

Shivaji University, Kolhapur
Revised Syllabus Structure
Electronics and Telecommunication Engineering
Scheme of Teaching and Examination
M.E. (ELECTRONICS & TELECOMMUNICATION ENGINEERING)

(To be implemented from 2015-2016)

Semester- I

Sr No	Subject	Teaching Scheme			Examination Scheme		
		L	T	P	TH	TW	OE
1	Advance Embedded System	3	-	2	100	25	-
2	Error control Coding Techniques	3	1	-	100	25	-
3	Advance Wireless Communication	3	-	2	100	25	-
4	Random Process	3	-	2	100	25	-
5	Elective I	3	1	-	100	25	-
6	Seminar- I	-	-	2	-	25	-
7	Comprehensive viva	-	-	-	-	-	25
	TOTAL	15	2	8	500	150	25

Semester- II

Sr No	Subject	Teaching Scheme			Examination Scheme		
		L	T	P	TH	TW	OE
1	Advance microwave circuit design	3	-	2	100	25	-
2	Adhoc& wireless sensor networks	3	-	2	100	25	-
3	computer vision	3	-	2	100	25	-
4	Elective II	3	1	-	100	25	-
5	Elective III	3	1	-	100	25	-
6	Seminar- II*	-	-	2	-	25	-
7	Comprehensive viva	-	-	-	-	-	25
	Total	15	2	8	500	150	25

*-Students should prepare research proposal on any technical topic & Present the seminar.

Elective-I	Elective-II	Elective-III
Mobile Computing	Cryptography & Network Security	Advanced Operating Systems
Digital Data Compression	Multi rate system	Optimization techniques
Internet Traffic engineering	SDR & Cognitive Radio Technology	Industry automation & process control
Advanced Antenna Theory	DSP architecture & algorithm	Nanotechnology

Semester- III

Sr No	Subject	Teaching Scheme			Examination Scheme		
		L	T	P	TH	TW	OE
1	Seminar-III	-	-	1		50	
2	Dissertation Phase-I	-	-	4		50	50
	Total	-	-	5		100	50

1. TW marks in Seminar-III shall be based on the delivery of at least two seminars in semester III, The topic of both seminars shall be related to his/her dissertation topic.
2. TW marks for dissertation phase I shall be based on work carried out by the candidate based on his/her dissertation work in consultation with his/her guide. This work may also include software assignment, field work, industrial training, etc. as decided by guide. The student shall submit monthly progress report to the department. The student shall deliver a presentation at the end of semester III based on the work
3. Practical batch will be comprised of 9 students.
4. P. G. Recognized teacher within university can be appointed as an external examiner.

Semester -IV

Sr No	Subject	Teaching Scheme			Examination Scheme		
		L	T	P	TH	TW	OE
1	Dissertation Phase-II	-	-	5		100	200*
	Total	-	-	5		100	200

1. TW marks for dissertation phase II shall be based on work carried out by the candidate based on his/her dissertation work in consultation with his/her guide. This work may also include software assignment, field work, industrial training, etc. as decided by guide. The student shall submit progress report after every fifteen days to the department. The student shall deliver a presentation at the end of semester IV based on the work
2. *Dissertation phase II Oral examination shall be based on the work carried out by the candidate in dissertation phase I and phase II.

Comprehensive viva

The students have to prepare on all subjects which they have studied In Ist and IInd semesters

The viva will be conducted by the External/Internal Examiner jointly and their appointments will be made by university (PG recognized teachers in shivaji university).

The in-depth knowledge, preparation and subjects understanding will be assessed by the Examiners

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- I
w.e.f July 2015

1. Subject: Advanced Embedded Systems

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Practical: 02 hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	To Understand architecture of ARM family.
2	To Understand On chip peripherals of ARM controller.
3	To Understand basic concepts of RTOS and μ COS

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Design the ARM based systems.
2	Implement use of ON CHIP peripherals of ARM
3	Implement various scheduling algorithms

Unit No	Unit Name	No. of Lectures
I	ARM9 architecture and programming ARM9 architecture, Memory organization, Programmers model, instructions and assembly programming.	6
II	ARM caches MPU and MMU: Cache architecture, Cache policy, Coprocessor15 and caches, protected region, Initializing MPUs, caches and write buffer, virtual memory, ARM MMU, page tables, TLB, Coprocessor15 and MMU operation	8
III	ARM Peripherals and Programming On chip peripherals, GPIO, Interrupts, RTC, Watchdog, UART, I ² C, ADC and SPI interfacing and programming using Embedded 'C', CAN, LIN, USB, (LPC 29xx series Example 2921/23/25),	8
IV	Introduction to RTOS RTOS basics, RTOS architecture, share data problem, critical section, shared resources, Task states multitasking, context switching, Kernels, pre-emptive & non-pre-emptive schedulers, mutual exclusion, semaphores, Interrupt Latency, pipes & mails boxes.	5

	Message queues, timer functions, events.	
V	μCOS Kernel Structure: Tasks, Task State, Task Level Context Switching, Locking and unlocking of scheduler, Idle Task, Statistics Task, Interrupts, Clock Tick, Initialization, Starting the OS, Task Management: Creating/deleting and Suspending/ Resuming Task, Task Stacks and checking, Changing Task's Priority.	6
VI	Time management and event control blocks Time Management: Delaying/Resuming Task, System Time, Event Control Blocks: Initialization of ECB, Placing/Removing Task from ECB waitlist, Finding Highest Priority Task, List of Free ECB, Task State Management. Communication in μCOS-II.	3

Text Books

1.ARM System Developers Guide , Designing & Optimizing System Software by Andrew sloss ,Dominic symes,Chris Wright.- ELSEVIER Publication
2.MicroC/OSII the Real Time Kernel, 2 nd Edition, Jim Labarosse, CMP Books, PIC C Manual, CCS Inc

Reference Books

1.Embedded software primer by David Simon, Person Education.
2.ARM LPC 29xx series data sheet

List of Experiments(Minimum8)

1. Any 2 experiments on Assembly language programming on LPC 29XX series.
2. Any 5 experiments on ARM using Embedded “c” on kiel.
3. Any 3 experiments on RTOS/ μCOS.

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2.Subject: Error Control Coding Techniques

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Tutorial: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	To Understand basic concept & need of Error Control Coding
2	To Study of various encoding & decoding techniques through block codes
3	To Study of various encoding & decoding techniques through Convolutional Codes.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand and identify the role of Error Control Coding techniques.
2	Capable to Analyze & design the encoder & decoder of Block Codes.
3	Analyze the concept of encoding & decoding procedures in convolutional codes.

