क्रमांकः ECED/   / 2014-15   दिनांकः 08/01/2015

Appendix - 1

Existing Scheme

Sr. No.	Course Name	Code	Teaching Scheme			Credit	Examination Scheme				Total
			L	T	P			Theory	Tutorial	Practical	
		B.Tech. IV(E&C), VII Semester									
1	**VLSI DESIGN(NEW)**	EC 401	4	0	2	5		100	--	50	150
2	**MOBILE COMMUNICATION(NEW)**	EC 403	4	0	2	5		100	--	50	150
3	**ELECTRONICS INSTRUMENTATION(NEW)**	EC 405	3	0	2	4		100	--	50	150
4	**ELECTIVE I**	EC 4XX	3	0	0	3		100	--	--	100
5	**SEMINAR(NEW)**	EC 407	0	0	4	2		--	--	100	100
6	**PROJECT PRELIMINARIES(NEW)**	EC 409	0	0	4	2		--	--	100	100
	Total		14	0	14	21		400	--	350	750
	Total Contact Hours per week										

LIST OF SUBJECTS(FOR ELECTIVE-I)	
EC 411	Advanced Processor Architecture
EC 413	Adaptive Signal Processing
EC 415	Satellite Communication
EC 417	Wideband Communication
EC 419	Error Control Coding Techniques
EC 421	Power Electronics Converters

Appendix -2

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 401: VLSI DESIGN(NEW)	4	0	2	5	

INTRODUCTION TO VLSI DESIGN	**(08 Hours)**
Historical Perspective, Design Hierarchy, Concepts of Regularity, Modularity and Locality, VLSI Design Styles, VLSI Design Flow, Semi Custom- Full Custom IC Design Flow, Data Path, Control Path Programmable Logic Array, CMOS And Bipolar Transistor Gate Arrays And Their Limitations, Standard Cells, FPGA/CPLD Architecture, Computer-Aided Design Technology.	
CMOS COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS	**(06 Hours)**
CMOS Logic Circuits, Complex Logic Circuits, CMOS Transmission Gate, Behavior of MOS Logic Elements, SR Latch Circuit, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.	
DYNAMIC LOGIC CIRCUIT	**(08 Hours)**
Basic of Pass Transistor Circuits, Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, Dynamic and High Performance Dynamic CMOS Circuit.	
CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION	**(10 Hours)**
MOSFET Scaling And Small Geometry Effects, Delay Estimation, Logical Efforts And Transistor Sizing, Power Dissipation, Interconnect, Design Margin, Reliability.	
DIGITAL MODELING AND SIMULATION WITH VHDL	**(08 Hours)**
Introduction to VHDL, Basic Language Elements, Behavioral Modeling, Dataflow Modeling, Structural Modeling, Generics, Configurations, Packages, Model Simulation.	
DESIGN OF ARITHMATIC BUILDING BLOCKS	**(08 Hours)**
Data Path Operations: Adders, Shifter, Multiplier, Power And Speed Trade Off In Data-path Structures.	
DESIGN OF MEMORY AND ARRAY STRUCTURE	**(08 Hours)**
Memory Core Architecture, Memory Peripheral Circuits, Power Dissipation In Memory, Case Studies In Memory.	
	(Total Contact Time: 56 Hours)

PRACTICALS
01) Introduction Of IC Design And Layout Software Tool.
02) Implementation Of NAND And NOR Logic Gate And Obtaining VTC.
03) Implementation Of Complex Logic Function Using CMOS .
04) Implementation Of Sequential Logic Using CMOS.
05) Implementation Of Dynamic Logic Circuit.
06) Introduction Of HDL Software Tool.
07) Implementation And Simulation Of Logic Gate With HDL.
08) Implementation Of Digital Logic With Different Model Of HDL.
09) Design And Implementation of Arithmetic Building Blocks.
10) Design And Implementation of Array Building Blocks.
BOOKS RECOMMENDED
1. Sung-Mo Kang and Leblebici Y., "CMOS Digital Integrated Circuits: Analysis And Design", Tata McGraw-Hill, 3rd Ed., 2003.
2. Rabaey Jan, Chandrakasan Anantha and Borivoje Nikolic," Digital Integrated Circuits: A Design Perspective", Pearson Education, 2nd Ed., Second Impression, 2008.
3. Weste Neil H.E, Harris D. and Banerjee A., "CMOS VLSI Design: A Circuits And Systems Perspective", Pearson Education, 3rd Ed., 2002.
4. Perry Douglas L., "VHDL: Programming By Example", McGraw-Hill, 4th Ed., 2000.
5. Bhasker J., "A VHDL Primer", Pearson Education, 3rd Ed., 2001.
6. Pucknell D.A. and Eshraghian K.,"Basic VLSI Design, Prentice Hall of India", 3rd Ed., 2003

ELECTRONICS ENGINEERING DEPARTMENT

इलेक्ट्रानिक्स अभियांत्रिक विभाग

SARDAR VALLABHBHAI NATIONAL INSTITUTE OF TECHNOLOGY, SURAT

सरदार वल्लभभाई नेशनल इन्स्टीट्युट ओफ टेक्नोलोजी, सुरत

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 403: MOBILE COMMUNICATION(NEW)	3	0	2	4	

INTRODUCTION TO CHANNEL MODEL	**(06 Hours)**
AWGN Channel, Multipath and Fading Effects, Large and Small Scale Fading, Flat and Frequency Selective Fading, Slow and Fast Fading, Rayleigh, Rician and Nakagami Channel Models.	
INTRODUCTION TO CELLULAR MOBILE SYSTEMS	**(12 Hours)**
A Basic Cellular System, Cellular Communication Infrastructure: Cells, Clusters, Cell Spliiting, Frequency Reuse Concept And Reuse Distance Calculation, Cellular System Components, Operations of Cellular Systems, Handoff/Handover, Channel Assignment-Fixed And Dynamic, Cellular Interferences: Co-Channel And Adjacent Channel, Antennas For The Base Stations, Sectorization, Attributes Of CDMA in Cellular Systems.	
MOBILE SWITCH AND MOBILE TRAFFIC CALCULATION	**(06 Hours)**
Channels, Call Handling And Grade Of Service, Erlang B And C Formula, Traffic Calculaton Examples.	
GSM: GLOBAL SYSTEM FOR MOBILES COMMUNICATIONS	**(10 Hours)**
GSM: Architecture, Features Of GSM, Cell Size, GSM Network Components, GSM Identifiers, GSM Terrestrial Interfaces, GSM Channels, Handover, Introduction To Microcellular, Call And Radio Resource Management.	
GPRS: GENERAL PACKET RADIO SERVIC	**(08 Hours)**
GPRS and Its Features, GPRS Network Architecture, GPRS Protocol Architecture, GPRS Backbone Network, GPRS Interworking With External Network, Call Routing in GPRS, Logical Channels Of GPRS, GPRS Applications.	
EDGE: ENHANCED DATA - RATES FOR GLOBAL EVOLUTION	**(02 Hours)**
An Overview: EDGE, EDGE Upgradations, GPRS Vs EDGE, EDGE Services.	
IS-95 TO CDMA 2000 SYSTEMS AND EVOLUTION	**(04 Hours)**
UMTS: UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM	**(09 Hours)**
UMTS Architecture, UMTS Radio Or Air Interface, UMTS TDD and FDD, UMTS/WCDMA Channels, UMTS/WCDMA Packet Handling And Handover.	
	(Total Contact Time: 56 Hours)

PRACTICALS
01) QPSK/QAM Modulation Techniques.
02) To study the AT Commands On the GSM Emulator.
03) To study the Hardware of GSM Trainer.
04) To study the GSM-GPRS Embedded Environment.
05) Spread Spectrum Communication Trainer.
06) CDMA Trainer With BER.
07) Channel Modeling And Testing Using MATLAB And/Or COMMSIM.
08) CDMA And Other Modulation Techniques Using Embedded SDR Environment.
09) Cellular Calculations Using MATLAB Simulations.
10) Traffic Calculations Using MATLAB Simulations.
BOOKS RECOMMENDED
1. Dalal Upena,"Wireless Communication", Oxford University Press, 1st Ed., 2009.
2. Lee William C. Y.,"Mobile Cellular Telecommunications", McGraw-Hill, 3rd Ed., 2008.
3. Rappaport Theodore,"Wireless Communications - Principles and Practice", Pearson Education -LPE, 2nd Ed., 2002.
4. Bates R. J.,"GPRS:General Packet Radio Services", McGraw-Hill, 1st Ed., 2001.
5. Christian Bettstetter and Christian Hartmann,"GSM - Architecture, Protocols and Services", John Wiley, 3rd Ed., 2009.

