait ARQ, Go-back-to N ARQ, Selective Reject ARQ, Data Link Control Protocol HDLC, Basic characteristics, Frame structure and operation of HDLC, Data transparency control using bit stuffing, Utilization efficiency of a link, Point-to-Point Protocol (PPP), Introduction to LCP, PAP, CHAP, NCP and IPCP

Text Books:

1. Data and Computer Communication, 7/e by William Stallings.
2. Data Communication and Networking, 3/e by Behrouz. A. Forouzan.

Module – 5:

Multiplexing: Frequency Division Multiplexing, Carrier standards, Synchronous Time Division Multiplexing, TDM link control, Digital Carrier systems, SONET/SDH, Statistical Time Division Multiplexing, Performance, Cable Modem, ADSL Design, Discrete multitone, xDSL

Text Books:

1. Data and Computer Communication, 7/e. by William Stallings.
2. Data Communication and Networking, 3/e. by Behrouz. A. Forouzan.

Module – 6:

Switched Networks: Comparison of Circuit switching, Message switching and Packet switching techniques, Digital switching concepts like Space division switching, 3-Stage Space division switch, Control Signalling, Common-channel Signalling, TDM Bus switch, TSI switch, Time Multiplexed Switches like STS and TST, Routing in circuit switched networks

Text Books:

1. Data and Computer Communication, 7/e. by William Stallings.
2. Data Communication and Networking, 3/e. by Behrouz. A. Forouzan.

Module – 7:

Packet Switching: Datagram packet switching and Virtual circuit Packet switching, Use of Least cost algorithms like Dijkstra's and Bellman-Ford algorithms, Routing characteristics, Routing strategies, Example system of ARPANET (all 3 generations) Congestion, Congestion control techniques, Traffic management, Congestion control in Packet switched networks, CCITT X.25 Interface

Text Books:

1. Data and Computer Communication, 7/e. by William Stallings.
2. Data Communication by Prakash C. Gupta.

EC 5203 Microwave Engineering

Module-1

Introduction to Microwave: History of Microwaves, Microwave Frequency bands, Applications of Microwaves: Civil and Military, Medical, EMI/ EMC, MMIC, RFMEMS.

Module-2

Microwave Network Analysis: Equivalent Voltages and currents, Impedance and Admittance Matrices, Scattering Parameters, The Transmission *(ABCD)* Matrix.

Module-3

Passive Microwave Devices and Components: Basic Properties of Dividers and Couplers, The T-Junction Power Divider, Wilkinson Power Divider, Waveguide Directional Couplers, Quadrature (90◦) Hybrid, Coupled Line Directional Couplers.

Module-4

Active Microwave Devices and Components: Diodes and Diode Circuits: Schottky Diodes and Detectors, PIN diodes and Control circuits, Varactor diodes, other diode (Gunn diodes, Tunnel diodes, IMPATT diodes, BARITT diodes), Bipolar Junction Transistors, Field Effect Transistors, Microwave Tubes: Klystron, Travelling Wave Tube, Magnetron.

Module-5

Design of Ferromagnetic Components: Intro to Ferromagnetic Material, Faraday rotation in ferrite, Ferrite Isolators, Ferrite Phase Shifters, Ferrite Circulators.

Module-6

Microwave Planar Transmission Lines: Microstripline, Parallel strip line, Coplanar strip line, Shielded strip line.

Module-7

Microwave Measurements: Network Analyzer, Spectrum analyzer**,** Frequency and impedance measurement at microwave frequency, Measurement of Microwave antenna parameters.

Text Book:

1. David M. Pozar, "Microwave Engineering", Third Edition, Wiley India.

Reference Book:

1. S. Y. Liao , “Microwave Devices & Circuits”, PHI 2nd Edition
2. B. R. Vishvakarma, R U Khan, M K. Meshram, “ Intoduction to Microwave Measurements”
3. R.E.Collin, "Foundations for Microwave Engineering", Second edition, IEEE Press.

EE 4207 DIGITAL SIGNAL PROCESSING

MODULE – I

Introduction: Discrete-Time Signals, Shanon's sampling theorem, Difference equation description, characteristics of digital filters and time domain analysis, properties of discrete time system (linearity, time-variance, convolution), BIBO stability, Z-transformation and their application in solving difference equations, Relationship between Laplace and Z-transforms.

(7)

MODULE – II

Frequency Domain Analysis: Discrete Time Fourier Transform (DTFT) and Discrete Fourier Transform (DFT), Periodic convolution, Direct evaluation of DFT, FFT algorithms- decimation in time and frequency, Relationship between Fourier and Z-transforms

(8)

MODULE – III

Digital Filter Structures: Direct form I&II, cascade, parallel and ladder realizations.

(5)

MODULE – IV

Filter Function Approximations and Transformations.
Review of approximations of ideal analog filter response, Butterworth filter, Chebyshev Type I & II.

(6)

MODULE – V

Frequency Transformations: Frequency transformation in analog domain, frequency transformation in digital domain.

(4)

MODULE – VI

Design of IIR Filter: Design based on analog filter approximations, Impulse invariance method, Matched Z-transformation, Bilinear transformation.

(7)

MODULE – VII

Design of FIR Filters: Symmetric and antisymmetric FIR filters, design of linear phase FIR filters using windows and frequency – sampling methods, design of optimum equiripple linear phase FIR filters, comparison of FIR and IIR filters.

(8)

Text Books:

1. John G. Proakis, Dimitris G. Mamalakis, Digital Signal Processing, Principles, Algorithms and Applications
2. Alan V. Oppenheim Ronald W. Schafer, Digital Signal Processing, PHI, India.

Reference Book:

1. Antonious, Digital Filter Design, Mc-Graw-Hill International Editions.

EC6201 INTELLIGENT INSTRUMENTATION

Module – 1:

Technological trends in making transducers, Silicon sensors, Intelligent sensors and Bio-sensors. Measurement of Pressure, Level, Flow and Temperature using silicon sensors. Bio-sensors application and its type

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
3. "Sensors and Transducers", 2/e by D. Patranabis

Module-2:

Non-contact type sensing: Radiation Sensors, X Ray and Nuclear radiation sensors, Fibre optic sensors for Temperature, Liquid level, Fluid flow measurement,

Electro-analytical sensors: Electrochemical cell, Standard Hydrogen Electrode (SHE), Smart sensors

Text Books:

1. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.
2. "Sensors and Transducers", 2/e by D. Patranabis

Module – 3:

Instrumentation systems, Types of Instrumentation systems, Data acquisition system and its uses in intelligent Instrumentation system, Detailed study of each block involved in making of DAS, Signal Conditioners: as DA, IA, Signal Converters (ADC & DAC), Sample and hold, Designing of Pressure, Temperature measuring instrumentation system using DAS, Data logger

Text Books:

1. "Process Control Instrumentation Technology" 6/e, by Curtis D Johnson, Pearson Ed.
2. "Electrical and Electronics Measurement and Instrumentation" by A. K. Swahney.
3. "Electronics instrumentation" by H. S. Kalsi [TMH]

Module – 4:

Automation system, Concepts of Control Schemes, Types of Controllers, Components involved in implementation of Automation system; Converter (I to P) and Actuators: Pneumatic cylinder, Relay, Solenoid (Final Control Element), Computer Supervisory Control System (SCADA), Direct Digital Control's Structure and Software

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

Module – 5:

Introduction of Programmable logic controller, Principles of operation, Architecture of Programmable controllers, Programming the Programmable controller

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

Module – 6:

Introduction about Distribution Digital Control, Functional requirements of process control system, System architecture, Distributed Control systems, Configuration, Some popular Distributed Control Systems, Industrial control applications like cement plant, thermal power plant.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Process Control Instrumentation Technology", by Curtis D Johnson, Pearson Ed.

Module –7:

Introduction about Intelligent controllers, Model based controllers, Predictive control, Artificial Intelligent Based Systems, Experts Controller, Fuzzy Logic System and Controller, Artificial Neural Networks, Neuro-Fuzzy Controller system.