Unit No	Unit Name	No. of Lectures
I	<p>Linear block codes Need , Objective & Approaches of Error Control Coding, Introduction, Structure, Parameters, Generator & Parity Check Matrix, Encoding circuit for (n-k) Linear Block Code, Syndrome & Error detection, Syndrome circuit, Distance Properties, Error detecting & Correction Capabilities, Standard Array & Syndrome decoding for (n,k) linear Block Code. Hamming Codes, Product codes, Repetition code, Hadamard codes (Wash Code), Dual Code, Shortened and Extended linear Codes, Reed Muller(RM) Codes.</p>	6
II	<p>Cyclic codes Algebraic structure, Polynomial representation of codeword, Generator polynomial, Non-systematic & Systematic Cyclic Codes, Generator & Parity Check Matrices, Structure of Cyclic Encoder & Syndrome Calculator, Encoding of cyclic code using (n-k) & K shift register, Syndrome computation and Error detection, Decoding of Cyclic code, Error-Trapping Decoding. Cyclic Redundancy Check Code, Cyclic Hamming Codes, Golay Code, Shortened Cyclic Codes, Cyclic Product Code, Quasi Cyclic Code.</p>	6

III	<p>Bose Chaudhuri Hocquenghem CODE (BCH) Groups, Rings & its properties, Fields : Binary Field Arithmetic, Primitive element and primitive polynomial, Primitive BCH Code, Construction of Galois Field $GF(2^m)$, Properties of Galois Field $GF(2^m)$, Minimal & Generator Polynomial for BCH Code. Decoding of BCH Code, Peterson-Gorenstein-Zierler decoder, Error location and Error Evaluation Polynomials, Implementation of Galois Field Arithmetic, Implementation of Error Correction</p>	8
IV	<p>Reed-solomon codes & decoding algorithms Introduction, Error correction capability of RS code, RS code in Nonsystematic & Systematic form, Syndrome decoding, The Euclidean Algorithm : Error location & Error Evaluation Polynomials, Decoding of RS using the Euclidean Algorithm, Decoding of RS & Nonbinary BCH codes using the Berlekamp Algorithm</p>	5
V	<p>Convolutional codes Introduction, Convolutional Encoder, Generation of Output code sequence using Time domain & Transform domain approach, Convolutional code representation : Code Tree, State diagram & Trellis diagram, Structural & Distance properties of Convolutional codes, Transfer Function of Convolution Code. Optimum decoding of Convolutional Codes: Maximum Likelihood decoding, The Viterbi Algorithm, Suboptimal Decoding: Sequential Decoding, Majority Logic Decoding.</p>	6
VI	<p>Iteratively decoded codes TURBO CODE : Introduction, Basic Turbo Encoding Structure, Decoding Algorithms, The Maximum Posterior decoding Algorithm. Low Density Parity Check Codes (LDPC) : Introduction, Construction, Tanner Graph, Decoding LDPC Code: Hard & Soft decoding, Vertical Step updating, Horizontal Step Updating, Terminating & Initializing the decoder algorithm.</p>	5

Text Books

1. Shu Lin, Daniel J. Costello, Jr., "Error Control Coding", 2nd Edition, Pearson Education
2. Todd K Moon, "Error Correction Coding", Wiley student Edition 2006

Reference Books

1. Salvatore Gravano, "Introduction to Error Control Codes", South Asia Edition, Oxford University Press.
2. Jorge Castineira Moreira, Patrick Guy Farrell, "Essentials of Error Control Coding", Wiley student Edition
3. W. Cary Huffman and Vera Pless, "Fundamentals of Error Correcting Codes", First Edition, Cambridge University Press.

**Minimum 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- I
w.e.f July 2015

3.Subject: Advanced Wireless Communications

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory :100 Marks
Practical: 02 hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	To acquire fundamental knowledge of Wireless Communications.
2	To study the different interferences in wireless channels and propagation models
3	To study capacity of wireless channels and multiple antenna system
4	To understand the basic concepts of OFDM

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Students will able to understand the need and applications of Wireless Communication.
2	Students will able to design propagation model as per the application requirement
3	Students will able to implement Multiple Input Multiple Output antenna System
4	Students will able to utilize the knowledge of OFDM IN high data rate system

Unit No	Unit Name	No. of Lectures
I	Overview of Wireless Communication: History of Wireless Communications, Wireless Vision, Technical Issues, Current Wireless System, Cellular Telephone Systems, Wireless LANs, Wide Area Wireless Data Services The Wireless Spectrum , Methods for Spectrum Allocation , Spectrum Allocations for Existing Systems , Standards, Other Wireless Systems and Applications .	5
II	Point to point communication :Detection,Diversity and Channel uncertainty Detection in rayleigh fading channel, time diversity, antenna diversity, frequency diversity, impact of channel uncertainty.	6
III	Radio Wave Propagation: Free space propagation model- basic propagation mechanisms –reflection- ground reflection model diffraction-scattering-practical link budget design-outdoor and indoor	7

	propagation models Small scale fading and multipath: Small scale multipath propagation-Impulse response model of a multipath channel –small scale multipath measurements-parameters of mobile multipath channels –types of small scale fading.	
IV	Capacity of Wireless Channels : Introduction, Capacity in AWGN , Capacity of Flat-Fading Channels, Channel and System Model, Channel Distribution Information (CDI) , Channel Side Information at Receiver, Channel Side Information at the Transmitter and Receiver, Capacity with Receiver Diversity, Capacity Comparisons , Capacity of Frequency-Selective Fading Channels , Time-Invariant Channels, Time-Varying Channels	7
V	Multiple Antenna Systems : Multiple Input Multiple Output (MIMO) Systems, The Narrowband Multiple Antenna System Model, Transmit Precoding and Receiver Shaping , Parallel Decomposition of the MIMO Channel ., MIMO Channel Capacity, Beamforming , Space-time codes, Smart Antennas	5
VI	MIMO and multicarrier modulation: Narrowband MIMO model-parallel decomposition of MIMO channel-MIMO channel capacity-MIMO diversity gain –data transmission using multiple carriers multicarrier modulation with overlapping subchannels-mitigation of subcarrier fading-basic concepts of OFDM	6

Text Books

1. Andrea Goldsmith, “Wireless Communications,” Cambridge University Press, 2005
2. David Tse, Pramod Viswanath, “ Fundamentals of Wireless Communication”

Reference Books

1. T.S. Rappaport, “Wireless Communications,” Pearson Education, 2003
2. Raj Pandya, “Mobile and Personal Communication Systems and Services,” Prentice Hall of India, 2002
3. William C.Y. Lee, “Wireless and Cellular Telecommunications,” Third edition, Mc. Graw Hill, 2006.

List of Experiments (Min 8)

1. Introduction of mobile trainer.
2. Wireless channel modeling and diversity using MATLAB
3. Analysis of broadband wireless channel modeling using MATLAB
4. Analysis of Spread Spectrum communication technique using MATLAB
5. Analysis of MIMO Diversity using MATLAB

6. Study of propagation loss using Okumura – Hata model
7. Free Space Propagation – Path Loss Model
8. Study of Active/passive satellites, uplink/downlink & Transponders
9. Write a code for Rayleigh fading channel.
10. Write a code for Log-distance path loss model.
11. Write a code for PN sequence generation

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w.e.f July 2015

4.Subject: Random Processes

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory : 100Marks
Practical:02hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Develop the logical concepts of probability theory
2	Understand basic concepts of Random variables & Random Processes
3	Study concept of Markov Chain and Queuing Theory

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Solve Probability Problems
2	Classify Random Variables
3	Apply statistical measures in Practical problems
4	Apply Markov Chain & Queuing Theory to solve Problems

Unit No	Unit Name	No. of Lectures
I	Probability Theory: The concept of Probability; the axioms of Probability; sample space and events; Conditional probability and Baye's theorem, Independence of events, Bernoulli trails.	6
II	Random variables: Introduction to Random Variables, Discrete Random Variable, Continuous Random Variable, Expectation of Random Variable, Moments of Random Variable(mean, mode variance,skewness, Kurtosis)	6
III	Multiple Random Variables: cumulative distribution function and probability density function of single and multiple Random Variables, statistical properties, Jointly distributed Gaussian random variables,Conditional probability density, properties of sum of random variables,Central limit theorem, Estimate of population means, Expected value and variance and covariance.	6
IV	Random Processes: Classification of Processes;Properties, Auto correlation and cross correlation function;Estimate of auto correlation function. Spectral Density: Definition, Properties, white noise, Estimation of auto-correlation function using frequency domain technique, Estimate of spectral density, cross spectral density and its estimation, coherence.	6
V	Markov Chains: Chapman Kolmogorov equation,Classification of states, Limiting probabilities, Stability of Markov system,Reducible chains, Markov chains with continuous state space.	6
VI	Queuing Theory: Elements of Queuing System Little's Formula,M/M/1 Queue,Multi server system	6

Text Books

1.Introduction to probability Models,(Third edition) - Sheldon M. Ross.
2.Random Signal Processing, Prof.G.V.Kumbhojkar, C.Jamanadas&Company

Reference Books

1.Probability and Random Processes for Electrical Engg.-Alberto Lean-Garcia (Pearson Education.)
2.Probability, Random Variables and Stochastic Processes by Athanasios Papoulis and S. Unnikrishna Pillai, PHI, 4th Edition, 2002
3.Stochastic Processes – J. Medhi , (New Age International.)