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 405: ELECTRONICS INSTRUMENTATION(NEW)	3	0	2	4	

SIGNAL CONDITIONING FOR RESISTIVE / REACTIVE / SELF-GENERATING SENSORS	**(10 Hours)**
Signal Conditioning For Resistive Sensors: Amplifiers For Voltage Dividers, Wheatstone Bridge: Balance Measurements, Deflection Measurements, Differential And Instrumentation Amplifiers, Interference, Signal Conditioning For Reactance Variation Sensors: AC Bridges, Carrier Amplifiers And Coherent Detection, Specific Signal Conditioners For Capacitive Sensors, Resolver-To-Digital And Digital-To-Resolver Converters, Signal Conditioning For Self-Generating Sensors: Chopper And Low-Drift Amplifiers, Electrometer And Transimpedance Amplifiers, Charge Amplifiers, Noise In Amplifiers.	
SIGNAL CONVERTERS	**(09 Hours)**
I To P / P To I Converter, Temperature to Voltage Converter, Conversion To Frequency, Period, or Time Duration, Measurement of Phase Difference Using X-OR and SR Flip-Flop Method, Measurement of Active And Reactive Power of Supply Line, Locking Amplifiers, Variable Oscillators, Direct Sensor-Microcontroller Interfacing.	
ISOLATION TECHNIQUES	**(08 Hours)**
Transformer Isolation, Optical Isolation, Digital Techniques For Optical Isolation, Hall-Effect Principle And Measurement Of Displacement, Current And Power Using Hall Sensors, Amplifications Of Low Level Signals, Guarding, Shielding.	
DATA ACQUISITION AND CONVERSION	**(08 Hours)**
Analog Signal Processing, Sample And Hold Operation, S/H Circuits Using Op-Amps, Introduction To Data Acquisition System, Various DAS Configurations, Single Channel DAS, Multi-Channel DAS, IC Based DAS, Data Acquisition, Data Acquisition in PLC.	
TELEMETRY SYSTEMS	**(09 Hours)**
Introduction To Telemetry System, Current Telemetry: 4 To 20 Ma Loop, Design Of 2/4 Wire Transmitters, Simultaneous Analog And Digital Communication,Intelligent Sensors, Sensor Buses: Fieldbus, RS232, RS485, MODBUS, AS-I, Devicenet, Profibus, Foundation Fieldbus, Industrial Ethernet.	
	(Total Contact Time: 42 Hours)

PRACTICALS
01) Design and Implement Simple V to I converter and modified Howland V to I Convertor.
02) Design and Implement V to V Convertor given specifications.
03) Design and Implement R to V convertor.
04) Bridge Linearity technique using Op-AMP.
05) Measurement of Phase Difference Using X-OR and SR Flip-Flop Methods.
06) Instrumentation amplifier using Feedback.
07) Two Position digital controller with dead-Zone.
08) Instrumentation Trainer.
09) RS485 communications.
10) DATA acquisition using DAQ card.

BOOKS RECOMMENDED
1. Ramon Pallas and John G. Webster, "Sensors and Signal Conditioning", John Wiley & Sons, 2nd Ed., 2001.
2. Rangan C. S., Sarma G. R. and Mani V. S. V., "Instrumentation Devices And Systems", Tata McGraw-Hill, 2nd Ed., 2004.
3. Helfrick Albert D. and Cooper W. D., "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall India, 1st Ed., 1990.
4. A. J. Bouvens, "Digital Instrumentation", McGraw-Hill, 1st Ed., 1997.
5. Johnson Curtis D., "Process Control Instrumentation Technology", Prentice Hall, 7th Ed., 2003.
6. Shawhney A. K. "A Course In Electrical And Electronics Measurements And Instrumentation", Dhanpat Rai & Sons, 11th Ed., 1999.
7. Mathivanan N., " PC Based Instrumentation Concepts and Practice", PHI Learning, 1st Ed., 2009.

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 407: SEMINAR(NEW)	0	0	4	2	
				(Total Contact Time:)	

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 409: PROJECT PRELIMINARIES(NEW)	0	0	4	2	
				(Total Contact Time:)	

LIST OF SUBJECTS (FOR ELECTIVE-I)

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 411: ADVANCED PROCESSOR ARCHITECTURE(NEW)	3	0	0	3	

FRONT END DESIGN	**(09 Hours)**

Design Methodology At Register And Processor Level, Instruction Set Principles: Data Representation: Machine Instructions And Programs, Addressing Modes For Signal Processing And Media Processing, Instructions For Control Flow, Data Path Design, Control Design, Role Of Compilers, Examples Of Instruction Sets: MIPS, ARM, Motorola, Trimedia TM32, Intel Processors, Etc., SIMD Instruction Set, Pipelining: Data And Instruction Hazards, Superscalar Operation, Examples.

EXPLOITING INSTRUCTION - LEVEL PARALLELISM	**(12 Hours)**

Instruction Level Parallelism(ILP): Concepts And Challenges, Overcoming Data Hazards, Dynamic Scheduling, Dynamic Hardware Prediction, High Performance Instruction Delivery, Hardware Based Speculation, Limitations Of ILP, Thread Level Parallelism(TLP), Exploiting ILP With Software Approaches: Static Branch Allocation: VLIW Approach, Advanced Compiler Support For Exposing And Exploiting ILP, Hardware Support, Hardware Versus Software Speculation, Examples: P6 Microarchitecture, IA-64 And Itanium Processor, Etc.

MEMORY SYSTEM ISSUES	**(12 Hours)**

Memory Systems: Multilevel Memories: Address Translation, Memory Allocation, Review Of Cache, Mapping Functions, Replacement Algorithms, Cache Performance, Reducing Cache Miss Penalty, Miss Rate, Cache Miss Penalty, Hit Time, Main Memory And Organizations For Improving Performance, Memory Technology, Virtual Memory, Address Translation, Protection, Examples: Alpha 21264 Memory Hierarchy, Emotion Engine Of Sony Playstation 2, Sun Fire 6800 Server, Etc.

MULTIPROCESSORS	**(09 Hours)**

Symmetric Shared Memory Architectures, Message Passing Architectures, Distributed Shared Memory Multiprocessors, Implementing Synchronization And Data Sharing, Models Of Memory Consistency, Multithreading, Performance Of Multiprocessors.

(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED

1. John Hennessy and David Patterson,"Computer Architecture - A Quantitative Approach", Morgan Kaufman, 3rd Ed., 2003.

2. John P. Hayes,"Computer Architecture And Organization", WCB McGraw-Hill, 3rd Ed., 1998.

3. Richard Y. Kain,"Advanced Computer Architecture: A System Design Approach", PHI Learning, 1st Ed., 2010.

4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky,"Computer Organisation", McGraw-Hill, 5th Ed., 2002.