Text Books:

1. "Computer-Based Industrial Control", by Krishna Kant, PHI.
2. "Instrumentation ", by Kirk and Rimboi.

EC6203 FIBER OPTIC COMMUNICATION SYSTEM

Module –1:

Introduction: Generations of optical communication, Advantages, Basic elements of an optical fiber transmission link

Text Book:

"Optical Fiber Communications" G.Keiser, 3/e, McGraw Hill

Module – 2:

Optical Fiber: Classification of Fibers, Fiber material and fabrication methods, Ray optics representation & wave optics representation for Step index and Graded index fibers, Phase & Group Velocity, Mode propagation, Goos-Hanchen shift, Power flow in step index fibers.

Text Book:

"Optical Fiber Communications" G.Keiser,3/e, McGraw Hill

Module –3 :

Signal attenuation and distortion in optical fibers, Dispersion effects in optical fibers.

Text Book:

"Optical Fiber Communications" G.Keiser, 3/e, McGraw Hill

Module - 4:

Optical Sources: Structure and materials of LED and LD sources, Operating characteristics and modulation capabilities of the LED and LD sources

Source to Fiber Power launching and coupling, Lensing scheme for coupling improvement, Fiber to fiber coupling and alignment methods, Splicing techniques, Fiber Connectors.

Text Book:

"Optical Fiber Communications" G.Keiser,3/e,McGraw Hill

Module – 5:

Principle of PIN photodiode and Avalanche photodiode, Noise in photodetectors, Detector response time, Photodiode materials, Optical receiver configuration and performance, Pre-amplifier design for optical receiver, analog and digital receiver.Point to point transmission links, Wavelength division multiplexing, optical data buses, Link power and rise time budget, Optical Amplifiers.

Text Book

"Optical Fiber Communications" G. Keiser, 3/e, McGraw Hill

Module – 6:

Fiber optics in LAN, MAN, SAN, WAN, FDDI architecture, SONET/ SDH architecture, SONET/ SDH network elements

Text Book:

"Optical Networking and WDM", Walter Goralski, Tata McGraw-Hill

Module - 7:

Potential application and future prospects optical fibers, multimode intensity sensors and signal mode interferometric sensors

Text Book:

"Fundamentals of Fiber optics in telecommunication and sensor systems", B.P.Pal, New age International (P) Ltd. Publishers, 2001.

Ref. Books:

1. "Optical Fiber Communication",J. M. Senior, PHI,2nd Ed.
2. "Introduction to Fiber Optics", Ghatak &Thyagarajan, Cambridge University press.
3. "Optical Communications", J.H.Franz &V.K.Jain Narosa Publishing House.
4. "Fiber Optics Communication", Harold Kolimbiris, Pearson Education.

EC6205 COMPUTER NETWORKING

MODULE- I

Local Area Networks: Background, Topologies and Transmission Media, LAN standards IEEE 802 reference Model, Logical Link Control, Medium Access Control, IEEE 802.3 Medium Access Control, Ethernet, Fast Ethernet, Gigabit Ethernet, Token Ring and FDDI, Medium Access Control, IEEE 802.5 Transmission Medium Options.

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- II

Connecting devices and Backbone Networks: Bridges, Functions of a Bridge, Bridge Protocol Architecture, Fixed routing, Spanning tree approach, Connecting devices like Repeaters, Hubs, Bridges ,Two-layer switches, Routers and Three layer switches, Backbone Networks, Bus Backbone, Star Backbone, Connecting remote LANs, Wireless LANs, Applications, Architecture, IEEE 802.11, Architecture and Services, Medium Access Control, Physical layer.

Text Books:

1. "Data and Computer Communication", 8/e.by William Stallings.
2. "Data Communication and Networking" , 4/e. by Behrouz A. Forouzan.

MODULE- III

Internetworking: Principles of Internetworking, Requirements, Architectural approaches, Connectionless Internetworking, Addressing, Routing techniques, Static versus Dynamic Routing, Internet Protocol (IP), Internet Control Message Protocol (ICMP), IPV6 Structure, Header, Address and Header Formats, ICMPV6.

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- IV

Internet work Operations: Unicast and Multicast routing, Autonomous Systems, Unicast routing protocol OSPF, Internet Group Management Protocol (IGMP), Border Gateway Protocol, Integrated Service Architecture, ISA Approach, Components, Services, Queuing Discipline, Resource Reservation Protocol (RSVP), Differentiated Services (DS).

Text Books:

1. "Data and Computer Communication",8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- V

Transport Protocols: Connection Oriented Transport Protocol Mechanisms, Reliable Sequencing networks services, Unreliable network services, TCP Services, TCP Header Format, TCP Mechanisms, TCP Implementation policy options, TCP Congestion Control, Retransmission Timer Management, Window Management, Quality of Service, User Datagram Protocol (UDP).

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- VI

Network Security: Passive and Active Attacks, Symmetric Encryption, Encryption Algorithms, Key Distribution, Traffic Padding, Message Authentication, Hash function, Secure Hash function, Public-key Encryption, Digital Signature, RSA Public Key Encryption algorithm, Key Management, Secure Socket layer and Transport layer Security, SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, Handshake Protocol, IP level security IPSEC, Application layer security PGP, Firewall, Virtual Private Networks.

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

MODULE- VII

Distributed Applications: Electronic Mail, Simple Mail Transfer Protocol (SMTP), Multipurpose Internal Mail Extension (MIME), Client Server Model, Socket Interface, Simple Network Management Protocol (SNMP) SNMP V2 and SNMP V3, Hypertext Transfer Protocol (HTTP) Overview Message Entities, World Wide Web (WWW), HTML, Common Gateway Interface (CGI), Voice over IP (VOIP).

Text Books:

1. "Data and Computer Communication", 8/e. by William Stallings.
2. "Data Communication and Networking", 4/e. by Behrouz A. Forouzan.

EE 6201 CONTROL THEORY

MODULE – I

Introduction:, Examples of control systems and applications, Basic components of control systems, Open loop and closed loop control systems, Effect of feedback on overall gain, Stability and external disturbances, Classification of control system : Linear and nonlinear continuous and digital, Time invariant and time varying, Minimum phase and non-minimum phase systems etc. Linearization of nonlinear systems using Taylors series.

MODULE – II

Block Diagrams and Signal Flow Graph: Block diagrams of control systems, Block diagram reduction, Signal Flow Graph (SFG)- Basic properties of SFG, SFG algebra, Gain formula to SGP, Application of gain formula to block diagrams.

MODULE – III

Time Response of Control Systems: Transient and steady state response, Time response specifications, Typical test signals, Steady state error, and error constant, Stability- Absolute, relative and conditional stability, Dominant poles of transfer function.

Root Locus Methods: Root locus concept, Properties and construction of root locus, Determination of relative stability from root locus, Root sensitivity to parameter variation, Root contours, Systems with transportation lag and effect of adding poles or zeros.

MODULE – IV

Bode Analysis and Introduction to Design: Frequency response specifications, Correlation between time and frequency domain Bode plot, Determination of stability using Bode plot, Introduction to compensation design using Bode plot.

MODULE – V

Other Frequency Domain Tools: Nyquist stability criterion, Theory of Magnitude phase plot, Constant M, constant N circle and Nichols chart.

MODULE – VI

Control System Components and Basic Control Actions: Sensors and encoders in control system, Potentiometer, Tachometers, incremental encoders, Synchros, Operational Amplifiers, Basic control actions: on-off control, P, PI, PD and PID.

MODULE – VIII

Concepts of State, State Variables: Development of state-space models. State and state equations, State equations from transfer function Transfer function from state equations, State transition matrix, Solution of State equation, Transfer Matrix, State variables and linear discrete time systems, Controllable and observable State models, Asymptotic state observers. Control system design via pole placement.

Text Books:

1. I. J. Nagrath & Gopal, "Control Systems Engineering", 4th Edition New Age International Publication.
2. K. Ogata, "Modern Control Engineering", 3rd Edition, Pearon Education.