List of Experiments (Minimum 8)

1. Bernoulli Trials (Binomial Distribution)
2. Study of Rayleigh Probability Density Function
3. Probability density function of Gaussian distributed random variable
4. Effect of changing the Mean and Standard deviation in Gaussian PDF
5. Study of autocorrelation
6. Study of crosscorrelation
7. Study of markov chain
8. power spectral density (psd)
9. Calculation of various statistical parameters for random signal

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w.e.f July 2015

5.Subject: Mobile Computing(Elective-1)

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100Marks
Tutorial: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Introduce an advanced element of learning in the field of wireless communication.
2	Introduce students to the concepts of wireless devices and mobile computing.
3	Introduce mobile computing principles that support connectivity to cellular networks, mobile internet.
4	Understand the principles of security in mobile networks and their applications.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand the characteristics and limitations of mobile hardware devices including their user-interface modalities with wireless communication.
2	Develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
3	Design and develop context-aware solutions for mobile devices
4	Aware of professional and ethical issues, in particular those relating to security and privacy of user data and user behavior.

Unit No	Unit Name	No. of Lectures
I	Introduction to mobile computing: Introduction,added dimensions of Mobile Computing,condition of mobile users,Architecture of Mobile software Applications	7
II	Introduction to mobile Development Frameworks and Tools: Fully centralized frame Works and tools,Nptier client server frameworks and tools,JAVA,BREW,	6
III	Mobile Internet : WAP 1.1 Architecture,wireless application Environment1.1,WAP 2.0 Architecture,i-mode	5
IV	VUI and Applications: Introduction, Qualities of speech, voice transcription,voiceRecognition,text to speech technologies:converting written language to spoken Language..	6
V	Mobility and Location based services: Introduction, data acquisition of location information, GIS, location information modeling, location based services applied, utilizing location based services with mobile application, representing location with UML, security and privacy of location information, localization	6
VI	Architecture, Design, and Technology Selection for Mobile Applications: Introduction, Practical Concerns with Architectures, Architectural Patterns for Mobile Applications. Security issues in mobile computing, Authentication, encryption, Characteristics of SIM, Security application development for mobile OS	6

Text Books

1.Reza B'Far, "Mobile Computing Principles,CAMBRIDE University Press
2.Uwe Hansmann,LotharMerk,MartinS.Nicklous,Thomasstober, "David Tse,PramodViswanath, "Principles Mobile Computing",Second Edition

Reference Books

1.Jerry D. Gibson, The Mobile Communication Handbook , IEEE Press
2.Jochen Schiller, Mobile Communication, Pearson Education Asia

****Minimum 8 tutorials based on above syllabus**

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- I
w.e.f July 2015

5.Subject: DIGITAL DATA COMPRESSION (Elective-1)

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory : 100 Marks
Tutorial: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	To provide students with contemporary knowledge in Data Compression and Coding.
2	To equip students with skills to analyze and evaluate different Data Compression and Coding methods

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Explain the evolution and fundamental concepts of Data Compression and Coding techniques.
2	Analyze the operation of a range of commonly used Coding and Compression techniques
3	Identify the basic software and hardware tools used for data compression.
4	Identify what new trends and what new possibilities of data compression are available

Unit No	Unit Name	No. of Lectures
I	Introduction Definitions, Historical background,, Applications, Taxonomy, Intuitive Compression. Run-Length Encoding, RLE Text Compression, RLE Image Compression, Move-to-Front Coding, Scalar Quantization	4
II	Statistical Methods Information Theory Concepts, Variable-Size Codes, Prefix Codes, Golomb Codes, The Kraft-MacMillan Inequality, The Counting Argument, Shannon-Fano Coding, Huffman Coding, Adaptive Huffman Coding, MNP5, MNP7, Arithmetic coding, Adaptive Arithmetic Coding, QM Coder, Text Compression, Context-Tree Weighting	7
III	Dictionary Methods String Compression, Simple Dictionary Compression,LZ77 (Sliding Window), LZSS, Repetition Times, QIC-122, LZX, File Differencing: VCDIFF, LZ78, LZFG, LZRW1,LZRW 4, LZW, LZMW, LZAP, LZY, LZP	7

IV	Image Compression Approaches to Image Compression; Image Transforms, Orthogonal Transforms. The Discrete Cosine Transform JPEG, JPEG-LS. Progressive Image Compression, JBIG, JBIG2, Vector Quantization, Adaptive Vector Quantization, Block Matching, Block Truncation Coding, Context-Based Methods, Wavelet Methods	7
V	Video Compression Analog Video , Composite and Components Video , Digital Video , Video Compression , MPEG , MPEG-4 , H.261	7
VI	Audio Compression Sound, Digital Audio , The Human Auditory System , μ -Law and A-Law Companding , ADPCM Audio Compression , MLP Audio , Speech Compression , Shorten MPEG-1 Audio Layers	4

Text Books

1. The Data Compression- Mark Nelson, Jean-Ioup Gailly, 2nd edition, (M&T pub.) press ltd.)
2. Data Compression: The complete Reference-David Saloman, D., 3rd ed, (Springer publication.)
3. Introduction to Data Compression-Khalid Sayood, 2nd ed. (Academic press ltd.)

Reference Books

1. Introduction to Information Theory and Data Compression- Darrel Hankerson, 2nd ed, (Chapman and Hall/CRC publications.)
2. Handbook of Image and video Processing-AI Bovik(Academic press ltd. Publication.)
3. Compression Algorithms for Real Programmers- Peter Wayner (Academic press ltd.)

**Minimum 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- I
w.e.f July 2015

5.Subject: Internet traffic engineering (Elective 1)

Teaching Scheme	Examination Scheme
Lectures :03hrs / week	Theory :100Marks
Tutorial: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Determine link weights for IP traffic engineering for an interior gateway protocol (IGP) such as OSPF or IS-IS. 2. To discuss traffic engineering for IP intra-domain networks.
2	Develop the platform for understanding the basics of routers and types of routers, and as the background material to understand more details about a router's critical functions, such as address lookup and packet class classification

3	Make student to understand algorithms for efficient packet classification to offer differentiated services based agreements
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Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Estimate traffic in the network, as well as what performance measures might be of interest in IP networks
2	Evaluate various IP router architectures and highlight their advantages and disadvantages
3	Evaluate performance requirements of a packet classification algorithm in terms of number of memory accesses and the amount of storage requirement
4	Solve set of routing and traffic engineering problems in which MPLS can be used by giving due consideration to path management, traffic assignment, network information dissemination, and network management..