5. Harry Jordon and Gita Alaghband,"Fundamentals of Parallel Processing", PHI Learning, 1st Ed., 2003.

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 413: ADAPTIVE SIGNAL PROCESSING(NEW)	3	0	0	3	

INTRODUCTION TO ADAPTIVE FILTERING	**(06 Hours)**
Introduction To Stochastic Processes, Linear Adaptive Filter Structure, Real And Complex Forms Of Adaptive Filter, Non-Linear Adaptive Filter, Adaptation Approaches: Wiener Filter Theory Method Of Least Squares.	
OPTIMAL WIENER FILTERING	**(05 Hours)**
Mean-Square Error Criterion, Linear Optimum Filtering Statement, Principle Of Orthogonality, Wiener-Hopf Equation, Error Performance Surface, Numerical Examples, Channel Equalization, Linear Constrained Minimum Variance Filter.	
KALMAN FILTERING	**(05 Hours)**
Statement Of Kalman Filtering Problem, Estimation Of State Using Innovation, Variance Of Kalman Filtering, Extended Kalman Filtering.	
LINEAR ADAPTIVE FILTERING	**(05 Hours)**
Method Of Steepest Descent, Stability Of Steepest Descent, Least Mean Square Algorithm, Adaptive Prediction, Adaptive Equalization, Robustness Of LMS Algorithm, Block Adaptive Filter, Fast LMS Algorithm, Unconstrained Frequency-Domain Adaptive Filtering, Methods Of Least Squares.	
LATTICE FILTERS	**(05 Hours)**
Forward Linear Prediction, Backward Linear Prediction, Prediction Error Filters, derivation of the Lattice Structure, All-pole Lattice Structure, Pole-Zero Lattice Structure, Adaptive Lattice Structure, Autoregressive modelling.	
RECURSIVE LEAST SQUARES	**(06 Hours)**
Matrix Inversion Lemma, Weighted Recursive Least Squares Algorithm, Adaptive Noise Canceller, Convergence Analysis Of RLS Algorithm, Adaptive Equalization, State-Space Formulation Of RLS Problem, Adaptive Beam-Forming, Order Recursive Adaptive Filter.	
NON-LINEAR ADAPTIVE FILTERING	**(06 Hours)**
Introduction to Blind De-convolution, Back-Propagation Learning, Radial Basis Function Learning, Stochastic Gradient Approach, Markov Model, Singular Value Decomposition.	
APPLICATIONS OF ADAPTIVE SIGNAL PROCESSING	**(04 Hours)**
Adaptive Modeling And System Identification, Inverse Adaptive Modeling, Adaptive Interference Canceling, Adaptive Arrays And Adaptive Beam-Forming.	
	(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED
1. Simon Haykin,"Adaptive Filter Theory", Prentice Hall International”, 3rd Ed., 2002.
2. Bernard Widrow and Samuel Stearns,"Adaptive Signal Processing", Pearson Education, 2nd Ed., 1995.
3. Ali H. Sayed,"Fundamentals of Adaptive Filtering", Wiley, 1st Ed., 2003.
4. Farhang-Boroujeny B.,"Adaptive Filters Theory and Applications", John Wiley & Sons, 1st Ed.,1998.
5. Mohamed Ibnkahla(Edited),"Adaptive Signal Processing in Wireless Communications", CRC Press, Taylor & Francis Group, 1st Ed., 2009.

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फोन नं: संस्थान कार्यालय: २२२३३७१-७४, फेक्स नं: २२२८३९४, २२२७६३३४   विभागीय प्रमुख: २२०१५५१, विभाग कार्यालय: २२०१५५२
ई-मेइल: director@svnit.ac.in, hod@eced.svnit.ac.in

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 415: SATELLITE COMMUNICATION (NEW)	3	0	0	3	

SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS	**(09 Hours)**

Introduction: Frequency Allocations For Satellite Services, INTELSAT, Polar Orbiting Satellites, Kepler's First, Second And Third Law, Definitions Of Terms For Earth-Orbiting Satellites, Orbital Elements, Apogee And Perigee Heights, Orbital Perturbations, Effects Of A Non-Spherical Earth, Atmospheric Drag, Inclined Orbits, Calendars, Universal Time, Julian Dates, Sidereal Time, The Orbital Plane, The Geocentric-Equatorial Coordinate System, Earth Station Referred To The IJK Frame, The Topcentric-Horizon Co-Ordinate System, The Sub-Satellite Point, Predicting Satellite Position, LEO-MEO-HEO, Launching Methods.

GEOSTATIONARY ORBIT AND SPACE SEGMENT	**(08 Hours)**

Introduction, Antenna Look Angles, The Polar Mount Antenna, Limits Of Visibility, Near Geostationary Orbits, Earth Eclipse Of Satellite, Sun Transit Outage, Launching Orbits, Power Supply, Attitude Control, Spinning Satellite Stabilization, Momentum Wheel Stabilization – Station Keeping, Thermal Control, TT&C Subsystem, Transponders, Wideband Receiver, Antenna Subsystem.

EARTH SEGMENT AND SPACE LINK	**(09 Hours)**

Transmit-Receive Earth Stations-Uplink And Downlink, Equivalent Isotropic Radiated Power, Free-Space Transmission, Losses, Link Power Budget Equation, System Noise, Antenna Noise, Amplifier Noise Temperature, Amplifiers In Cascade, Noise Factor, Noise Temperature, Carrier-To-Noise Ratio, Input Back Off, The Earth Station HPA, Output Back Off, Satellite TWTA Output, Effects Of Rain, Rain-Fade Margin, Combined Uplink And Downlink C/N Ratio.

SATELLITE ACCESS	**(08 Hours)**

Single Access – Preassigned FDMA, Demand-Assigned FDMA, SPADE System, Bandwidth-Limited And Power-Limited TWT Amplifier Operation, TDMA : Reference Burst; Preamble And Postamble, Carrier Recovery, Network Synchronization, Frame Efficiency And Channel Capacity, Pre-Assigned TDMA, Demand Assigned TDMA, Speech Interpolation And Prediction, Satellite Switched TDMA, CDMA.

SATELLITE SERVICES/SYSTEMS	**(08 Hours)**

Satellite Mobile Services: VSATs, Radarsat, Global Positioning Satellite System (GPS): Orbcomm, DTH.

(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED
1. Dennis Roddy,"Satellite Communications", McGraw-Hill, 3rd Ed., 2001.
2. Tomasi Wayne,"Advanced Electronic Communication Systems", PHI, 5th Ed., 2001.
3. Feher Kamilo,"Digital Communications – Satellite Earth Station", PHI, 1st Ed., 1981.
4. Singh R. P. and Sapre S. D.,"Communication Systems: Analog And Digital", Tata McGraw-Hill, 1995.
5. Pratt T. and Bostian C. W., "Satellite Communication", John Wiley & Sons, 1st Ed., 1986.

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 417: WIDEBAND COMMUNICATION(NEW)	3	0	0	3	

INTRODUCTION	**(02 Hours)**

Spread Spectrum Modulation(SSM) Concepts, Advantages-Disadvantages, Averaging And Avoidance Type Systems, Concept of SSM Bandwidth From Shanon's Theorem And SNR.

PSUEDO RANDOM CODES	**(06 Hours)**

Direct Sequence(DS) Or Pseudo Noise(PN) Codes And Generation, Aperiodic And Periodic Sequences, Maximum Length(ML) Sequences, Walsh-Hadamard Sequences, Gold Codes/Gold Sequences, Quadratic Residue Sequences (Q-R) Sequences, Hall Sequences, Twin Prime Sequences, Criteria To Select Code/Sequence.

DIRECT SEQUENCE SPREAD SPECTRUM SYSTEM	**(08 Hours)**

General Block Diagram Of DSSS Transmitter And Receiver, Biphase And Quadriphase Modulation, Mathematics Associated With The System, PN Signal Characteristics, Spectral Density, Bandwidth And Processing Gain, Direct Sequence Spread Spectrum Receiver Considerations(Rake Receiver), Partial Correlation Of PN Sequences At The Rake Receiver, Cyclic Prefix In DSSS Frames, Signal Processing At The Rake Receiver, Characteristics Of DSSS Systems, Interference Rejection, Antijam Characteristics, Energy And Bandwidth Efficiency, Near-Far Problem And Power Control.