Reference Books:

1. Norman Nise, "Control System Engineering, 4th Edition, Wiley.
2. Graham C. Goodwin, "Control System Design", PHI.
3. B. C. Kuo, "Automatic Control System", 7th Edition, PHI.

EC7201 MOBILE & CELLULAR COMMUNICATION

MODULE- I

Mobile Communication Systems & Standards: Evolution of Mobile Radio Communications, Elements of cellular communication systems, Different generations of Cellular Networks, Introduction to GSM, GPRS, UMTS, WLAN, WLL, Bluetooth, PAN.

MODULE- II

The Cellular Concept: Frequency Reuse, Hand-off strategies, Schemes to enhance cellular system capacity and range extension, Spectral efficiency.

MODULE- III

Mobile Radio Interferences & System Capacity: Co-channel interference and Adjacent channel interference, Power control, Inter-symbol interference, Interference and system capacity.

MODULE- IV

Propagation & Fading: Free-space propagation model, Propagation path loss, Outdoor propagation models (Okumura model & Hata model), Indoor propagation models (Partition Losses in the same floor and between floors), Multipath fading, time dispersive and frequency dispersive channels, delay spread and coherence bandwidth, LCR and ADF.

MODULE- V

Diversity & Combining Techniques: Diversity Schemes (Space, frequency, field and polarization diversities) and combining techniques.

MODULE- VI

Antenna Design Parameters: Antennas used for Mobile Communications, Radiation patterns, smart antenna (basic concept), Antenna location, Spacing and height.

MODULE- VII

Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, OFDM, DS-CDMA, FH-CDMA, TH-CDMA, Capacity of Cellular CDMA.

Text Book:

1. Theodore S Rappaport, "Wireless Communication: Principles and Practice" Prentice Hall of India, New Delhi, 2006, 2/e.

Reference Book:

1. William C. Y. Lee, "Mobile Communications Engineering" Tata McGraw Hills Education Pvt. Ltd., 2010 , 2/e, (Indian reprint)

EC7203 ANTENNAS & PROPAGATION FOR WIRELESS COMMUNICATION

MODULE – 1

Radiation and Antennas: Definition of antenna, Function of antenna, Properties of antennas, Network theorems, Basic antennas parameters and elements, Radiation mechanism, Radiation field, Power and Radiation Resistance, Radiation, induction and electronic field, Friis transmission formula, Hertzian dipole, Different current distribution in liner antennas, Radiation form half wave dipole and quarter wave monopole, Radiation characteristics of dipoles.

Text Books:

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter -3)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

Module -2

Linear Antennas Arrays: Directional characteristics of dipoles, Radiation patterns of alternating current element, dipoles and monopoles, two element array, Uniform linear array, Broadside and endfire array, Array of non isotropic radiations, Principles of pattern multiplication, Binomial arrays.

Array Synthesis: Synthesis methods, Dolph Chebyshev methods.

Text Books:

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter - 4 and Chapter - 5)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

Module: - 3

HF, VHF and UHF Antennas: Resonant and non – resonant antennas, LF Antennas, Antennas for HF, VHF and UHF, Dipole array, Broadside array, Endfire array, Folded dipole, Yagi-uda antenna, Log-periodic antenna, Loop antenna, Helical antenna.

Text Books:

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter - 6)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

Module – 4

Microwave Antennas: Parabolic reflector, Types of Parabolic reflectors, Feed systems, Shaped beam antennas, Horn antennas, Slot antenna, Slot on the walls of rectangular waveguide, Babinet's principle.

Text Book:

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter - 7)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

MODULE -5

Microstrip Antennas: Introduction, Advantages, Limitations, Feeding techniques, analysis using transmission line model and cavity model, Broadband Techniques.

Text Book:

1. "Antenna Theory and Design", C.A. Balanis, John Wiley & Sons, Inc.

MODULE – 6

Antennas for Special Applications: Electrically and physically small antennas, Antennas for satellite communication, Architecturally acceptable antennas, Leaky wave antennas, Antennas for mobile communication, Antennas for GPR, UWB antennas.

Text Book:

1. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York. (Chapter-17)

MODULE – 7

Radio Wave Propagation: Surface Wave, Space wave, Tropospheric wave propagation, Ducting, Inosphere Layers, Inosphere wave Propagation, MUF, Skip distance, Fading Effect of the Earth's magnetic field, LOS communication, Radio Horizon, Microwave frequency bands, Microwave link.

Text Book:

1. "Electromagnatic Waves and Radiating Systems", E. C. Jordan & K.G. Balmain, PHI.
2. "Electronic and Radio Engineering" F.E. Terman, McGraw Hill Ltd.
3. "Antennas and Wave Propagation, G.S.N. Raju, Pearson Education.

Reference Books:

1. " Antenna Analysis", Edward A. Wolf, John Wiley and Sons,
2. "Antenna Theory and Practice", Rajeshwari Chatterjee, IInd Edition, New Age International Ltd.

EC7205 TELECOMMUNICATION SWITCHING SYSTEMS & NETWORKS

MODULE- I

Switching in Telecommunication Systems: Evolution of Telecommunications, General principle of switching, Classification of Switching Systems, Elements of Switching System, Signalling tones, DTMF, Common Control and Direct Control

Text Book:

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001

MODULE- II

Electronic Space Division Switching: Stored Program Control (SPC), Centralised SPC, Distributed SPC, Enhanced Services, Two-Stage Networks, Three-Stage Networks.

Text Book:

1. "Telecommunication Switching Systems &Networks", by T. Viswanathan, PHI, 2001 (Ch-4)

MODULE- III

Time Division Switching: Principle of Time Division Space Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Introduction to Combination Switching.

Text Book

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001.(Ch- 6)

MODULE- IV

Traffic Engineering: Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modelling Switching systems, Erlang B formula, Delay Systems.

Text Book:

1. "Telecommunication Switching Systems", by T. Viswanathan, PHI, 2001. (Ch- 8)

MODULE- V

Integrated Services Digital Networks: ISDN and its Motivation, New Services, Network and Protocol Architecture, Transmission Channels, Internetworking, BISDN.

Text Book:

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001.(Ch- 11)

MODULE- VI

Telephone Networks: Network Subscriber Loop Systems, Switching Hierarchy & Routing, Transmission Plan, Numbering Plan, National and International numbering schemes

Text Books:

1. "Telecommunication Switching Systems & Networks", T. Viswanathan, PHI, 2001. (Ch-9)
2. "Telecommunications Switching, Traffic and Networks", J. E. Flood, (Ch- 10), Pearson Education Asia, 2004

MODULE- VII

ATM Networks: Introduction to Asynchronous Transfer Mode (ATM), Protocol, Architecture, ATM Logical Connection, ATM Cells, Transmission of ATM Cells, ATM Adaptation Layer, Traffic and congestion control

Wireless Networks: Introduction to Wireless Networks.

Text Book:

1. "Data & Computer Communications by William Stallings", 7/e, PHI. (Ch– 11 & 12).
2. "Wireless Communication-Principle and Practices". 2nd Ed. T. S. Rappaport, Pearson.

MEC1011 PROBABILITY MODELS AND STOCHASTIC PROCESSES

Module -1:
Random variables, Distribution and density functions, Expectation, Characteristic functions, Conditional probability, Conditional expectation. Sequences of Random Variables, Convergence concepts, Laws of large numbers, Central limit theorem

Module -2:
Random Vectors and Estimation:
Random Vectors, Covariance characterization, Jointly Gaussian random variables

Module -3:
Representations of Random Processes:
Sampling theorem, Karhunen-Leeve expansion, Orthogonal increment processes, White noise integrals, Spectral representation.

Module -4:
Concept of stochastic Processes, Classification, ensemble, Time averaging and Ergodicity. Methods of description, Stationarity, Covariance and Correlation coefficient, Auto correction and Cross Correlation functions, Power spectral densities.