Unit No	Unit Name	No. of Lectures
I	IP traffic engineering: Evolution of Traffic engineering in internet domain, Taxonomy and recommendation for internet traffic engineering, Performance Measures and characteristics, applications view and traffic models, Architectural frame work, link weight determination, Duality of the MCNF Problem	6
II	Internet Routing and Router Architectures: Architectural View of the Internet, Allocation of IP Prefixes and AS Number, Policy-Based Routing, Point of Presence, Traffic Engineering Implications, Internet Routing Instability. Router Architectures: Functions, Types, Elements of a Router, Packet Flow, Packet Processing: Fast Path versus Slow Path, Router Architectures	6
III	Analysis of IP address lookup Algorithms: Network Bottleneck, Network Algorithmics, Strawman solutions, Thinking Algorithmically, Refining the Algorithm, Cleaning up, Characteristics of Network Algorithms. IP Address Lookup Algorithms : Impact, Address Aggregation, Longest Prefix Matching, Naïve Algorithms, Binary , Multibit and Compressing Multibit Tries,	6
IV	IP Packet Filtering and Classification Search by Length Algorithms, Search by Value Approaches, Hardware Algorithms, Comparing Different Approaches IP Packet Filtering and Classification : Classification, Classification Algorithms, Naïve Solutions, Two-Dimensional Solutions, Approaches for d Dimensions,	6

V	Quality of Service Routing: QoS Attributes, Adapting Routing: A Basic Framework. Update Frequency, Information Inaccuracy, and Impact on Routing, Dynamic Call Routing in the PSTN, Heterogeneous Service, SingleLink Case, A General Framework for Source-Based QoS Routing with Path Caching , Routing Protocols for QoS Routing, QOSPF: Extension to OSPF for QoS Routing, ATM PNNI.	6
VI	Routing and Traffic Engineering with MPLS: Traffic Engineering of IP/MPLS Networks, VPN Traffic Engineering, Problem Illustration: Layer 3 VPN, LSP Path Determination: Constrained Shortest Path Approach, LSP Path Determination: Network Flow Modeling Approach, Layer 2 VPN Traffic Engineering, Observations and General Modeling Framework, Routing/Traffic Engineering for Voice Over MPLS.	6

Text Books

1.Network Routing: Algorithms, Protocols, and Architectures DeepankarMedhi and KarthikeyanRamasamy, Morgan Kaufmann
2.The competitive internet service provider, network architecture, interconnection, traffic engineering and network design, oliverheckmann john wiley& sons ltd,

Reference Books

1.Network Algorithmic: An Interdisciplinary Approach to Designing Fast Networked Devices George Varghese (Morgan Kaufmann Series in Networking
2.Network Analysis, Architecture, and Design , James D. McCabe, Morgan Kaufmann Publishers
3.Traffic Engineering with MPLS By Eric Osborne, Ajay Simha Publisher: Cisco Press

**Minimum 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- I
w.e.f July 2015

5.Subject: Advanced Antenna theory (Elective 1)

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Practical: 01 hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Develop the logical concepts of antenna theory
2	Understand basic concepts of antennas and various antenna parameters
3	Able to design of various types of antennas
4	Develop skills necessary to solve practical problems on antenna designs

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Design different types of antennas
2	Measure different parameters of the design antenna
3	Understand the concept of smart antenna

Unit No	Unit Name	No. of Lectures
I	ANTENNA ARRAYS N element linear arrays – uniform amplitude and spacing- - Directivity , DesignProcedure, N-Element Linear Array: Three-Dimensional Characteristics ,Rectangular-to-Polar Graphical Solution, N-Element Linear Array: Uniform Spacing, NonuniformAmplitude ,Superdirectivity,Planar Array, Design Considerations , Circular Array	7
II	ANTENNA SYNTHESIS Synthesis problem, Line source methods - Fourier transform and Woodward-Lawson sampling method, Linear array Methods-Fourier transform and Woodward-Lawson sampling method ,comparison of shaped beam synthesis method – Low side lobe, narrow main beam synthesis methods –Taylor line source method.	7

III	Microstrip antennas: Introduction, Rectangular Patch, Circular Patch, Quality Factor, Bandwidth, and Efficiency, Input Impedance, Coupling, Circular Polarization, Arrays and Feed Networks	6
IV	Broadband microstrip antennas Introduction, Mechanism of Parasitic Coupling for Broad BW, Gap-Coupled RMSAs, Radiating-Edge Gap-Coupled RMSAs, Non-radiating-Edge Gap-Coupled RMSAs, Gap and Hybrid-Coupled MSA, Multilayer Broadband MSA- Electromagnetically Coupled MSAs, stacked multiresonator MSA, Design Examples.	6
V	Compact Broadband microstrip antennas Introduction, Compact Shorted RMSAs, Partially Shorted RMSAs, Effect of Dimensions of RMSAs with a Single Shorting Post, Effect of the Position of the Single Shorting Post, Compact Shorted CMSA and Its Variations.	5
VI	Smart antennas Introduction, Smart-Antenna Analogy, Cellular Radio Systems Evolution, Signal Propagation, Smart Antennas' Benefits and draw backs, Antenna Beam forming, Multiple-Input Multiple-Output (MIMO) System, Reconfigurable Arrays	5

Text Books

1. Broadband Microstrip antennas – Girish Kumar and K.P. Ray, Artech House
2. Antenna Theory- C. A. Balanis- Wiley and sons

Reference Books

Antenna Theory and Design – Stutzman and Warren L, John Wiley & Sons
Antennas – John. D. Krauss- TMH ed.
Antenna Arrays: A Computational Approach' By Randy L. Haupt, John Wiley and Sons

**Minimum 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

1.Subject: Advanved Microwave Circuit Design

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Practical: 02 hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Analyze transmission-line circuits at RF and microwave frequencies.
2	Design impedance matching in transmission-line networks
3	Perform Scattering parameter analysis of RF networks
4	Design RF Filters, Amplifiers, Oscillators & mixers
5	Study of Microwave Integrated Circuits

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand RF and Microwave circuit analysis techniques.
2	Understand transmission line circuits and Microstrip lines
3	Understand S-parameters and network characterization techniques
4	Design microwave small signal and power amplifiers oscillators & mixers
5	Understand Microwave Integrated Circuits & processing techniques

Unit No	Unit Name	No. of Lectures
I	<p>Introductuion:</p> <p>Importance of Radio frequency design, RF behaviour of passive components, Chip components and circuit board consideration. Transmission line Analysis, Strip line & microstrip line, Smith Chart.</p>	6
II	<p>Microwave Network Analysis:</p> <p>Interconnecting Networks, Network properties & applications, Scattering parameters, Impedence matching using discrete components, microstrip line matching networks, baising networks.</p>	6

III	RF Filter Design: Basic resonator & Filter configurations, special filter realisations, Filter implementations, Coupled filters	6
IV	RF Transistor Amplifier Design: Characteristics of amplifiers, Amplifier power relations, Stability considerations, Constant gain, Noise figure circles, Constant VSWR circles, Broadband Highpower & Multistage Amplifiers.	6
V	Oscillator and Mixture Design: Basic Oscillator Model, High frequency Oscillator configuration, Basic characteristics of Mixers & mixer design.	6
VI	Microwave Integrated Circuits: Materials & basic fabrications technologies of Hybrid ICs & monolithic ICs, Examples of IC Fabrication flow, MICs- amplifiers, Oscillators, Mixers, Frequency dividers, Digital modulators, Switches, Phase shifters, Multipliers & Upconverters.	6

Text Books

1. Reinhold Ludwig and Pavel Bretshko, "RF Circuit Design Theory & Applications", Pearson Education.
2. D.M.Pozar, "Microwave Engineering.", John Wiley & sons

Reference Books

1. Yoshihiro Konishi, "Microwave Integrated Circuits" BSP Books Pvt. Ltd.
2. Samuel Y Liao, "Microwave Devices & Circuits", Prentice Hall of India, 2006
3. Robert E. Collin, 2nd "Foundations for Microwave Engineering", McGraw Hill. Robert. E. Collin Foundation of Microwave Engg – McGraw Hill.