OTHER SPREAD SPECTRUM SYSTEMS	**(05 Hours)**

Frequency Hopping Spread Spectrum, Fast And Slow Frequency Hopping, Associated Mathematics, Time Hopping Spread Spectrum System, Hybrid Spread Spectrum System And Chirped Spread Spectrum.

BASIC PRINCIPLES OF OFDM	**(03 Hours)**

Orthogonality And Subcarrier Setting In The Spectrum, FDM Vs Orthogonal FDM, Single Carrier Systems, Data Transmission In A Multipath Enviroment By Single And Multicarrier Systems.

OFDM BLOCK DIAGRAM AND EXPLANATION	**(08 Hours)**

Scrambling Or Energy Dispersal, Convolutional Encoding, Puncturing, Interleaver, Serial To Parallel Conversion And Symbol Mapping, Modulation Of Data, Pilot Insertion, IFFT, Cyclic Prefix Insertion, Transmission Of OFDM Signal Over The Channel, RF Modulation, OFDM Signal Reception And Demodulation.

OFDM SIGNAL MATHEMATICAL REPRESENTATION	**(06 Hours)**

OFDM Frequency Domain Representation, OFDM Time Domain Representation, OFDM System Spectral Settings Acording to Lattice, Selection Parameters For Modualtion, Pulse Shaping In OFDM Signal And Spectral Efficiency, Windowing In OFDM Signal And Spectral Efficiency.

VARIOUS ISSUES IN OFDM	**(04 Hours)**

Timing Errors And Symbol Synchronization, Sampling Frequency Synchronization, Carrier Frequency, Synchronization, Pilot Insertion In OFDM Transmission And Channel Insertion, Channel Impulse Response Estimation Basics, Amplitude Limitations In OFDM, Peak To Average Power Ratio,Approaches To Remove The Amplitude Limitations, OFDM Vs CDMA, Flash OFDM, Vector OFDM, Wideband OFDM, Adaptive OFDM.

(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED
1. Dalal Upena,"Wireless Communication", Oxford Press, 1st Ed.,2009.
2. Molisch Andreas,"Wideband Wireless Digital Communication",Pearson LPE,1st Ed., 2001.
3. Muthu Chidambara Nathan P.,"Wireless Communications",PHI 1st Ed., 2008.
4. Schulze Henrik and Luders Christian,"Theory And Applications Of OFDM and CDMA",Wiley, 1st Ed.,2005 .
5. Simon M. K.," Spread Spectrum Communication Handbook",McGraw-Hill, 1st Ed. 2001.

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 419: ERROR CONTROL CODING TECHNIQUES (NEW)	3	0	0	3	
CHANNEL CAPACITY AND CODING					**(06 Hours)**
Introduction, Channel Models, Channel Capacity, Channel Coding, Information Capacity Theorem, The Shannon Limit, Random Selection Of Codes, Hamming Distance, Few Points Of Information Theory.					
BLOCK CODES					**(05 Hours)**
The Digital Communication Channel, Introduction To Block Codes, Single Parity Check Codes, Product Codes, Repetition Codes, Hamming Codes, Minimum Distance Of Block Codes, Soft - Decision Decoding, Automatic Repeat Request Schemes.					
LINEAR CODES					**(05 Hours)**
Definition of Linear Codes, Generator Matrices, The Standard Array, Parity - Check Matrices, Error Syndromes, Error Detection And Correction, Shortened And Extended Linear Codes.					
CYCLIC CODES					**(05 Hours)**
Definition Of Cyclic Codes, Polynomials, Generator Polynomials, Encoding Cyclic Codes, Decoding Cyclic Codes, Factors Of XN +1, Parity-Check Polynomials, Dual Cyclic Codes, Generator And Parity-Check Matrices Of Cyclic Codes.					
BCH CODES					**(05 Hours)**
Linear Algebra, Galois Field, Definition and Construction of Binary BCH Codes, Error Syndromes In Finite Fields, Decoding SEC and DEC, Reed- Solomen Codes.					
CONVOLUTION CODES					**(05 Hours)**
Convolution, Encoding Convolutional Codes, Generator Matrices For Convolutional Codes, Generator Polynomials For Convolutional Codes, Graphical Representation Of Convolutional Codes, The Viterbi Decoder.					
CONCEPT OF INTERLEAVER AND PUNCTURE CODING					**(02 Hours)**
TURBO CODES AND LDPC CODES					**(04 Hours)**
TRELLIS CODED MODULATION					**(04 Hours)**
Introduction To TCM, The Concept Of Coded Modulation, Mapping By Set Partitioning, Ungerboeck's TCM Design Rules, TCM Decoder, Performance Evaluation For AWGN Channel, Computation Of Dfree.					
APPLICATIONS OF ERROR CONTROL CODING					**(01 Hours)**
					(Total Contact Time: 42 Hours)
BOOKS RECOMMENDED					
1. Gravano Salvatore,"Introduction to Error Control Codes", Oxford University Press, 1st Ed., 2007.					
2. Bose Ranjan,"Information Theory, Coding and Cryptography", Tata McGraw-Hill, 1st Ed., 2007.					
3. Moon Tood K.,"Error Correction Coding - Mathematical Methods and Algorithms", Wiley- Interscience, 1st Ed., 2006.					
4. Sklar Bernard,"Digital Communications - Fundamentals and Applications", Pearson Education-LPE, 2nd Ed., 2009.					
5. Glover Lan and Grant Peter,&qout;Digital Communications", Pearson Education-LPE, 1st Ed., 2008.					

B. Tech - IV(EC), Semester - VII	L	T	P	C	
EC 421: POWER ELECTRONIC CONVERTERS (NEW)	3	0	0	3	

INTRODUCTION	**(07 Hours)**
Power Electronics Scope And Applications, Interdisciplinary Nature Of Power Electronics, Types Of Power Electronics Circuits, Thyristor Characteristics, Two Transistor Analogy, Gate Characteristics, Methods Of Triggering And Commutation, Ratings And Protection Of Devices, Modern Semiconductor Devices.	
PHASE CONTROLLED RECTIFIERS	**(10 Hours)**
Principle Of Phase Control, Half Wave Controlled Rectifiers, Half Wave Controlled Rectifiers With R, R-L, R-L-E Load, Single Phase Full Wave Controlled Converters, 2-Pulse Mid-Point Converters, 2-Pulse Half And Fully Controlled Bridge Converters With R, R-L, R-L-E Load, Three Phase Converter System With Diodes, 3 Phase Half And Fully Controlled Bridge Converters, Triggering Scheme, Effect Of Source Impedance On The Performance Or The Converters, Dual Converters.	
CHOPPERS	**(10 Hours)**
Chopper Operation And Control Strategies: Duty Ration Control And Frequency Control, Types Of Idealized Chopper Circuits, Steady State Time Domain Analysis Of Type Choppers, Step Up Chopper.	
INVERTERS	**(09 Hours)**
Forced Commutated Inverters, Single Phase Voltage Source Inverters, Half Bridge Inverters, Full Bridge Inverters, Steady State Analysis, Voltage Control In Single Phase Inverters, 3-Phase Bridge Inverters, Pulse Width Modulated Inverters, Reduction Of Harmonics In Inverter.	
AC VOLTAGE CONTROLLERS	**(06 Hours)**
Principle Of AC Voltage Controllers: Integral Cycle Control And Phase Control, Types Of AC Voltage Controllers, Analysis Of 1-Phase Integral Cycle Control AC Controllers With R Load, Analysis Of 1-Phase Phase Control AC Controllers With R And R-L Load.	
	(Total Contact Time: 42 Hours)
BOOKS RECOMMENDED	
1. Bimbhra P. S.,"Power Electronics", Khanna Publishers, New Delhi, 4th Ed., 2001.	
2. Rasid M. H.,"Power Electronics Circuits, Devices And Applications", Prentice-Hall of India, New Delhi, 2nd Ed., 1999.	
3. Singh M. D. and Khanchandani K. B.,"Power Electronics", Tata McGraw-Hill, New Delhi, 2nd Ed., 2007.	
4. Ned Mohan, Tore M. Undeland and William P. Robbins,"Power Electronics Converters, Applications, and Design", John Willey & Sons, 2nd Ed.,1995.	
5. Jain Alok,"Power Electronics and Its Applications", PHI Pvt. Ltd., 1st Ed., 2002.	