Module -5:
Special Processes:
Markov processes and queuing theory, Wiener process, Poisson processes, Gaussian Process. Shot noise, Thermal noise.

Module -6:
Linear filtering of Stochastic Processes, AR, MA and ARMA Processes, Detection of known Signals

Module - 7:
Mean Square Error Filtering/Estimation, Optimal Filters, Weiner Filter and Kalman Filter, Spectral Estimation, Estimating a random variable with a constant, stored data wiener filter, Real Time wiener filter.

Text Books:

1. Probability, Random variables and Stochastic processes- A. Papoulis & S.U. Pillai
2. Random Signals – K. Sam Shanmugan & A. M. Breipohi.

MEC1019 MICROELECTRONIC DEVICES AND CIRCUITS

Module –1:
Introduction to IC Technology, Overview of MOS and BJT, Threshold Voltage, Body effect, basic DC equations, 2nd order Effect, MOS model, small-signal AC characteristics, CMOS inverter and its DC characteristics, static load MOS inverter, Silicon semiconductor technology, wafer processing, oxidation, epitaxy, deposition, ion implantation, CMOS technology, N-Well and P-Well process and SOI.

Module –2:
Fault Modeling and Simulation, Testability, Analysis Technique, Ad-hoc Methods and General guidelines, Scan Technique, Boundary Scan, Built in Self Test Analog Test Buses, Design for Electron Beam Testability, Physics of Interconnects in VLSI, Scaling of Interconnects, A Model for Estimating Wiring Density, A Configurable Architecture for Prototyping Analog Circuits.

Module – 3:
Mixed signal VLSI chip basic CMOS circuits, CMOS gate transistor sizing, Power Dissipation, Scaling of MOS Transistor Dimension, MOSFET and BJT Current Mirrors and its applications, Basic Gain Stage, Gain boosting techniques, Super MOS transistor, Primitive analog cell, Linear voltage – current converters, MOS multipliers and resistors, CMOS Bipolar and low voltage, BiCMOS, Op- Amp Design, Instrumentation Design, and Low Voltage Filter, BJT and MOS current mirror circuits and its applications.

Module –4:
CMOS Logic gate design, Fan-in and Fan-out, typical NAND and NOR delays, Transistor sizing, CMOS logic structure, DC analysis of Complementary Logic, BiCMOS logic, Pseudo NMOS, dynamic CMOS logic, Clocked CMOS logic, Pass transistor, CMOS Domino Logic, NP domino logic, Cascode voltage switch logic, source-follower pull-up logic (SFPL), clocking strategy and IO structure.

Module – 5:
Single-ended and differential operations, Basic differential pair: qualitative analysis and quantitative analysis, Common mode response, Differential pair with MOS loads, Gilbert Cell. General considerations, performance parameters, One-stage Op Amps, two-state Op Amps, Gain boosting, comparison, Common mode feed back, Input range limitations, Slew Rate, Power supply rejection, Noise in Op Amps,Operational Transconductance Amplifier(OTA) and its applications.

Module – 6:
Review of Statistical Concepts, Statistical Device Modeling, Statistical Circuit Simulation, Automation, Analog Circuit Design, Automatic Analog Layout, CMOS Transistor Layout, R and C Layout, Analog Cell Layout, Mixed Analog - Digital Layout

Module – 7:
Introduction to Circuit Modeling Tools, Circuit Descriptions, DC Circuit Analysis, AC Circuit Analysis, Transient Analysis, Advance SPICE Command and Analysis, Diode, JFET and MOSFET (Model, Statement and Parameter)

TEXT BOOKS:

1. Randoll L. Geiger, Phillip E. Allen, Noel K. Strader "VLSI Design Techniques for Analog and Digital Circuits", Mc Graw Hill International company, 1990.
2. Malcom R. Haskard, Lan C May, "Analog VLSI Design NMOS and CMOS", Prentice Hall, 1998.
3. R. Jacob Baker, Harry W. LI., & David K. Boyce., "CMOS Circuit Design". 3rd Indian reprint, PHI, 2000.
4. Microelectronic Circuits, 5th Edition, by Adel S. Sedra and Kenneth C. Smith, Oxford University press, 2004.
5. Philip E. Allen Douglas and R. Holberg, "CMOS Analog Circuit Design", Second Addition Oxford University Press-2003.
6. Fundamentals of Microelectronics, 1st Edition, by Behzad Razavi, Wiley Press, January 2008.
7. M.H Rashid, SPICE for Power Electronics and Electric Power, Englewood. Cliffs, N.J. Prentice Hall, 1993.
8. PSPICE Manual, Irvine, Calif: - Micro Sim Corporation, 1992.

MEC 1047 SENSORS AND TRANSDUCERS

Module -1:
Introduction about sensors and transducers, Principles of operation and their classification, characteristics of sensors
Reference Book:
1. "Sensors and Transducers", 2/E By D. Patranabis

Module - 2:
Conventional sensors Type
Based on Resistive principles. Potentiometer and Strain Gauge
Based on Inductive principles – Ferromagnetic Plunge type, Inductance with a Short-circuited sleeve. Transformer type, Electromagnetic Transducers
Based on capacitive principles - The parallel plate capacitive sensor, Variable Permittivity Capacitive Sensor, Stretched Diaphragm Variable Capacitive Transducer. Electrostatic and Piezoelectric Transducers, Quartz Resonators and Ultrasonic Sensors
Based on Magnetic principles. Magnetoresistive, Hall effect, Inductance and Eddy current sensors. Angular/Rotary movement Transducer, Electromagnetic Flowmeter, Pulse wire sensor and SQUID sensor
Reference Book:
1. "Sensors and Transducers", 2/E By D. Patranabis

Module - 3:
Thermal Sensors: *Acoustic Temp Sensor, Nuclear Thermometer, Magnetic Thermometer, Resistance Change Type, Thermoemf, Junction Semiconductor Types, Thermal Radiation, Quartz Crystal, NQR, Spectroscopic Noise Thermometry, Heat flux sensors.*
Radiation Sensors: *Basic Characteristics, Photo-emissive Cell and Photomultiplier, Photoconductive Cell - Photovoltaic and Photojunction Cell, Position-Sensitive Cell, X-ray and Nuclear Radiation Sensors. Fibre, PHI Optic Sensors*
Reference Book:
1. "Sensors and Transducers", 2/E By D. Patranabis

Module - 4: Electroanalytical Sensors
Introduction, Electro-chemical Cell, Cell potential, Sd. Hydrogen Electrode (SHE), Liquid Junction and Other potentials, Polarization, Reference Electrodes, Sensor Electrodes, Electro-Ceramics in Gas Media.
Reference Books:
1. "Sensors and Transducers", 2/E By D. Patranabis

Module - 5: Smart Sensors
Introduction, Primary Sensors Excitation, Amplification, Fitters, Converters, Compensation, Information Coding/Processing, Data Communication and Automation
Reference Books:
1. "Sensors and Transducers", 2/E By D. Patranabis

Module - 6: Digital Transducers
Digital Encoder, Shaft Encoder, Switches: Pressure, Level, Flow, Temperature, Proximity Switches, Limit Switches and its types, Isolators (or Barriers).
Reference Books:
1. Electrical & Electronics Measurements and Instrumentation By A.K.Shawhney, Dhanpat Rai & Sons.
2. Electronics instrumentation By H. S. Kalsi [TMH]

Module -7: Recent trends in sensor Technologies
Introduction, Film Sensors, Semiconductor IC Technology, Microelectromechanical System (MEMS), Nano Sensors, Application of Sensors : Automotive Sensors, Home Appliance Sensors, Aerospace Sensors, Sensors for manufacturing, Medical Diagnostic Sensors, Sensors for Environmental Monitoring.
Reference Book:
1. "Sensors and Transducers", 2/E By D. Patranabis

MEC1149 APPLIED BIOELECTRONIC INSTRUMENTATION

Module-1:
INTRODUCTION TO BMI & MEASUREMENTS: Physiological system & measurable variables, Human & equipment safety, Physiological effects of electricity, Micro & Macro-shock

Module-2:
MODELLING & SIMULATION IN BMI: Model based analysis of action potential, Cardiac output, Respiratory mechanism, Blood Glucose regulation

Module-3:
BIOMEDICAL SYSTEMS & ACQUISITION: Recording schemes and analysis of biomedical signals with typical examples of ECG, EMG, EEG, Wavelet transform, signal compression, Biomedical DSP

Module-4:
BMI FOR DIAGNOSOS & MONITORING: CT, PET, MRI, Thermal imaging, Ultrasound imaging, Diagnosis,Telemedicine & Telemonitoring. Antenna for biomedical application

Module-5:
BMI MICROSYSTEM: Implantable medical devices, Microsystem for clinical application, Microsensors

Module-6:
DIATHERMY & RADIOLOGY: Microwave, SW & UHF diathermy, LASER & X-RAY applications, Other radioactive rays

Module-7:
SPECIAL TOPICS: MedIcal informatics, Bio-neuro-fuzzy network, Blood gas & Pulmonary function analyzer.