List of Experiments: (Minimum 8)

- 1.To determine Transmission line parameters.
 - 2.Impedance and frequency measurement using MW Test bench
 - 3 Waveguide parameters measurement using MW Test bench
 4. Scattering parameters of Circulator using MW Test bench
 5. Scattering parameters of Magic Tee using MW Test bench
 - 6.To measure the magnitude and phase of reflection and transmission coefficients (S parameters) of one port network using Vector Network Analyzer
 - 7.To measure the magnitude and phase of reflection and transmission coefficients (S parameters) of Two port network using Vector Network Analyzer
 8. Design of matching networks
 9. To study & test performance of Microwave amplifiers.
 - 10.To study & design of RF filters
- (Note: Experiments are not limited to above list)**

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

2.Subject: Adhoc and Wireless Sensor Networks

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory : 100 Marks
Practical: 02hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	To study different issues and challenges in Adhoc wireless network and deriving application specific solutions.
2	To study technologies and challenges in Cognitive Radio Network
3	To study architecture and different protocols in Wireless Sensor Networks
4	To study practical perspective on Wireless Sensor Networks

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Students will able to develop desired protocols as per the requirement of applications.
2	Students will able to provide solution over spectrum access .
3	Students will able to design a suitable protocol as per the requirement
4	Students will able to implement practical knowledge for design and development of Wireless Sensor Network Applications.

Unit No	Unit Name	No. of Lectures
I	Introduction: Introduction to adhocnetworks,Challenges Applications of MANETs,IOT and Applications of IOT	4
II	Communication Protocols in Adhoc Networks: MAC Protocols: design issues, goals and classification. Contention based protocols-with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15.Routing Protocols:Topologybased,position based and power aware routing	8
III	Cognitive Radio and Networks: Introduction,Spectrum access Model,CR technologies and challenges IEEE 802.22 standard:TV bands and Pus.applicationsref.architechure	6
IV	Opportunities and Challenges and Architecture in Wireless Sensor Networks: Introduction, Opportunities,Growing Research and Commercial Interest , Applications,Technical Challenges, SNs Global View and Requirements.Individual Components of SN Nodes, Sensor Network Node, Wireless SNs as Embedded Systems	6
V	Overview of Communication Protocols for Sensor Networks: Introduction.,Applications/Application Layer Protocols, Localization Protocols .Time Synchronization Protocols,Transport Layer Protocols, Network Layer Protocols , Data Link Layer Protocols	6
VI	A Practical Perspective on Wireless Sensor Networks: Introduction., WSN Applications., Classification of WSNs . Characteristics, Technical Challenges, and Design Directions.,Technical Approaches.	6

Text Books

1.ImadMahgoub and Mohammad Ilyas,Boca Raton, Florida, “Sensor Network Protocols” Cordeiro Agrawal, “Adhoc and Sensor Networks Theory and Applications,2 nd Edition.
2..C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007
3. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

Reference Books

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007
3 KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
4 Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

List of Experiments(Minimum 8)

1. Study of wireless network setup and analysis.
2. Measurement of network setup time and communication load.
3. Measurement of network throughput
4. Measurement of Packet delivery ratio
5. Measurement of bandwidth overhead
6. Measurement of packet latency
7. Measurement of distance and signal strength.
8. Design and simulate DSDV (Destination Sequenced Distance Vector) protocol in ns2.
9. Design and simulate AODV (Ad hoc On Demand Distance Vector Routing) Protocol in ns2

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015
3.Subject: Computer Vision

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Practical: 02 hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Understand concepts of Image Segmentation
2	Provide logical base for Feature Extraction
3	Study different Classifiers
4	Apply concept of ANN

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Segment desired objects from Image
2	Extract the features from objects/Image
3	Apply classifier techniques

Unit No	Unit Name	No. of Lectures
I	Introduction : Introduction to Computer Vision System and applications Fundamentals of digital images: representation, Pixel geometry Image Enhancement: gray level transformation ,histogram processing	5
II	Image Segmentation : Fundamentals; Point, line and Edge detection;Thresholding; Region based segmentation	7
III	Representation and Description: Representation;BoundaryDescriptors;RegionalDescriptors;Use of principle components for description;Relational Descriptors	9
IV	Pattern Recognition : Overview of pattern recognition;Patterns and pattern Classes	2
V	Classifications: Decision making ;Statistical Decision making ;Nearest neighbour classifier; Clustering : Basic concepts,Classical schemes ; Model based methods, Fuzzy clustering	7
VI	Artificial neural networks: Human Recognition system;Artificial neural networks;Different models of Artificial neural networks; Perceptron and learning;	6

Text Books

1	Digital Image processing and Pattern Recognition by Malay K. Pakhira (PHI)
2	Digital Image processing by Rafael c. Gonzalez and Richard E. Woods (Pearson Education)

Reference Books

1.	Fundamentals of DigitalImage processing, by A.K.Jain(PHI)
2.	Digital image processing and analysis by B. Chanda , D. Dutta Mujumdar (PHI)
3.	Image processing, analysis and machine vision by Milan sonka , V. Hlavac , R. Boyle (Thomson learning

List of Experiments(Minimum 8)

1. Gray level Transformation
2. Histogram equalization
3. Smoothing linear filters
4. Edge Detection techniques
5. Image segmentation using Thresholding
6. Image segmentation using region based approach.
7. Boundary / Regional descriptor
8. Statistical Decision making
9. Nearest neighbor classifier
10. ANN Perceptron Model

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

4.Subject: Cryptography & Network security(Elective-II)

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Tutorial: 01 hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Understand Block Cipher and DES principles
2	Understand Symmetric Encryption Methods
3	Identify network security threat
4	Understand Key Resources and management resources

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Implement Cryptography methods on Network Security concepts and Application
2	Implement Symmetric methods
3	Implement Message authentication and Hash Functions
4	Identify the attacks and methods of web security

Unit No	Unit Name	No. of Lectures
I	Overview: Services, Mechanisms, and attacks, The OSI Security Architecture, A model for network security, Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, and Steganography	5
II	Block Ciphers and the Data Encryption Standard: Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.	5
III	Contemporary symmetric Ciphers: Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, Confidentially using symmetric Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, and Random Number Generation	5
IV	Public Key Cryptography and RSA: Principles of Public Key cryptosystems, The RSA Algorithm, Key Management, other Public Key Cryptosystems key Management, Diffie-Hellman Key exchange	5
V	Message Authentication and hash functions: Authentication Requirements, F Authentication Function, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs. Hash Algorithms: MD5 Message Digest Algorithm, Secure Hash Algorithm. Digital signatures and Authentication protocols: Digital signatures, Authentication protocols and Digital signature Standard	8
VI	Authentication Applications: Kerberos, X. 509 Authentication Service. Electronic Mail Security: Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentications, Header, Encapsulating Security Payload, Combining Security Associations, Key Management. Web Security: Web Security Considerations, Secure socket layer and Transport layer security. Secure electronic transaction. System Security: Intruders, Intrusion detection, password management. Malicious Software, Viruses, Viruses and Related Threats, Firewalls: Firewall Design Principles, Trusted systems.	8

Text Books

1. Willam Stallings, Cryptography and Network Security, Third Edition, Pearson Education

Reference Books

1. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, Private communication in a public world, Second Edition, Pearson Education Asia, 2002.