Appendix - 1

Existing Scheme

Sr. No.	Course Name	Code	Teaching Scheme			Credit	Examination Scheme			Total
	B. Tech. IV(E&C), VIII Semester									
			L	T	P		Theory	Tutorial	Practical	
1	**RF AND MICROWAVE ENGINEERING**	EC 402	4	0	2	5	100	--	50	150
2	**ELECTRONIC SYSTEM DESIGN (NEW)**	EC 404	3	0	2	4	100	--	50	150
3	**INDUSTRIAL MANAGEMENT: THEORY AND PRACTICES (NEW)**	MH 404	3	1	0	4	100	25	--	125
4	ELECTIVE	EC 4XX	3	0	0	3	100	--	--	100
5	**PROJECT**	EC 406	0	0	10	5	--	--	250	250
	Total		13	01	14	21	400	25	350	775
	Total Contact Hours per week									

LIST OF SUBJECTS(FOR ELECTIVE-II)	
EC 408	VLSI System Design
EC 412	Advanced Radar Technology
EC 414	Mobile Computing
EC 416	EM Interference & Compatibility
EC 418	Biomedical Instrumentation
EC 422	Smart Antennas

Appendix 2

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 402: RF AND MICROWAVE ENGINEERING (NEW)	4	0	2	5	

INTRODUCTION	**(02 Hours)**
RF Behavior of Passive Components, Chip Components.	
TRANSMISSION LINE ANALYSIS	**(05 Hours)**
Need For Transmission Line Theory, Examples Of Transmission Lines, Equivalent Circuit Representation, Theoretical Foundation, Circuit Parameters For A Parallel Plate Transmission Line, General Transmission Line Equation, Microstrip Transmission Lines, Terminated Lossless Transmission Line, Special Termination Conditions, Sourced And Loaded Transmission Line.	
SMITH CHART	**(05 Hours)**
From Reflection Coefficients to Load Impedance, Impedance Transformation, Admittance Transformation, Parallel and Series Connection.	
SINGLE- AND MULTIPORT NETWORKS	**(03 Hours)**
Basic Definitions, Interconnecting Networks, Network Properties And Application, Scattering Parameters- Definition And Meaning Of S- Parameters.	
RF FILTERS DESIGN	**(06 Hours)**
Basic Resonator and Filter Configurations, Special Filter Realizations.	
MMIC	**(03 Hours)**
Introduction, Materials, Fabrication Techniques, Thin Film Formation.	
MICROWAVE WAVEGUIDES AND COMPONENTS	**(06 Hours)**
Introduction, Rectangular Waveguides, Rectangular Cavity Resonators, Microwave Hybrid Circuits: Waveguides Tees, Magic Tees, Directional Couplers.	
MICROWAVE DEVICES AND SOURCES	**(08 Hours)**
Microwave Bipolar Transistors, Microwave Tunnel Diodes, Gunn Diodes, Klystrons And Magnetrons.	
MICROWAVE COMMUNICATIONS	**(04 Hours)**
Simplified Microwave System, Microwave Repeaters, Diversity, Microwave Radio Stations, System Gain.	
RADAR	**(08 Hours)**
Basic Radar, Simple Form Of Radar Equation, Radar Block Diagram, Detection Of Signal Noise, Receiver Noise & SNR, Transmitted Power, PRF, Antenna Parameters, Introduction To Doppler And MTI Radar, Delay Line Canceller, Staggered PRFs, Tracking With Radar, Conical Scan And Sequential Lobbing.	
ELECTRONIC NAVIGATION	**(06 Hours)**
Instrument Landing System, Precision Approach Radar, Microwave Landing System, Satellite Navigation Systems (GPS).	
	(Total Contact Time: 56 Hours)
PRACTICALS	
01) To Study Microwave Bench.	
02) To Plot Standing Wave Pattern Of Different Loads.	

03) To Measure VSWR Of Different Loads.
04) To Find Unknown Impedance Using Smith Chart.
05) To Study Properties Of Directional Coupler.
06) To Study Microstrip Band Pass And Band Stop Filters.
07) To Study Microstrip Power Divider.
08) To Plot Mode Characteristics Of Reflex Klystron.
09) To Measure Dielectric Constant Of Substrate Used For Microstrip Line.

BOOKS RECOMMENDED

1. Ludwig Reinhold and Bretchko Pavel,"RF Circuits Design: Theory And Applications", Pearson Education, Low Price Ed., 1st Ed., 2000.
2. Liao Samuel Y.,"Microwave Devices And Circuits", PHI, 3rd Ed., 2nd Reprint, 2006.
3. Tomasi Wayne,"Advanced Electronic Communication Systems", PHI, 5th Ed., 2001.
4. Skolnik Merril I.,"Introduction To Radar Systems", Tata McGraw-Hill, 3rd Ed., 2004.
5. Nagaraia N. S.,"Elements of Electronics Navigation", Tata McGraw-Hill, 2nd Ed., 1990.
6. Das Annapurna and Das Sisir K.,"Microwave Engineering", Tata McGraw-Hill, 2nd Ed., 2006.
7. Kumar A.,"Microwave Techniques: Transmission Lines", New Age International, 1st Ed., 1998.

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 404: ELECTRONIC SYSTEM DESIGN (NEW)	3	0	2	4	

LINEAR POWER SUPPLIES	**(06 Hours)**
Basic Operation, Basic Introduction To Protection Circuits, Voltage Regulator Using IC723, Adjustable Voltage Regulator.	

SWITCH MODE POWER SUPPLY	**(09 Hours)**
Choice Of Switching Frequency, Operation And Design Of Different Types Of Switching Regulators, Buck Type, Boost Type And Buck-Boost Type In Continuous And Discontinuous Mode, Study of PWM IC, Isolated Multi-Winding SMPS, Push-Pull Configuration, Merits And Demerits Of SMPS.	

NON-LINEAR OP-AMP CIRCUITS AND FUNCTION GENERATORS	**(07 Hours)**
Logarithmic And Antilog Amplifiers, Design Issue With Log Amplifier, Transfer Curve Synthesizer, Sine Wave Generation Using An Analog MUX, Digital Scheme Using ADC, DAC, EPROM Device And Microprocessors, Multi Op-Amp Function Generator.	

ANALOG MULTIPLIER	**(04 Hours)**
Simple Multiplier Using An Emitter Coupled Transistor Pair, Gilbert Multiplier Set, Complete Four Quadrants Analog Multiplier, IC Multiplier, Application Of Analog Multiplier..	

SWITCHED CAPACITOR FILTER	**(05 Hours)**
Switched Capacitor Using A MOSFET, SC Integrator, Practical Limitation Of SC Integrator, Switch Capacitor Filters, Gyrator Circuit.	

GUIDELINES FOR ENCLOSURES	**(03 Hours)**
Components And Accessories, Grounding And Shielding Techniques Noise In Electronic Circuits, EMI/ EMC Protection Against EMI, ESD Selection Of Cables, Connectors, Types Of Knobs, Mechanical Fixture PCB Holders, Clamps, Control Panel Layout Ergonomics, Types Of' Gear Boxes And Drives. Ingress Protection Authorized Regulatory Bodies For Certifying Instruments In Hazardous Location (BASEEFA, FM, PTB, UL, CESI, LLIE, CSA, DEMKO, IEC And CENELEC).	