Text Books:

1. R.S.Khandpur, Handbook for BMI, TMH Publisher.
2. Webster, Medical instrumentation application & design, John willey & sons.
3. Webster, Bioinstrumentation, John willey & sons.
4. Cromwell, BMI & Measurements, PHI Publisher.
5. Car & Brown, Introduction to biomedical equipment technology, Pearson education.
6. Antenna theory & Practise by Rajeswari chatterjee.
7. Medical informatics by M.L.SAIKUMAR
8. Biomedical DSP by Wills J Tompkin, PHI

MEC2113 REAL TIME EMBEDDED SYSTEM DESIGN

Module – 1: Introduction to Embedded Systems

Embedded system overview, Design challenges, Common design metrics, Time-to-market design metric, NRE and unit cost design metrics, Performance design metric, Processor technology, General purpose processors – software and hardware, Application specific processors, IC technology, Semi-custom ASIC

Text Book:

1."Embedded System Design A Unified HW.SW Introduction", by Vahid G Frank and Givargis Tony, John Wiley & Sons, 2002. Chapter 1 (1.1-1.4)

Module – 2: Embedded System Processors

Combinational logic and transistors, RT-level combinational and sequential components, Custom single purpose processor design. RT-level custom single– purpose processor design, Optimization, Optimization of FSMD, Optimization of data path.

Text Book:

1."Embedded System Design A Unified HW.SW Introduction", by Vahid G Frank and Givargis Tony, John Wiley & Sons, 2002. Chapter 2 (2.1-2.6)

Module-3: Memory

Write ability and data permanence, memory devices type of memory and basic form, EEPROM, flash memory, SRAM and DRAM, basic DRAM characteristics, memory selection for embedded systems, allocation of memory to the program segment blocks.

Text Book:

1."Embedded Systems Architecture, Programming and Design", by Raj Kamal, TMH-2003.

Module – 4: Device and Interrupt service

Bus models, time multiplexed bus, strobe and handshake protocols, strobe handshake compromise priority arbiter multilevel bus, and architecture.

Text Book:

1. "Embedded Systems Architecture, Programming and Design", by Raj Kamal, TMH-2003.

Module -5: *Embedded System Peripherals*

Timers, Counters, Watch-dog timers, Example of reaction timer, Watchdog timer, UART, PWM, Controlling a dc motor using a PWM. General purpose processor, ASIP's and ASIC's, semiconductor IC's programmable logic devices of CGD, Processor selection for embedded systems, special purpose processor

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid G. Frank and Givargis Tony, John Wiley & Sons, 2002. Chapter 4 (4.1-4.4)

Module – 6: *Interfacing*

Communication basics, Basic protocol concepts, ISA bus protocol, Microprocessor interfacing, I/O addressing, Interrupts, Example of DMA I/O and ISA Bus protocol, Arbitration, Priority arbiter, Daisy-chain arbiter, Parallel, Serial and Wireless communication, infrared-TRDA, radio frequency, error detection, CAN, USB, Blue tooth, IEEE 802-II, shared memory models

Text Book:

1. "Embedded System Design A Unified HW.SW Introduction", Vahid G Frank and Givargis Tony, John Wiley & Sons, 2002. Chapter 6 (6.1-6.8).

Module – 7: Digital Camera and Systems

Simple digital camera, User's perspective, Designer's perspective, Requirement specification, Design, Micro controller alone, Micro controller and CCDPP Digital thermometer, handhold computer, navigation system, IP phone, software defined-radio, smart card.

Text Book:

1-"Embedded System Design A Unified HW.SW Introduction", Vahid G Frank and Givargis Tony, John Wiley & Sons, 2002. Chapter 7 (7.1-7.4)

Reference Book:

1. "Fundamental of Embedded System Design & Applications" by Vijay Nath, K.S. Yadav, L.K. Singh, ACM Learning, New Delhi.
2. INTRODUCTION TO EMBEDDED SYSTEMS, K. Shibu, TMH Edition.
3. "Embedded Systems Architecture, Programming and Design", by Raj Kamal, TMH-2003.

EC7207 SATELLITE COMMUNICATION SYSTEM

Module – 1:
An overview of satellite communication, satellite orbits, kepler's law, Orbital Elements, Eclipse effect, Sun transit outage, Placement of a satellite in a geostationary orbit, Station keeping and Stabilization
Text Books:
1. T. Pratt & C. W. Bostian, Satellite Communication.
2. Dennis, Roddy, Satellite communication, McGraw Hill.

Module – 2:
Satellite Link Design: Basic transmission theory, Friss transmission equation, EIRP, Completion Link design, System noise temperature G/T ratio, Noise figure and Noise temperature.
Text Books:
1. T. Pratt & C. W. Bostian, Satellite Communication.
2. Tri T. Ha, Digital Satellite communication, McGraw Hill.

Module – 3:
Communication Satellite Sub-systems : Space Platform (Bus) and Communication Subsystem (Payload), Satellite Antennas, Frequency reuse Antennas
Text Book:
1. T. Pratt & C. W. Bostian, Satellite Communication.

Module – 4:
Earth Stations: Earth station antennas, Tracking, Equipment for earth stations, Equipment Reliability and Space qualification
Text Book:
1. T. Pratt & C. W. Bostian, Satellite Communication.

Module – 5:
Analog Satellite Communication Vs Digital Satellite Communication, Multiple Access Techniques : FDMA Concept, MCPC & SCPC, TDMA frame efficiency and superframe structure, Frame Acquisition and Synchronisation, CDMA concept, PN system, Spread spectrum, DSSS, DS CDMA, FHSS, FH CDMA.
Text Books:
1. T. Pratt & C. W. Bostian, Satellite Communication.
2. Tri T. Ha, Digital Satellite communication, McGraw Hill.
3. Dennis Roddy,, Satellite Communication, McGraw Hill

Module – 6:

Efficient Techniques: Demand Assignment Multiple Access, Digital Speech Interpolation and SPADE.
Text Books:
1. T. Pratt & C. W. Bostian, Satellite Communication.
2. Tri T. Ha, Digital Satellite communication, McGraw Hill.

Module – 7:
Special Purpose Satellite: INTELSAT, INMARSAT, DBS, VSAT, MSAT and GPS
Text Book:
1. Dennis Roddy, Satellite Communication, McGraw Hill.

EC7209 DIGITAL VIDEO SIGNAL CODING

Module – 1:

Elements of a Television System: Picture & Sound Transmission, Picture & Sound Reception, Scanning, Persistence of Vision and Flicker, Horizontal and Vertical resolution, Kell factor, CCIR-B standards.

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake

Module – 2:

Composite Video Signal: Video signal Dimensions, Horizontal and Vertical Synchronization details, Scanning sequence details of 625 line TV systems. Channel band width, vestigial side band transmission and reception, Channel band width for B & W and colour transmission

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake

Module – 3:

TV Cameras and TV Picture Tube (B/W): Camera tube characteristics, Vidicon, Plumbicon, Silicon diode Array, Solid State Image Scanners. Elements of monochrome picture tube

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake.
3. "Colour Television" by R. R. Gulati, New Age International.