2. Atul Kahate, Cryptography and Network Security, Tata McGrawhill, 2003

**Minimum 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- I
w.e.f July 2015
4.Subject: Multirate systems(Elective-II)

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory :100Marks
Tutorial: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	To provide basic concepts of Multirate systems
2	To give inputs regarding details of Multirate filter banks and their types.
3	To provide concepts of Multidimensional Multirate Systems
4	To provide information of different applications of Multirate Systems

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Understand the basic multi-rate operations
2	Apply the concept of Multirate filter banks.
3	Implement the design of Multirate filter banks
4	Understand the role of Multirate systems in different applications.

Unit No	Unit Name	No. of Lectures
I	Fundamentals of Multi-rate Systems: Basic multi-rate operations, interconnection of building blocks, polyphase representation, multistage implementation.	6
II	Multirate Filter Banks: Maximally decimated filter banks: Errors created in the QMF bank, alias-free QMF system, power symmetric QMF banks, M-channel filter banks, poly-phase representation, perfect reconstruction systems, alias-free filter banks, tree structured filter banks, transmultiplexers.	6
III	Para-unitary Perfect Reconstruction Filter Banks: Lossless transfer matrices, filter bank properties induced by paraunitariness, two channel Para-unitary lattices, M-channel FIR Para-unitary QMF banks, transform coding.	6

IV	Linear Phase Perfect Reconstruction QMF Banks: Necessary conditions, lattice structures for linear phase FIR PR QMF banks, formal synthesis of linear phase FIR PR QMF lattice. Cosine Modulated Filter Banks: Pseudo-QMF bank and its design, efficient polyphase structures, properties of cosine matrices, cosine modulated perfect reconstruction systems	6
V	Multidimensional Multirate Systems: Introduction, Multidimensional signals and their sampling, minimum sampling density, Multirate fundamentals, Alias free decimation. Cascade connections, Multirate filter design. Special filters and filter banks.	6
VI	Applications: FSK Modems, OMC data transmission, DAB and ADSL, Asynchronous conversion of sampling rates, Speech and audio coding, Image and video coding, Simulation of room acoustics using Wavelets, Multirate techniques with sensors	6

Text Books

1.P. P. Vaidyanathan, "Multirate Systems and Filter Banks," Pearson Education (Asia) Third impression, 2010.
2.N. J. Fliege, "Multirate Digital Signal Processing," John Wiley & Sons, USA, 2000.

Reference Books

1.Ljiljana Milic, "Multirate Filtering for Digital Signal Processing: MATLAB Applications(Premier Reference Source)".
2.R. E. Crochiere, L.R. Rabiner, "Multirate Digital Signal Processing," Prentice Hall.
3.Gilbert Strang and Truong Nguyen, "Wavelets and Filter Banks," Wellesley-Cambridge Press, 1996

**Minimum 8 tutorials based on abovesyllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part-II
w.e.f July 2015

4.Subject: SDR & Cognitive Radio Technology(Elective-II)

Teaching Scheme	Examination Scheme
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Lectures : 03hrs / week	Theory : 100Marks
Tutorial: 1hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Understand concept of SDR and Cognitive radios.
2	Know COBRA, SCA, JTRS
3	Understand concept of smart antenna

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Enable the student to understand the evolving paradigm of cognitive radio communication and the enabling technologies for its implementation.
2	Enable the student to understand the essential functionalities and requirements in designing software defined radios and their usage for cognitive communication
3	Expose the student to the evolving next generation wireless networks and their associated challenge

Unit No	Unit Name	No. of Lectures
I	SDR concepts & history, Benefits of SDR, SDR Forum, Ideal SDR architecture, SDR Based End-to-End Communication, Worldwide frequency band plans, Aim and requirements of the SCA.	6
II	Architecture Overview, Functional View, Networking Overview, Core Framework, Real Time Operating Systems, Common Object Request Broker Architecture (CORBA), SCA and JTRS compliance.	6
III	Radio Frequency design, Baseband Signal Processing, Radios with intelligence, Smart antennas, Adaptive techniques, Phased array antennas, Applying SDR principles to antenna systems, Smart antenna architectures.	6
IV	Low Cost SDR Platform, Requirements and system architecture, Convergence between military and commercial systems, The Future For Software Defined Radio .	6
V	Cognitive radio concepts & history, Benefits of Cognitive radio, Cognitive radio Forum. Ideal Cognitive radio architecture, Cognitive radio Based End-to-End Communication, Worldwide frequency band plans. Low Cost Cognitive radio Platform, Requirements and system architecture, Convergence between military and commercial systems.	6

VI	Radio Frequency design, Baseband Signal Processing, Radios with intelligence, Smart antennas, Adaptive techniques, Phased array antennas, Applying Cognitive radio principles to antenna systems, Smart antenna architectures.	6

Text Books

1. Dillinger, Madani, Alonistioti (Eds.): Software Defined Radio, Architectures, Systems and Functions, Wiley 2003
2. Reed: Software Radio, Pearson

Reference Books

1. Software Defined Radio for 3G, 2002, by Paul Burns.
2. Tafazolli (Ed.): Technologies for the Wireless Future, Wiley 2005
3. Bard, Kovarik: Software Defined Radio, The Software Communications Architecture, Wiley 2007

**Minimum 8 tutorials based on abovesyllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

4.Subject: DSP Architecture & Algorithm(Elective-II)

Teaching Scheme	Examination Scheme
Lectures : 3 hrs / week	Theory : 100 Marks
Tutorial : 1 hrs / week	TW : 25 Marks

Course Objectives: The course aims to:	
1	Understand DSP Processor.

2	Understand Architecture and Programming of TMS32054XX.
3	Understand Architecture of TMS320C6XXX.
4	Understand DSP Algorithms.

Course Outcomes:	
Upon successful completion of this course, the student will be able to:	
1	Differentiate various DSP Processors.
2	Implement Onchip Peripherals of DSP Processors.
3	Implement DSP algorithms.
4	Design application programming using DSP processors.