PRINTED CIRCUIT BOARDS	**(08 Hours)**
Printed Circuit Board Design Guidelines: General Components Layout Scheme, Grid System, PCB Size, mechanical stress, Design Rules For Analog And Digital Circuit PCB, Single, Multi Layer And SMD Boards, Artwork, CAD Packages, Soldering Techniques.	

	(Total Contact Time: 42 Hours)

PRACTICALS
01) Linear Voltage Regulator Using Op-Amp And Discrete Components.
02) Low & High Voltage Generation Using IC 723 & Fold Back Current Limiting Circuit.
03) Testing Of PWM IC For SMPS.
04) Design & Implementation Of Buck Type SMPS.
05) Design & Implementation Of Boost Type SMPS.
06) Design & Implementation Digital Scheme For Sine Wave Generation Using An Op-Amp,Counter & MUX.
07) Log-Antilog Amplifier.
08) Application Of Analog Multiplier Circuit.

09) Implementation Of ADC & DAC.
10) Design of PCB on given application.

BOOKS RECOMMENDED
1. Pressman Abraham I.,"Switching Power Supply Design", McGraw-Hill, 2nd Ed., 1997.
2. Franco S,"Design with Operational Amplifiers and Analog Integrated Circuits", McGraw-Hill, 3rd Ed., 2007.
3. Walter C. Bosshart,"Printed Circuit Boards – Design and Technology", Tata McGraw-Hill, 4th Ed.,1983.
4. Otmar Kigenstein,"Switched Mode Power Supplies in Practice", John Wiley and Sons, 5th Ed., 1989.
5. Keith H. Billings,"Handbook of Switched Mode Supplies", McGraw-Hill, 7th Ed., 1989.
6. Salivahanan S.,"Linear Integrated Circuits", McGraw-Hill, Fourth Reprint, 2010.
7. Botkar K. R.,"Integrated Electronics", Khanna Publishers, 10th Ed., 2006.

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ई-मेइल: director@svnit.ac.in, hod@eced.svnit.ac.in

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
MH 404: INDUSTRIAL MANAGEMENT: THEORY AND PRACTICES (NEW)	3	1	0	4	

ECONOMICS	**(06 Hours)**

Introduction To Economics, Micro And Macro Economics, Applications And Scopes Of Economics, Demand Analysis, Demand Forecasting, Factors Of Production, Types Of Cost, Market Structures, Break Even Analysis.

MANAGEMENT	**(13 Hours)**

Introduction To Management, Features Of Management, Nature Of Management, Development Of Management Thoughts: Scientific Management By Taylor And Contribution Of Henry Fayol, Coordination And Functions Of Management, Centralization And Decentralization, Decision Making.

- Fundamentals Of Planning.
- Objectives And MBO.
- Types Of Business Organizations: Private Sector, Public Sector And Joint Sector.
- Organizational Behavior: Theories Of Motivation, Individual And Group Behavior, Perception, Value, Attitude, Leadership.

FUNCTIONAL MANAGEMENT	**(20 Hours)**

- Marketing Management: Core Concepts Of Marketing, Marketing Mix (4P), Segmentation – Targeting – Positioning, Marketing Research, Marketing Information System, Concept Of International Marketing, Difference Between Domestic Marketing And International Marketing
- Operations Management: Introduction To Operations Management, Types Of Operation Systems, Types Of Layouts, Material Handling, Purchasing And Store System, Inventory Management.
- Personnel Management: Roles And Functions Of Personnel Manager, Recruitment, Selection, Training, Industrial Dispute, Collective Bargaining.
- Financial Management: Goal Of Financial Management, Key Activities In Financial Management, Organization Of Financial Management, Financial Institutions, Financial Instruments, Sources Of Finance.

MODERN MANAGEMENT ASPECTS	**(03 Hours)**

Introduction To ERP, e – CRM, SCM, Re – Engineering, WTO, IPR, Etc.

	(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED
1. Prasad L.M.,"Principles & Practice Of Management", Sultan Chand & Sons, 1994.
2. Banga T. R. and Shrama S.C.,"Industrial Organisation & Engineering Economics", Khanna Publishers, 1995.
3. Robbins S.,"Organizational Behavior", PHI(Pearson), 1998.
4. Kotler P., Keller, Koshi and Jha,"Marketing Management – A South Asian Perspective", Pearson, 2007.
5. Sharma S. D.,"Operations Research", Kedar Nath Ram Nath & Company, 2002.

LIST OF SUBJECTS (FOR ELECTIVE-II)

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 408: VLSI SYSTEM DESIGN(NEW)	3	0	0	3	
INTERCONNECT					**(08 Hours)**
The Wire, Interconnect Parameter, Electrical And Spice Wire Model, RLC Parasitic, Signal Integrity And High Speed Behavior Of Interconnects: Ringing, Cross Talk And Ground Bounce. Layout Strategies At IC And Board Level For Local And Global Signals, Power Supply Decoupling, Advance Interconnect Techniques.					
DESIGNING OF SEQUENTIAL LOGIC CIRCUIT					**(08 Hours)**
Static And Dynamic Latches And Registers, Design And Optimization Of Pipelined Stages, Timing Issues In Digital Circuits, Handling Multiple Clock Domains, Synchronous And Asynchronous Design Styles, Interface Between Synchronous And Asynchronous Blocks, Set-Up And Hold Time Violation, Concept Of Meta-Stability.					
SYSTEM HARDWARE DECOMPOSITION					**(04 Hours)**
Data Path And Control Path, Register Transfer Level Description, Control Path Decomposition (Interfacing With FSM), Pitfalls of Decomposition, Control Flow And Data Flow Pipelines, Communication Between Subsystems, Control Dead Locks.					
SUBSYSTEM DESIGN					**(12 Hours)**
Logic Design Consideration For Arithmetic Building Blocks: Adders, Multipliers, Shifters Logic Design Consideration For Memory Architecture: Address Decoder, Sense Amplifier, Voltage Reference, Drivers/Buffers, Timing And Control Shared Memory Data Hazards And Consistency, Mutual Exclusion.					
DESIGN FOR TEST					**(10 Hours)**
Introduction, Test Procedure, Issues In Design For Testability, Ad-Hoc Testing, Scan-Based Test, Boundary Scan Design, Built-In-Self Test (BIST), Test Pattern Generation, Fault Models, Automatic Test Pattern Generation (ATPG).					
					(Total Contact Time: 42 Hours)
BOOKS RECOMMENDED					
1. Rabaey Jan M., Chandrakasan Anantha and Borivoje Nikolic, "Digital Integrated Circuits (Design Perspective)", Prentice Hall of India, 2nd Ed., 2003.					
2. Smith M. J. S.,"Application Specific Integrated Circuits", Addison Wesley, 1st Ed., 1999.					
3. Dally W. J. and Poulton J. W.,"Digital System Engineering", Cambridge University Press, 1st Ed., 1998.					
4. Hall S. H., Hall G. W. and McCall J. A.,"High Speed Digital System Design", John Wiley & Sons, 1st Ed., 2000.					
5. Bakoglu H. B.,"Circuit Interconnect And Packaging For VLSI", Addison-Wesley, 1st Ed., 1990.					
6. Weste Neil H. E., Harris D. and Banerjee A. ,"CMOS VLSI Design", Addison Wesley, 3rd Ed., 2004.					
7. Laung-Terng Wang, Cheng-Wen Wu and Xiaoqing Wen,"VLSI Test principles And Architectures Design For Testability", Morgan Kaufmann Publishers, 1st Ed., 2006.					