Module – 4:

TV TRANSMITTERS & TV RECEIVERS: Transmitter requirements, High level and IF modulated transmitters, Visual and Aural exciters, Diplexers. Block schematic & functional requirements of T.V. receiver, IF response, Elements of Digital television, Merits of digital processing

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake.
3. "Colour Television" by R. R. Gulati, New Age International.

Module – 5:

Colour Signal Transmission and Reception: Colour sync, colour burst signal, Composite colour signal, Colour TV Camera, Colour picture tube, NTSC coder and decoder, PAL Coder and decoder, SECAM coder and decoders. Introduction to Extended Definition Television (EDTV) and High Definition Television (HDTV)

Text Books:

1. "Monochrome and colour Television" by R. R. Gulati.
2. "Television Engineering" by A. M. Dhake

Module – 6:

Contemporary Video Coding Scheme: User requirement from video, segmentation-based coding, Model based coding, sub-band coding. Codebook vector based coding, Block-based DCT transform video coding (MPEG-1, MPEG-2, H.261 , H.263, H.264).

Text Book:

1. "Compressed Video Communication " by A. H. Sadka (Wiley publication)

Module – 7:

Object–Based Video Coding:

VOP(video object plane) encoder, Shape coding, Motion estimation and compensation , Padding techniques, Basic Motion techniques, Texture coding , MPEG-4 VOP decoders, Layered video coding. Real-time video transmission over Mobile IP Network

Text Book:

1. "Compressed Video Communication " by A. H. Sadka (Wiley publication)

MEC 1125 INFORMATION AND CODING THEORY

Module -1:
Introduction:
Introduction to information theory & error control coding, Information measure, Entropy, Differential Entropy, Conditional Entropy, Relative Entropy, Information rate, Mutual Information, Channel Capacity.

Module- -2:
Source Coding:
Shannon's Source Coding Theorem, Prefix Coding, Huffman Coding, Shannon-Fano Coding, Arithmetic Coding, Lempel-Ziv Algorithm, Rate Distortion Theory.

Module -3:
Channel Capacity & Coding:
Channel Coding Theorem, Markov Sources, Discrete Channel with discrete Noise, BSC, BEC, Capacity of a Gaussian Channel, channel capacity for MIMO system, Bandwidth-S/N Trade-off.

Module -4:
Block Codes:
Galios Fields, Hamming Weight and Hamming Distance, Linear Block Codes, Encoding and decoding of Linear Block-codes, Parity Check Matrix, Bounds for block codes, Hamming Codes, Syndrome Decoding.

Module -5:
Cyclic Codes:
Introduction to cyclic code, Method for generating Cyclic Codes, Matrix description of Cyclic codes, Cyclic Redundancy Check (CRC) codes, Circuit implementation of cyclic codes, Burst error correction, BCH codes.

Module -6:
Convolutional Codes:
Introduction to Convolutional Codes, Polynomial description of Convolutional Codes, Generating function, Matrix description of Convolutional Codes, Viterbi Decoding of Convolutional code, Introduction to Turbo Code.

Module -7:
Coding for Secure Communications:
Introduction to Cryptography, Overview of Encryption Techniques, Secret-Key Cryptography, Data Encryption, Standard (DES), Public-Key Cryptography, RSA algorithm, Digital signature, One- way Hashing.

Text Books:

1. "Information Theory, Coding & Cryptography", by Ranjan Bose, TMH, Second Edition.
2. "Communication Systems", by S. Haykin, 4th Edition, Wiley-Publication.

Reference Books:

1. "Elements of Information Theory" by Thomas M. Cover, J. A. Thomas, Wiley-Interscience Publication.
2. "Error Correction Coding Mathematical Methods and Algorithms" by Todd K. Moon, Wiley-India Edition.
3. "Cryptography and Network Security", Fourth Edition, by William stallings

MEC 2015 OPTICAL NETWORKING AND DWDM

Module -1:
Optical Network Elements:
Passive Components, 2x2 fiber couplers, Scattering Matrix representation, star Couplers, Mach-Zehnder multiplexers, Phase-array-based WDM devices, Fiber Grating, Tunable Sources, Tunable filters, Circulators, Isolators, Wavelength Converters, Switching Elements, Wavelength Routers.

Module -2:
Optical Amplifiers:
Types, Semiconductor Optical Amplifiers, Erbium doped fiber amplifier, amplification mechanism, Conv. efficiency, Gain, Noise, Applications, Power amplifiers, In-line amplifiers, Preamplifiers, Application to Optical Video distribution, Long Span Transmission, Repeaterless Transmission, Under Sea Transmission system.

Module -3:
Optical Networks:
Topological performance, SONET/SDH, Broadcast and select WDM networks, Single-hop networks, Multi-hop Networks, Testbeds.

Module -4:
Wavelength Routed networks, Wavelength Routing Testbeds, Nonlinear effects on network performances, SRS,SBS,SPM,XPM,FWM, Optical CDMA networks.

Module -5:
Dispersion Management:
Need for dispersion management, pre-compensation and post compensation technique, Broadband dispersion compensation, Tunable dispersion compensation, Higher order dispersion management, PMD compensation.

Module -6:
Optical Switching:
Photonic packet switching, Bit interleaving, Packet interleaving, OTDM Testbeds.

Module -7:
Soliton communication:
Solitons, Soliton Pulses, Soliton parameters, Transmission for ultrafast (UF) OTDM signal using Soliton.

Text Book:

1. Optical Fiber Communications"G.Keiser,3/E, McGraw Hill.

Ref.Books:

1. B.Mukherjee , Optical Communication Networks, McGraw Hill.
2. R. Ramaswami and K.N. Sivarajan, Optical Networks: A Practical Perspective, Morgan Kaufmann
3. G.P.Agrawal, Fiber Optic Communication Systems, John Wiley & Son (Asia) Pvt. Ltd.
4. J. H. Franz & V. K. Jain, Optical Communications, Narosa Publishing House.

MEC 2019 MICRO-ELECTRO-MECHANICAL-SYSTEMS

Module -1:

Micro electromechanical systems:

Introduction, MEMS Overview, Microfabrication of MEMS: Surface Micromachining, Bulk Micromachining, LIGA, micromachining of polymeric MEMS devices

Module -2:

Fundamentals MEMS Device Physics:

Actuation: Electrostatic Actuation, Piezoelectric Actuation, Thermal Actuation ,Magnetic Actuation, Mechanical Vibrations ,The single degree of Freedom System ,The many Degrees of freedom system, Microsensing for MEMS: Piezoresistive sensing, Capacitive sensing, Piezoelectric sensing, Resonant sensing, Surface Acoustic Wave sensors.

Module -3:

MEMS Materials and fabrication process Modelling:

Metals, semiconductors, thin films for MEMS and their deposition techniques, materials for polymer MEMS. Solid modeling:Numerical Simulation of MEMS, Mechanical Simulation, Electrostatic Simulation .

Module -4:

MEMS Switches :

Switch parameters, basics of switching, Switches for RF and microwave applications, actuation mechanisms for MEMS devices, dynamics of switch operation, MEMS switch design considerations, Microwave Considerations, Material Consideration, Mechanical Considerations modeling and evaluation.

Module -5:

MEMS Inductors and Capacitors :

MEMS Inductors: self and mutual inductance, micromachined inductors, , modeling and design issues of planar inductors, variable inductor and polymer based inductor. MEMS Capacitors: MEMS gap tuning capacitor, MEMS area tuning capacitor, Dielectric Tunable capacitors.

Module -6:

MEMS RF applications :

Mems based RF and Microwave circuits : RF Filters, Micromachined Phase shifters, and Micromachined antenna.