Unit No	UNIT NAME	No. of Hours
I	Introduction to Programmable DSPs Comparison of GP Processors and DSP processor Architecture, Multiplier and MAC, Modified Bus structures and Memory Access schemes, Multiple Access Memory, Dual port memory, VLIW Architecture, Pipelining, Special Addressing Modes, On-Chip Peripherals, RISC Vs CISC design	6
II	Architecture of TMS32054XX Introduction, Architecture, buses, Memory organization, CPU, ALU, Barrel Shifter, On-chip Peripherals, Address Generation Logic	6
III	TMS32054XX Assembly Language Instructions, Programming in Assembly language	6
IV	Architecture of TMS320C6XXX Features, Architecture, Memory Interfacing, Addressing Modes, Pipeline operation, Peripheral, C-Programming and DSP Application development like Speech coding Image processing and coding applications	8
V	Implementations of basic DSP algorithms: An FFT Algorithm for DFT Computation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing. FPGA Based DSP System Design,	6
VI	Application Programming TMS320C54XX/TMS320C6XXX Application Programming on TMS320C54XX/TMS320C6XXX with Code Composer Studio.	4

Text Books:

1	B. VenkataRamani and M. Bhaskar, Digital Signal Processors, Architecture, Programming and TMH, 2004.
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2	Avtar Singh, S.Srinivasan DSP Implementation using DSP microprocessor with Examples from TMS32C54XX -Thamson 2004
3	E.C.Ifeachor and B.W Jervis,Digital Signal Processing A Practical approach, Pearson Publication

Reference Books:

1	DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.
2	S.K. Mitra, Digital Signal Processing, Tata McGraw-Hill Publication, 2001
3	Computer Networking A top down approach, James F. Kurose, Person, Fifth Edition

**Minimum 8 tutorials based on abovesyllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

5.Subject: Advanced Operating System(Elective-III)

Teaching Scheme	Examination Scheme
Lectures : 03 hrs / week	Theory : 100 Marks
Tutorial: 1hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Understand the Concept of hardware interface and OS Interface
2	Understand parallel System along with Multiprocessor
3	Understand IPC patterns
4	Understand the concept of Process along with I/O devices and System

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Implement hardware interface along with addressing and interrupts
2	Implement System calls and OS Interface
3	Implement Parallel System for two process system
4	Implement I/O devices and System on OS

Unit No	Unit Name	No. of Lectures
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I	<p>Introduction & Hardware Interface</p> <p>Introduction, System Levels, Hardware Resources, Resource Management, Virtual Computers, Requirement of Operating system.CPU, Memory and Addressing, Interrupts, I/O Devices.</p>	10
II	<p>Operating System Interface</p> <p>System calls & its example, Information and Meta information, Naming OS objects, Devices as Files, Process Concept, Communication between Process, Unix Style Creation, Standard Input and standard output.</p>	5
III	<p>Parallel Systems</p> <p>Parallel Hardware, An OS for Two Processor System, Race condition with a shared process table, Atomic actions,Multiprocessor OS : Grouping Shared variables, using two process tables, threads, Implementation of Mutual Exclusion, varieties of computer models.</p>	5
IV	<p>Interprocess Communication (IPC) Patterns</p> <p>Using IPC, Patterns of IPC, Problems when Process complete, Race conditions and atomic actions, IPC pattern: Mutual Exclusion, Signalling, Rendezous, procedure consumer, Client Server, Database access and update, review of IPC pattern</p>	5
V	<p>Process</p> <p>Everday Scheduling, Preemptive Scheduling, Policy Vs Mechanism in scheduling, Scheduling in real operating System, Deadlock, Condition to occur, deal with deadlock, Two phase Locking, starvation, Message passing variation</p>	5
VI	<p>I/O Devices & System</p> <p>Device and Controllers, Terminal Devices- Basic Terminal, Communication Devices, Disk devices, Disk Controller,SCSI Interface, tape devices, CD devices.</p> <p>I/O System software, Access Strategies- Double Buffering, Unification of files and I/O Devices, Disk device drivers, Disk caching, SCSI Device drivers.</p>	6

Text Books

1.Distributed Operating System Concept and design By Pradeep K Sinha PHI

2.Operating Systems by Flynn/ Mchoes

Reference Books

1.Operating system A design oriented approach By Charles Crowley Tata Mcgraw Hill

**Minimum 8 tutorials based on abovesyllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

5.Subject: Optimization techniques(Elective-III)

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory : 100Marks
Practical: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Students should understand the concept of Optimization Techniques.
2	Students should understand the concept of linear programming, Nonlinear programming, Geometric programming, Dynamic programming.
3	Students should understand the method for formulation of problem and assignment of models.
4	Students should understand single-dimensional and Multi-dimensional Search Methods.

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Students should be able to apply Optimization Techniques to Engineering Problems.
2	Students should be able to implement Linear/Nonlinear, Dynamic, Geometric programming.
3	Students should be able to apply single-dimensional and Multi-dimensional Search Methods in constrained and Unconstrained problem environments

Unit No	Unit Name	No. of Lectures
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I	Introduction : Historical development, Application to Engineering Problems, Statement of Optimization problems, Classification of Optimization, Multivariable optimization with and without constraints,	4
II	Linear Programming : Formulation, Geometry, Graphical solution, standard and matrix form of linear programming problems, Simplex programming and its flow chart, revised simplex algorithm, Two-phase Simplex method ,Degeneracy Duality in linear programming: Definition of Dual Problem, General Rules for converting any Primal into its Dual Simplex method and its flow chart. Decomposition principle, Transportation problem.	6
III	Nonlinear programming :Unimodal functions,single dimensional minimization methods, Exhaustive search,Fibonnaci method, Golden section, Comparison of Elimination method, Quadrature interpolation, Cubic interpolation , Directroot method, Random search method , Steepest decent method, Fletcher-Reeves method, David-Fletcher-PowellMethod,Convex sets and convex functions,Kuhn-Tucker conditions. convex optimization, Lagrange multipliers Convex quadratic programming: Wolfe's and Pivot complementary algorithms. Separable programming, Constrained Multi-dimensional Search Methods: Rosen's Gradient projection method, Penalty function method.	8
IV	Geometric programming : Problems with positive coefficients up to one degree of difficulty, Generalized method for the positive and negative coefficients Dynamic programming: Discrete and continuous dynamic programming (simple illustrations). Multistage decision problems, computation procedure and case studies	6
V	Assignment Models : Formulation of problem, Hungarian Method for Assignment Problem, Unbalanced Assignment Problems	6
VI	Genetic Algorithms : Introduction, Representation of design variables, Representation of objective function and constraints, Genetic operators, Application procedure and case studies	6

Note: - Term Work based on tutorials using MATLAB Optimization Tool Box

Text Books

1. Optimization: Theory and Practices, S.S Rao ,New Age Int. (P) Ltd. Publishers, New Delhi
2. Optimization concepts & application in Engg. -A. D. Belegundu, Tirupati R. Chandrupatla (Pearson Edn.)

Reference Books

1. Linear Programming and Network Flows- Mokhtar S. Bazaraa, John J. Jarvis, Hanif D. Sherali Second Edition (Wiley Publication)
2. Chong, E.K.P. and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
3. Peressimi A.L., Sullivan F.E., Vhi, J.J.. Mathematics of Non-linear Programming, Springer – Verlag

**Any 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015

5. Subject: Industrial Automation & Process (Elective-III)

Control

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory : 100 Marks
Tutorial: 01hrs / week	TW : 25 Marks

Course Objectives: The course aims to:	
1	Explain the General function of Industrial Automation , List basic Devices in Automated Systems , Distinguish Different Controllers Employed In Automated Systems .
2	Identify Practical Programmable Logic Controller Applications , Know the History of the PLC, Demonstrate Basic PLC Skills
3	To study basics fuzzy logic and control for industrial atomization

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Apply basic knowledge of process control techniques.
2	Develop a PLC program for an automatic control systems.
3	Select the right hardware for a given application
4	Consider such aspects of the automation system as network communication, human machine interface, safety and protection against interference