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 412: ADVANCED RADAR TECHNOLOGY(NEW)	3	0	0	3	

INTRODUCTION TO RADAR	**(03 Hours)**
Revision: Radar Block Diagram, Radar Equation, Detection Of Signal In Noise, Receiver Noise And S/N Ratio, Transmitter Power, Pulse Repetition Frequency, Beam Shapes.	
MTI AND PULSE DOPPLER RADAR	**(06 Hours)**
Introduction To MTI And Doppler Radar, Delay Line Cancellers, Staggered Prfs, Digital MTI Processing, Moving Target Indicator, Limitation To MTI Performance, Pulse Doppler Radar.	
TRACKING RADAR	**(05 Hours)**
Tracking With Radar, Monopulse Tracking, Conical Scan And Sequential Lobing, Limitation To Tracking Accuracy, Tracking In Range, Low Angle Trackings.	
INFORMATION FROM RADAR SIGNALS	**(06 Hours)**
Basic Radar Measurements, Theoretical Accuracy Of Radar Measurements, Ambiguity Diagram, Pulse Compression, Target Recognition.	
RADAR CLUTTER	**(06 Hours)**
Introduction, Surface Clutter Radar Equation, Land Clutter, Sea Clutter, Weather Clutter, Detection Of Targets In Clutter.	
RADAR ANTENNA	**(08 Hours)**
Functions Of Radar Antenna, Antenna Parameters, Radiation Pattern And Aperture Illumination, Reflector Antennas, Electronically Steered Phased Array Antennas, Phase Shifters, Frequency Scan Arrays, Mechanically Steered Planar Array Antennas, Radiators.	
RADAR TRANSMITTERS	**(05 Hours)**
Introduction, Linear Beam Power Tubes, Magnetrons, Other RF Power Sources.	
RADAR RECEIVER	**(03 Hours)**
The Radar Receiver, Receiver Noise Figure, Superheterodyne Receiver, Duplexers And Receiver Protectors, Radar Displays.	
	(Total Contact Time: 42 Hours)
BOOKS RECOMMENDED	
1. Sklonik Merrill,"Introduction To Radar Systems", Tata McGraw-Hill, 3rd Ed., 2001.	
2. Nagaraja N. S.,"Elements Of Electronics Navigation", Tata McGraw-Hill, 2nd Ed.,1996.	
3. Sharma K. K.,"Radar, Sonar And Navigation Engineering", S K Kataria & Sons, 2nd Ed., 2006.	
4. Mitra Monojit,"Microwave Engineering", Dhanpat Rai & Co., 3rd Ed., 2006.	
5. Kennedy George and Davis Bernard,"Electronics Communication Systems", Tata McGraw-Hill, 4th Ed., 1999.	

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 414: MOBILE COMPUTING(NEW)	3	0	0	3	

MOBILE COMMUNICATION: AN OVERVIEW	**(03 Hours)**
Definition Of Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile Networks, Mobility Management.	
GSM BASED ARCHITECTURES AND COMPUTING	**(08 Hours)**
Revision Of GSM, GPRS, EDGE- Services, System Architecture, Radio Interfaces, Protocols, HSCSD, Localization, Call Handling, Hard Handover, Security, Data Services, Channel Assignment Strategies.	
CDMA BASED SYSTEMS AND COMPUTING	**(03 Hours)**
IS-95, Softer And Soft Handover.	
MEDIUM ACCESS CONTROL	**(04 Hours)**
Motivation For A Specialized MAC (Hidden And Exposed Terminals, Near And Far Terminals), SDMA, FDMA, TDMA, CDMA.	
MOBILE IP NETWORK LAYER	**(05 Hours)**
IP And Mobile IP Network Layers, IP Packet Delivery (Delivery, Agent Advertisement And Discovery, Registration, Tunneling And Encapsulation, Optimizations) And Handover Management, Location Management, Registration, Tunneling And Encapsulation, Route Optimization, Dynamic Host Configuration Protocol (DHCP).	
MOBILE TRANSPORT LAYER AND DATABASES	**(05 Hours)**
Conventional TCP/IP, Mobile TCP, Methods Of TCP Layer Transmission In Mobile Networks, Fast Data Catching-Retransmit/Fast Data Recovery, Transmission / Time-Out Freezing, Selective Retransmission, Transaction Oriented TCP, TCP Over 2.5G/3G Mobile Networks, Client-Server Computing.	
DATA DISSEMINATION, BROADCAST MODELS AND BROADCASTING SYSTEMS	**(04 Hours)**
Communications Asymmetry, DAB, DVB, Data Delivery Mechanisms, Push-Based Mechanisms, Pull-Based Mechanisms, Hybrid Mechanisms, Selective Tuning And Indexing Techniques.	
DATA SYNCHRONIZATION IN MOBILE COMPUTING SYSTEMS	**(02 Hours)**
SyncML.	
DIFFERENT MOBILE NETWORKS AND COMPUTING	**(08 Hours)**
Wireless Access Protocol (WAP), Ad-Hoc Networks Like Bluetooth, Wireless Sensor Network, WLAN, WMAN, WPAN, Mobile Application Layer, Mobile Operating Systems, Cloud Computing, Cross Layer Architectures And Optimization Techniques, Game Theory.	
	(Total Contact Time: 42 Hours)
BOOKS RECOMMENDED	
1. Kamal Raj,"Mobile Computing", Oxford University Press, 1st Ed., 2007.	
2. Talukdar Ashoke and Yavagal Roopa,"Mobile Computing", Tata McGraw-Hill, 1st Ed., 2005.	
3. Aghavami Hamid, Guizani Mohsen, Zorzi Michele and Chen Hsiao-Hwa,"Wireless Communication And Mobile Computing", Wiley, 1st Ed., 2005.	
4. Schiller Jochen,"Mobile Communications", Addison Wesley, Pearson Education-LPE, 1st Ed., 2000.	
5. Pandya Raj,"Mobile And Personal Communication Systems And Services", IEEE Press / PHI, 1st Ed., 2000.	

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B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 416: EM INTERFERENCE & COMPATIBILITY(NEW)	3	0	0	3	

INTRODUCTION	**(04 Hours)**
History Of EMI/EMC, Analysis Of EMI, Type Of Noise And Interference, Electromagnetic Compatibility, Benefits Of Good EMC Design, EMC Regulations (Government, Commercial And Military), Examples Of EMC Related Problems.	
EMC REQUIREMENTS FOR ELECTRONIC SYSTEMS	**(05 Hours)**
Radiated Emission Limits For Class A, Class B, FCC And CICPR, Measurement Of Emissions For Verification Of Compliance, Radiated Emission And Susceptibility, Conducted Emissions And Susceptibility, Typical Product Emissions, Additional Product Requirements, Design Constraints For Products, Advantages Of EMC Design.	
CONDUCTED EMISSION AND SUSCEPTIBILITY	**(07 Hours)**
Measurement Of Conducted Emission: LISN, Common And Differential Mode Currents, Power Supply Filters, Basic Properties Of Filters, A Generic Topology, Effect Of Filter Elements On Common And Differential Mode Currents, Separation Of Conducted Emissions In to Common And Differential Mode Components For Diagnostic Purpose, Power Supplies: Linear And SMPS, Effect Of Power Supply Components On Conducted Emissions, Power Supply And Filter Placement, Conducted Susceptibility.	
RADIATED EMISSION AND SUSCEPTIBILITY	**(07 Hours)**
Simple Emission Models For Wires And PCB Lands: Differential Mode Versus Common Mode Currents, Differential Mode Current Emission Model, Common Mode Current Emission Model, Current Probes, Simple Susceptibility Models For Wires And PCB Lands: Shielded Cables And Surface Transfer Impedance.	
CROSS TALK	**(10 Hours)**
Three Conductor Transmission Lines And Crosstalk, Transmission Line Equations For Lossless Lines, The Per Unit Length Parameters: Homogeneous Versus Inhomogeneous Media, Wide Separation Approximation For Wires, Numerical Methods For Other Structures, The Inductive-Capacitive Coupling Approximation Model: Frequency Domain Inductive-Capacitive Coupling Model, Time Domain Inductive-Capacitive Coupling Model, Lumped Circuit Approximate Models. Shielded Wires, Inductive And Capacitive Coupling, Effect Of Shield Grounding, Effect Of Pigtails, Effects Of Multiple Shields, Mtl Model Predictions, Twisted Wires, Inductive And Capacitive Coupling, Effects Of Twist, Effects Of Balancing.	
SHIELDING	**(05 Hours)**
Shielding Effectiveness, Far Field Sources, Exact Solution, Approximate Solution, Near Field Sources: Near Field Versus Far Field, Electric Sources, Magnetic Sources, Low Frequency, Magnetic Fielding Shielding, Effect Of Apertures.	
SYSTEM DESIGN FOR EMC	**(04 Hours)**
Shielding And Grounding, PCB Design, System Configuration And Design, Electrostatic Discharge, Diagnostic Tools.	
	(Total Contact Time: 42 Hours)
BOOKS RECOMMENDED	
1. Paul Clayton,"Introduction to Electromagnetic Compatibility", Wiley Interscience, 2nd Ed., 2006.	
2. Ott H. W.,"Noise Reduction Techniques In Electronic Systems", Wiley Interscience, 2nd Ed., 1988.	
3. Goedbloed,"Electromagnetic Compatibility", Prentice Hall, 1st English Language Ed., 1993.	
4. Kaiser K. L.,"Electromagnetic Shielding", CRC Press, 1st Ed., 2006.	
5. Stallings W.,"Cryptography And Network Security Principles And Practices", Pearson Education, 3rd Ed., 2007.	
6. Michel Mardiguian,"EMI Troubleshooting Techniques", McGraw-Hill Professional, 1st Ed., 1999.	