Module -7:

MEMS packaging :

MEMS packaging: Role of MEMS packaging, Types of MEMS packaging,Microwave packaging Considerations, Wafer level packaging

Text Books:

1. RF MEMS & Their Applications by Vijay K. Varadan, K. J. Vinoy and K. A. Jose John Wiley & Sons, 2003
2. Introduction to Microelectromechanical Microwave Systems(2nd Edition) by Hector J.De Los Santos,Artech house
3. RF MEMS: Theory, Design, and Technology, Gabriel M. Rebeiz, John Wiley & Sons, 2003.

Reference Books:

1. Tai-Ran Hsu, "MEMS and Microsystems: Design and Manufacture," McGraw-Hill, 1st edition, ISBN: 0072393912.
2. Mems Mechanical Sensors Microelectromechanical system series Srephen Beeby/Artech House

EC8201 DIGITAL SIGNAL PROCESSING ARCHITUECTURE

MODULE – I

Introduction to Programmable DSPs: Multiplier and Multiplier Accumulator, Modified Bus structure and Memory Access Schemes, Multiple Access Memory, Multiported Memory, VLIW Architecture, Pipelining, Special Addressing Modes, On-chip peripherals

Hardware & Software development Tools: DSP system design flow, System Requirement Definition, Development of algorithms, System implementation, System debugging and testing, Assembly language tools, RTOS

Text Books:

1. "Digital Signal Processors", B. Venkataramani & M. Bhaskar, TMH
2. "Practical Digital Signal Processing", Edmund Lui, Elseveir Publications

MODULE – II

Architecture of TMS320C5X: Bus structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Block Repeat Registers, Parallel Logic Unit, Memory Mapped Registers, Program Controller, Flags in the Status Registers, On-chip memory, On-chip peripherals

Text Book:

1. "Digital Signal Processors", B. Venkataramani & M. Bhaskar, TMH

MODULE – III

TMS320C5X Assembly Language Instructions: Assembly Language Syntax, Addressing Modes, Load/Store Instructions, Addition, Subtraction, Move, Multiplication Instructions, NORM Instruction, Program Control Instructions, Peripheral Control

Text Book:

1. "Digital Signal Processors", B. Venkataramani & M. Bhaskar, TMH

MODULE – IV

ARCHITECTURE OF THE C6x PROCESSOR: Introduction, TMS320C6x Architecture, Functional Units, Fetch and Execute Packets, Pipelining, Registers, Linear and Circular Addressing Modes

Text Book:

1. "Digital Signal Processing and Applications with the C6713 and C6416 DSK", Rulph Chassaing, Wiley Interscience

MODULE – V

INSTRUCTION SET OF THE C6x PROCESSOR: TMS320C6X Instruction Set, Assembler Directives, Linear Assembly, ASM Statement within C, C-Callable Assembly Function, Timers, Interrupts, Multichannel Buffered Serial Ports, Direct Memory Access

Text Book:

1. "Digital Signal Processing and Applications with the C6713 and C6416 DSK", Rulph Chassaing, Wiley Interscience

MODULE – VI

MEMORY MODELS OF THE C6x PROCESSOR: Memory Considerations, Memory Models, Fixed- and Floating-Point Format, Code Improvement, Constraints, Programming Examples Using C, Assembly, and Linear Assembly

Text Book:

1. "Digital Signal Processing and Applications with the C6713 and C6416 DSK", Rulph Chassaing, Wiley Interscience

MODULE – VII

COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D-A Conversion Errors, Compensating filter

Text Book:

1. "Digital Signal Processing- Principals, Algorithms & Applications", Proakis, Pearsons Publication

EC8203 NEURAL NETWORKS AND FUZZY SYSTEM

Module 1:

Fundamental concepts, Introduction to artificial neural networks (ANN), supervised & unsupervised learning, error correction learning, Hebbian learning, competitive learning, Kohonen self-organizing networks

Module 2:

Single neuron/ perceptron networks: training methodology, application to linearly separable problems, multilayer perceptron networks, back propagation algorithm, virtues and limitations of back propagation, methods of speeding

Module 3:

Radial basis function networks, interpolation problems, covers theorem, regularization networks, functional expansion networks: functional link artificial neural network (FLANN), Cascaded FLANN

Module 4:

Fuzzy set theory & rules:

Introduction to fuzzy systems, membership funcation, fuzzy union, intersection and complement, fuzzy relational operations, fuzzy IF THEN rules, fuzzy reasoning

Module 5:

Fuzzy inference systems:

Introduction, Mamdani fuzzy model, Sugeno fuzzy model, Tekamoto fuzzy model, Neuro-fuzzy systems

Module 6:

Evolutionary Computing:

Introduction, gradient free optimization, genetic Algorithms: basic concept, search space, working principle, encoding, decoding, fitness function, selection, cross over, mutation, Particle swarm optimization: basic principle, algorithm & flowchart

Module 7:

Applications of ANN, fuzzy systems & Evolutionary Computing to time series prediction, pattern classification, control, communication engineering and biomedical engineering.

BOOK:

1. “Neural network Design”- M.T. Hagan, B. Demuth & M. Beale, Thomson Learning, 2002
2. “Neural Networks: A comprehensive Foundation” – Simon Haykin (Pearson education)
3. “Neuro-Fuzzy and Soft Computing”- J.S.R. Jang, C. T. Sun and E. Mizutani, PHI, NewDelhi
4. “Neural Networks: A Classroom Approach” S. Kumar, Tata Mc graw Hill, 2004.
5. Lecturer Notes

MEC 1137 RADAR SIGNAL ANALYSIS

Module -1:
Radar equation, MDS, detection of signal in noise, Receiver noise and signal to noise ratio, prediction of radar range

Module -2:
Probability density functions, probabilities of detection and false alarm rate, integration of radar pulses, radar cross section of targets, radar cross section fluctuations

Module -3:
Detection of radar signals:
matched filter, correlation receiver, detection criteria, detectors, integrators and CFAR receivers

Module -4:
Information from radar signals:
basic radar measurements, theoretical accuracy, ambiguity diagram, pulse compression, target recognition

Module -5:
Radar clutter:
surface clutter radar equation, land clutter, sea clutter, statistical model for surface clutter, detection of targets in clutter.

Module -6:
Estimation of signals in noise, linear mean square estimation, maximum likelihood estimation, Bays estimators of parameters of linear systems

Module -7:
Propagation of radar waves:
Forward scattering from earth, scattering from round earth surface, atmospheric refraction, standard and non standard propagation

Text Book :

1. M.I. Skolnik, "Introduction to Radar Systems" 3/e, TMH, New Delhi, 2001

MEC 2067 VHDL & VERILOG

Module – 1:
Introduction to VHDL:
System design with uses, History of VHDL, Simulation fundamentals, Modelling hardware, and Language basics, Building blocks in VHDL, Design units and library

Module – 2:
Sequential Processing:
Process statement, Signal vs variable assignment, Sequential statements, For loop, While loop, Condition statements, Examples of half adder and full adder, Test bench

Module – 3
Data Types and Subprograms:
Data types, Scalar, Composite, Access type, File type; Arrays; Objects, Signal variables, Constants and files, Association lists, Interface lists, Structural description, Examples. Subprogram, Functions, Conversion function, Resolution functions, Procedures

Module – 4:
Packages and VHDL Synthesis:
Packages, Package declaration, deferred constants, Subprogram declaration. Simple gate - concurrent assignment, IF control flow statement, Case control flow statement, Simple sequential statements, Asynchronous reset, Asynchronous preset and clear, Complex sequential statements.

Module – 5:
Introduction to Verilog:
Synthesis and Synthesis in a design process, logic value system, Bit-widths, value holder and hardware modelling, Continuos assignment statement, Procedural assignment statement, Logical operator, arithmetic operator, relational operators, shift operators, vector operations, bit-selects, if statement, case statement, more on inferring latches, loop statement, Latch with preset and clear, modelling flip-flops, functions, tasks, gate level modelling.