Unit No	Unit Name	No. of Lectures
I	<p>Process characteristics: Incentives for process control, Process Variable types and selection criteria, Process degree of freedom, The period of Oscillation and Damping, Characteristics of physical System: Resistance, Capacitive and Combination of both.</p> <p>Elements of Process Dynamics, Types of processes- Deadtime, Single/multicapacity, self-Regulating/nonselfregulating, Interacting/noninteracting, Linear/nonlinear, and Selection of control action for them. Study of Liquid Processes, Gas Processes, Flow Processes, Thermal Processes in respect to above concepts</p>	6
II	<p>Control Systems and Automation Strategy: Evolution of instrumentation and control, Role of automation in industries, Benefits of automation, Introduction to automation tools PLC, DCS, SCADA, Hybrid DCS/PLC, Automation strategy evolution, Control system audit, performance criteria, Safety Systems</p>	6
III	<p>Intelligent Controllers: Step analysis method for finding first, second and multiple time constants and dead time. Model Based controllers: Internal Model control, Smith predictor, optimal controller, Model Predictive controller, Dynamic matrix controller (DMC). Self Tunning Controller. Fuzzy logic systems and Fuzzy controllers, Introduction, Basic Concepts of Fuzzy Logic, Fuzzy Sets, Fuzzy Relation, Fuzzy Graphs, and Fuzzy Arithmetic, Fuzzy If-Then Rules, Fuzzy Logic Applications, Neuro-Fuzzy Artificial Neural networks and ANN controller</p>	6
IV	<p>Distributed Control Systems: DCS introduction, functions, advantages and limitations, DCS as an automation tool to support Enterprise Resources Planning, DCS Architecture of different makes, specifications, configuration and programming, functions including database</p>	6
V	<p>Programmable logic controllers (PLC): Introduction, architecture, definition of discrete state process control, PLC vs PC, PLC vs DCS, relay diagram, ladder diagram, ladder diagram examples, relay sequencers, timers/counters, PLC design, Study of at least one industrial PLC</p>	6
VI	<p>Automation for following industries – Power, Water and Waste Water Treatment, Food and Beverages, Cement, Pharmaceuticals, Sugar, Automobile and Building Automation.</p>	6

Text Books

1. Donald Eckman – Automatic Process Control, Wiley Eastern Limited
2. Thomas E Marlin – Process Control - Designing processes and Control Systems for Dynamic Performance, McGraw-Hill International Editions

Reference Books

1. Process control Systems - F.G. Shinskey, TMH Programmable Logic Controllers: Principles and Applications - Webb & Reis PHI
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**Minimum 8 tutorials based on above syllabus

SHIVAJI UNIVERSITY, KOLHAPUR
M.E.(Electronics and Telecommunication Engineering) Part- II
w.e.f July 2015
5.Subject: Nanotechnology(Elective-III)

Teaching Scheme	Examination Scheme
Lectures : 03hrs / week	Theory :100Marks
Tutorial: 01hrs / week	TW :25 Marks

Course Objectives: The course aims to:	
1	Introduction of Nanoscience & Nanotechnology
2	Study of Semiconductors nanostructure & Nanoparticle
3	Development of Different sensors, Actuators for particular application
	Applications of Nanotechnology in electronics device manufacturing, Medical, Mechanical Industry,

Course Outcomes: Upon successful completion of this course, the student will be able to:	
1	Students can understand field of Nanotechnology
2	Students can understand different material used for nanotechnology
3	Students can understand different nano-sensors, Actuators used for various application
4	Students can understand different applications of Nanotechnology

Unit No	Unit Name	No. of Lectures
I	Introduction to Nano Science and Nano Technology Introduction to Quantum Mechanics; Schrodinger equation and expectation values, Solutions of the Schrodinger equation for free particle, particle in a box, particle in a finite well, Reflection and transmission by a potential step and by a rectangular barrier.	6
II	Semiconductors Nanostructure & Nano-particle Semiconductor nanoparticles – applications, Optical luminescence and fluorescence from direct band gap semiconductor nanoparticles, surface-trap passivation in core-shell nanoparticles, carrier injection, polymer-nanoparticle, LED and solar cells, electroluminescence, barriers to nanoparticle lasers, doping nanoparticles, Mn-Zn-Se phosphors, light emission from indirect semiconductors, light emission from Si nanodots.	6
III	Semiconductor nanoparticles: size-dependant physical properties, Melting point, solidstate phase transformations, excitons, band-gap variations-quantum confinement, effect of strain on band-gap in epitaxial quantum dots. The p-n junction and the bipolar transistor; metal semiconductor and metal-insulator, Semiconductor junctions; field-effect transistors, MOSFETs, CMOS: heterostructures, high-electron-mobility devices, HEMTs, Quantum Hall effect, Introduction to single electron transistors (SETs): quantum dots, single electron effects, Coulomb blockade. References: 1. Encyclopedia of Nanotechnology- Hari Singh Nalwa 2. Springer Handbook of Nanotechnology - Bharat Bhushan	6
IV	NANOELECTRONIC APPLICATIONS Memory devices and sensors – Nano ferroelectrics – Ferroelectric random access memory –Fe-RAM circuit design –ferroelectric thin film properties and integration – calorimetric -sensors – electrochemical cells – surface and bulk acoustic devices – gas sensitive FETs – resistive semiconductor gas sensors –electronic noses – identification of hazardous solvents and gases – semiconductor sensor array	6
V	INDUSTRIAL NANOTECHNOLOGY Solar cells - Thin film Si solar cells - Chemical semiconductor solar cells - Dye sensitized solar cells - Polymer solar cells - Nano quantum dot solar cells - Hybrid nanopolymer solar cells - Fuel Cells – principle of working – basic thermodynamics and electrochemical principle – Fuel cell classification – Fuel cell Electrodes and Carbon nano tubes – application of power and transportation.	6

VI	Unit-VI BIOMEDICAL APPLICATIONS Nanoparticles and Micro-organism, Nano-materials in bone substitutes & Dentistry, Drug delivery and its applications, Biochips- analytical devices, Biosensors- Natural nanocomposite systems as spider silk, bones, shells; organic-inorganic nanocomposite formation through self-assembly. Polymeric nanofibres – Implications in Neuro science, tissue engineering and cancer therapy. Poly electrolyte multilayers- coated colloids- smart capsules. Colloids and colloids assembly of bio nanotechnology. Micro emulsions in nanotechnology	6
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Text Books

1. Quantum Physics – A. Ghatak
2. Quantum Mechanics - Bransden and Joachen

Reference Books

1. Encyclopedia of Nanotechnology- Hari Singh Nalwa
2. Springer Handbook of Nanotechnology - Bharat Bhushan

**Minimum 8 tutorials based on above syllabus

Shivaji University, Kolhapur
Revised Syllabus Structure of Third Year Engineering (ME) (w. e. f. 2015)
Electronics and Telecommunication Engineering Course

Subject Equivalence

Serial Number	New Subject	Old Subject
1	Advance Embedded System	--
2	Error control Coding Techniques	Linear Algebra & Error Control Techniques
3	Advance Wireless Communication	Wireless Communication
4	Random Process	Random Processes
5	Advance microwave circuit design	RF & Microwave Circuit Design
6	Adhoc& wireless sensor networks	---
7	computer vision	---
8	Mobile Computing	Mobile Computing

9	Digital Data Compression	Digital Data Compression
10	Internet Traffic engineering	----
11	Advanced Antenna Theory	---
12	Cryptography & Network Security	Cryptography & Network Security
13	Multi rate system	Multi Rate Systems & Filter Banks
14	SDR & Cognitive Radio Technology	----
15	DSP architecture & algorithm	----
16	Advanced Operating Systems	----
17	Optimization techniques	Optimization Technique
18	Industry automation & process control	----
19	Nanotechnology	---