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 418:BIOMEDICAL INSTRUMENTATION(NEW)	3	0	0	3	

ANATOMY AND PHYSIOLOGY	**(06 Hours)**
Elementary Ideas Of Cell Structure, Heart And Circulatory System, Control Nervous System, Musclo-Skeletal System, Respiratory System Body Temperature And Reproduction System.	

CLASSIFICATION OF BIOMEDICAL EQUIPMENT	**(02 Hours)**
Diagnostic, Therapeutic And Clinical Laboratory Equipment.	

BIOELECTRIC SIGNALS AND THEIR RECORDING	**(08 Hours)**
Bioelectric Signals (ECG, EMG, ECG, EOG & ERG) And Their Characteristics, Bio- Electrodes, Electrodes Tissue Interface, Contact Impedance, Effects Of High Contact Impedance, Types Of Electrodes, Electrodes For ECG, EEG And EMG.	

TRANSDUCERS FOR BIOMEDICAL APPLICATION	**(12 Hours)**
Resistive Transducers - Muscle Force And Stress (Strain Gauge), Spirometry (Potentiont), Humidity, (Gamstrers), Respiration (Thermistor), Inductive Transducers: Flow Measurements, Muscle Movement (LVDT), Capacitive Transducers: Heart Sound Measurement, Pulse Pick Up, Photoelectric Transducers, Pulse Transducers, Blood Pressure, Oxygen Analyses Piezoelectric Transducers: Pulse Pickup, Ultrasonic Blood Flowmeter, Chemcial Transducer: Ag-Agfallas (Electrodes, PH Electrode).	

BIOLDECTRIC SIGNAL RECORDING MACHINES	**(06 Hours)**
Physiological Pre-Amplifier And Specialized Amplifiers, ECG Lead Systems Details Of ECG, EMG, And EEG Machines.	

PATIENT MONITORING SYSTEM	**(04 Hours)**
Heart Rate Measurement Pulse Rate Measurement, Respiration, Rate Measurement, Blood Pressure Measurement, Microprocessor Applications In Patient Monitoring.	

SAFETY ASPECT OF MEDICAL	**(04 Hours)**
Gross Current, Micro Current Shock, Safety Standards Rays And Considerations, Safety Testing Instruments, Biological Effects Of X-Rays And Precautions.	

	(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED
1. John. G. Webster,"Medical Instrumentation",John Wiley, 4th Ed., 2009
2. Goddes L. A. and Baker L. E.,"Principles of Applied Biomedical Instrumentation",John Wiley, 3rd Ed., 1989.
3. Carr Joseph J. and Brown John M,"Biomedical Instrumentation And Measurement",Pearson, 4th Ed., 2001.
4. Cromwell,"Biomedical Instrument",Prentice Hall, 3rd Ed., 2000.
5. R.S. Khandpur,"Hand book of Medical instruments",TMH, 2nd Ed.,2003.

B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 422: SMART ANTENNAS(NEW)	3	0	0	3	

REVISION OF ANTENNA FUNDAMENTALS	**(06 Hours)**
Revision/Overview Of Electromagnetic Fields, Maxwell's Equations, Boundary Conditions, Antenna Field Regions, Power Density, Radiation Intensity, Basic Antenna Nomenclature, Antenna Pattern, Antenna Boresight, Beamwidth, Directivity, Beam Solid Angle, Gain, Effective Aperture, Magnetic Vector Potential And The Far Field, Linear Antennas, Infinitesimal Dipole, Finite Length Dipole, Loop Antennas, Revision of Channel Problems.	
INTRODUCTION TO SYSTEMS TYPES AND ISSUES	**(06 Hours)**
SISO, SIMO, MISO And MIMO Systems, Introduction To Various Terms: Diversity, Transmit And Receive Diversity, Beam Forming, Combining Techniques.	
ARRAY FUNDAMENTAL	**(12 Hours)**
Linear Arrays, Two Element Array, Uniform N-Element Linear Array, Broadside Linear Array, End-Fire Linear Array, Beam Steered Linear Array, Uniform N-Element Linear Array, Directivity, Broadside Array Maximum Directivity, End-Fire Array Maximum Directivity, Beam Steered Array Maximum Directivity, Array Weighting, Beam Steered And Weighted Arrays, Circular Arrays, Beam Steered Circular Arrays, Rectangular Planar Arrays, Fixed Beam And Sectorised Arrays, Butler Matrices, Fixed Side-Lobe Cancelling, Retro Directive Arrays, Fixed Weight Beam Forming Basics-Maximum Signal-To-Interference Ratio, Minimum Mean-Square Error, Maximum Likelihood, Minimum Variance.	
BEAM SWITCHING ANTENNA SYSTEMS	**(03 Hours)**
Beam Switching Techniques.	
ADAPTIVE/SMART ANTENNA SYSTEM	**(09 Hours)**
Adaptive Algorithm Basics-Angle Of Arrival Estimation, Fundamentals Of Matrix Algebra, Array Correlation Matrix, AOA Estimation Methods, Adaptive Beam forming, Least Mean Squares, Sample Matrix Inversion, Recursive Least Squares, Constant Modulus, Least Squares Constant Modulus, Conjugate Gradient Method, Spreading Sequence Array Weights, Description Of The New SDMA Receiver, Example Using Bi-Phase Chipping, Difference Between MIMO And Smart Antenna.	
WIDEBAND SMART ANTENNAS	**(03 Hours)**
CDMA Systems.	
SMART ANTENNAS APPLICATIONS FOR SOFTWARE AND COGNITIVE RADIO	**(03 Hours)**
.	
	(Total Contact Time: 42 Hours)

BOOKS RECOMMENDED
1. Gross Frank B.,"Smart Antenna For Wireless Communications With MATLAB", McGraw-Hill, 1st Ed., 2005
2. Jian Li and Petre Stoica,"Robust Adaptive Beamforming", John Wiley, 1st Ed., 2006.
3. Litva Johhn and Lo Titus K.,"Digital Beamforming In Wireless Communication", Artech House, 1st Ed., 1996.
4. Sarkar T. K., Wicks Michael C., Salazar-Palma M. and Bonneau Robert J.,"Smart Antennas", Wiley-IEEE Press, 1st Ed., 2003.
5. Liberti Joseph and Rappaport Theodore S.,"Smart Antennas For Wireless Communications: IS-95 And Third Generation CDMA Applications", PHI, 1st Ed., 1999 .

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B. Tech - IV(EC), Semester - VIII	L	T	P	C	
EC 406:PROJECT(NEW)	0	0	10	5	
				(Total Contact Time :)	