Module – 6:
Modelling:
Modelling of combinational, sequential logic and memory, Writing a Boolean expression, modelling a FSM and universal shift register, Modelling of a counter and ALU, modelling of parameterized adder, comparator and parity generator, Modelling of a decoder, multiplexer, and three state gate, factorial, UART, Blackjack model.

Module – 7:
Model Optimizations and Verification
Resource allocation, common sub-expressions, moving code, common factoring, commutativity and associativity, flip-flop and latch optimizations, design size. A test bench, delays in assignment statements, unconnected ports, missing latches, More on delays, event list, synthesis directives, blocking and non-blocking assignments.

Text Books:
1. “VHDL” by Douglas Perry, TMH, 1999.

Reference Books:
1. VERILOG HDL SYNTHESIS, by J. Bhasker, BS Publication 2004.
2. Fundamental of Digital Logic with VERILOG DESIGN, by Stephen Brown I Zvonko Vranesic, The McGraw-Hill Companies.
3. VERILOG HDL, A Guide to Digital Design and Synthesis, by Prabhu Goel,

MULTI-DIMENSIONAL SIGNAL PROCESSING

Module –I

Cocktail Party Problem, Overview of Independent Component Analysis, Strategies for Blind Source Separation, the Geometry of Mixtures, Un-mixing Using the Inner Product.

Module-II

Principal Component Analysis, Uncorrelatedness and whitening, Whitening transform, Robust Prewhitening, Blind Source Separation via Generalized Eigenvalue Decomposition,

Module-III

Methods using time structure, Separation by Autocovariances, The AMUSE algorithm, The SOBI algorithms, Separation by nonstationarity of variances, The SEONS algorithms, A fixed-point algorithm, ICA and kolmogoroff complexity.

Module-IV

Convolutive Mixtures and Blind Deconvolution, Bussgang methods, Cumulant-based methods, The convolutive BSS problem, Natural gradient methods, Spatio-temporal de-correlation methods.

Module-V

ICA by maximization of non-gaussianity, Non-gaussian is independent, Measuring non-gaussianity by kurtosis, Measuring non-gaussianity by Negentropy, Gradient algorithm using Negentropy.

Module-VI

ICA by maximum likelihood Estimation, The likelihood of the ICA model, Algorithms for maximum likelihood Estimation, The Bell-Sejnowski Algorithm, The INFOMAX Principle, Nonlinear ICA, Existence and uniqueness of nonlinear ICA, Separation of post-nonlinear mixtures, nonlinear BSS using self-organizing maps, A generative topographic mapping approach to nonlinear BSS, An ensemble learning approach to nonlinear BSS

Module-VII

Cognitive State Estimation Problem, Spatial filters, Common Spatial Pattern, CSP based Cognitive State Estimation. Instantaneous BSS, BSS based EEG Signal Analysis, Validity of the basic ICA model, Artifact removal from EEG and MEG, Topography Mapping of Independent Components. BCI performance Evaluation parameters, Feature Extraction, Thought Recognition, Linear classification

Books: 1. Independent Component Analysis by Aapo Hyvarinen, Juha Karhunen, Erkki Oja
A Wiley-Interscience Publication, JOHN WILEY & SONS, INC. New York.
2. Adaptive Blind Signal and Image Processing Learning Algorithms and Applications,
Andrzej Cichocki and Shun-ichi Amari, JOHN WILEY & SONS Ltd.
3. EEG Signal Processing by Saied Sanei and J.A. Chambers. [John Wiley and Sons Ltd.
4. Toward Brain-Computer Interfacing by, Guido Dornhege, Jos´e del R. Mill´an Thilo
Hinterberger, Dennis J. McFarland, Klaus-Robert M¨uller. [The MIT Press
Cambridge, Massachusetts London, England]

MEC 2137 WIRELESS NETWORKS

Module -1:
Wireless Personal Area Networks:
Bluetooth-IEEE 802.15.1: Bluetooth Protocol Stack, Bluetooth Link Type, Bluetooth Security. Network Connection establishment in Bluetooth
ZigBee Technology: ZigBee Components & Network Topologies
Ultra Wideband-IEEE 802.15.3a

Module -2:
Wireless Local Area Networks:
WLAN Technologies, Protocol architecture, Physical layer, Data link layer, Medium access control layer, Interference between Bluetooth and IEEE 802.11, Security of 802.11 systems

Module -3:
Wireless Wide Area Networks:
GSM Evolution for data, 3G Wireless Systems, cdmaOne Evolution, Evolution of cdmaOne to cdma2000 & Differences between cdma2000 & WCDMA.

Module -4:
TCP over wireless network:
Overview of traditional TCP, Impact on the performance of TCP over wireless environment, Link Layer Scheme (Snoop Protocol), The I-TCP protocol, The mobile TCP protocol.

Module -5
IPv6:
IPv4 vs. IPv6, IPv6 addressing, IPv6 header format, IPv6 extension, IPv6 routing architecture, QoS capabilities, IPv6 transition mechanism

Module -6:
Mobile IP:
Mobile IP: New architecture entities, Operation of Mobile IP, Message Format, Agent Discovery, Agent advertisement, Registration, Authentication, Route optimisation, Mobility support for IPV6

Module -7:
Wireless ATM:
WATM services, Reference model, Functions, Radio access layer, Handover, Location management, Access Point Control Protocol.

Text Book:
1. Wireless Communication & Networking by Vijay K. Garg, Elsevier
Reference Books:
1. Mobile communication by J.Schiller, Pearson Education
2. FOROUZAN----------
3. www.ietf.org
   (i) rfc 3513.txt : IPv6 addressing architecture
   (ii) rfc 2460.txt : IPv6 specification

MEC2163 SPEECH PROCESSING AND RECOGNITION

Module -1: Speech production:
Introduction, Speech Production Process, Representing Speech in Time and Frequency domains, Speech Sounds and Features, Approaches to Automatic Speech Recognition by Machine

Text Book:
1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed

Module -2: Signal Processing and Analysis Method for Speech Recognition:
Introduction, The Bank of filters front end processor, Linear predictive coding model for Speech Recognition, Vector quantization

Text Book:
1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed

Module - 3: Pattern comparison techniques:
Introduction, Speech Detection, Distortion Measures, Spectral-Distortion Measures, Incorporation of Spectral Dynamics Features into the Distortion Measures, Time Alignment and Normalization

Text Book:
1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed

Module -4: Speech Recognition System Design and Implementation Issues:
Introduction, Application of Source-Coding Techniques to Recognition, Template Training Methods, Performance Analysis and Recognition Enhancements, Template Adaptation to New Talkers, Discriminative Methods in Speech Recognition, Speech Recognition in Adverse Environments

Text Book:
1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed

Module - 5: Theory and Implementation of Hidden Markov Models:
Introduction, Discrete-Time Markov Process, Extensions to HMM, Basic Problems for HMM, Types of HMMs, Continuous Observation Densities in HMM, Auto Regressive HMMs, Variants on HMM structures, Inclusion of Explicit State Duration Density in HMMs, Optimization Criterion, Comparisons of HMMs, Implementation Issues for HMMs, Improving the Effectiveness of Model Estimates, Model Clustering and Splitting, HMM System for Isolated Word Recognition

Text Book:
1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed

Module - 6: Speech Recognition Based on Connected Word Models:
Introduction, General Notation for the Connected Word Recognition Problem, The Two-Level Dynamic Programming Algorithm, The Level Building Algorithm, The One Pass Algorithm, Multiple Candidate Strings, Grammar Networks for Connected Digit Recognition, Connected Digit Recognition Implementation.

Text Book:
1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed

Module - 7: Applications of Automatic Speech Recognition:
Introduction, Speech-Recognizer Performance Scores, Characteristic of Speech- Recognition Applications, Broad classes of Speech-Recognition Applications, Command and Control Applications, Projections for Speech Recognition

Text Book:

1. Fundamentals of Speech Recognition by Lawrence Rabiner, Biing –Hwang Juang Pearson Ed