

**ANNA UNIVERSITY TIRUCHIRAPPALLI****Tiruchirappalli – 620 024****Regulations 2008****Curriculum****M.E. COMPUTER AND COMMUNICATION ENGINEERING****SEMESTER I**

<b>S No.</b>	<b>Subject code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Theory</b>						
1	<b>MA 5131</b>	Applied Mathematics for Electronics Engineers	3	1	0	4
2	<b>CO5102</b>	Modern Digital Communication Techniques	3	0	0	3
3	<b>AN5101</b>	Advanced Digital Signal Processing	3	1	0	4
4	<b>AN5104</b>	Advanced Microprocessors and Microcontrollers	3	0	0	3
5	<b>CP 5101</b>	System Programming and Operating System	3	0	0	3
6	<b>E1***</b>	Elective I	3	0	0	3
<b>Practical</b>						
7	<b>CP5102</b>	Computer and Communication Laboratory I	0	0	4	3
<b>Total</b>						<b>23</b>

**SEMESTER II**

<b>S. No.</b>	<b>Subject code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Theory</b>						
1	<b>OC 5102</b>	Optical Fiber Communication	3	0	0	3
2	<b>AN 5152</b>	Computer Architecture and Parallel Processing	3	0	0	3
3	<b>AN 5010</b>	High Performance Communication Networks	3	0	0	3
4	<b>CP 5151</b>	Internet Concepts and Programming	3	0	0	3
5	<b>E2****</b>	Elective II	3	0	0	3
6	<b>E3****</b>	Elective III	3	0	0	3
<b>Practical</b>						
7	<b>CP 5152</b>	Computer and Communication Laboratory II	0	0	4	3
<b>Total</b>						<b>21</b>

### SEMESTER III

S No.	Subject code	Subject	L	T	P	C
<b>Theory</b>						
1	<b>E4***</b>	Elective IV	3	0	0	3
2	<b>E5***</b>	Elective V	3	0	0	3
3	<b>E6***</b>	Elective VI	3	0	0	3
<b>Practical</b>						
4	<b>CP5251</b>	Project Work Phase I	0	0	12	6
<b>Total</b>						<b>15</b>

### SEMESTER IV

S No.	Subject code	Subject	L	T	P	C
<b>Theory</b>						
1	<b>CP5251</b>	Project Work Phase II	0	0	24	12
<b>Total</b>						<b>12</b>

**Total Credits to be Earned for the Award of the Degree = 71**

### LIST OF ELECTIVES

S No.	Subject code	Subject	L	T	P	C
<b>Theory</b>						
1	<b>CP 5001</b>	Cellular Mobile Communications	3	0	0	3
2	<b>CP 5002</b>	Microwave Circuits	3	0	0	3
3	<b>CP 5003</b>	Operating System Design	3	0	0	3
4	<b>CP5004</b>	Visual Programming	3	0	0	3
5	<b>CP5005</b>	Ad-hoc Networks	3	0	0	3
6	<b>AN5001</b>	Digital Image Processing	3	0	0	3
7	<b>AN5002</b>	Neural Networks and Applications	3	0	0	3
8	<b>AN5005</b>	ASIC Design	3	0	0	3
9	<b>AN5154</b>	Embedded Systems	3	0	0	3
10	<b>DC5001</b>	High Speed Switching Architecture	3	0	0	3
11	<b>OC5003</b>	Non-linear Fiber Optics	3	0	0	3
12	<b>CO5006</b>	Speech and Audio Signal Processing	3	0	0	3
13	<b>CO 5010</b>	Communication Network Security	3	0	0	3
14	<b>CS 5104</b>	Software Engineering Methodologies	3	0	0	3
15	<b>CS5004</b>	Distributed Computing	3	0	0	3
16	<b>CS5006</b>	XML and Web Services	3	0	0	3
17	<b>CS5151</b>	Database Technology	3	0	0	3
18	<b>CS5154</b>	Object Oriented System Design	3	0	0	3

# ANNA UNIVERSITY TIRUCHIRAPPALLI

Tiruchirappalli - 620 024

Regulations 2008

## Syllabus

### M.E. COMPUTER AND COMMUNICATION ENGINEERING

#### SEMESTER I

#### MA5131 – APPLIED MATHEMATICS FOR ELECTRONICS ENGINEERS

L	T	P	C
3	1	0	4

#### UNIT I      **LINEAR ALGEBRAIC EQUATIONS & EIGEN VALUE PROBLEMS**      9

System of Equations – Solutions by Gauss Elimination Methods – Gauss Jordan and LU Decomposition Method Jacobi – Gauss Seidel Method – Eigen Values of Matrix by Jacobi and Power Method.

#### UNIT II      **THE WAVE EQUATIONS**      9

Solution of Initial and Boundary Value Problems – Characteristics–D'Alembert's Solution– Significance of Characteristic Curves – Laplace Transform Solutions – for Displacement in a Long String – A long String under its Weight – Longitudinal Vibration of a Elastic Bar with Prescribed Force on one end – Free Vibrations of a String .

#### UNIT III      **SPECIAL FUNCTIONS**      9

Bessel's Equation – Bessel Functions Legendre's Equation – Legendre Polynomials Rodrigue's Formula – Recurrence Relations – Generating Functions and Orthogonal Property for Bessel Functions – Legendre Polynomials.

#### UNIT IV      **RANDOM VARIABLES**      9

One–Dimensional Random Variables – Moments and Moment Generating Function –Binomial Poisson– Uniform – Exponential Normal and Weibull Distribution – Two Dimensional Random Variables Marginal and Conditional Distribution Covariance – Correlation Coefficient – Function of One Dimensional and Two Dimensional Random Variables.

#### UNIT V      **QUEUING THEORY**      9

Single and Multiple Server Markovian Queuing Models – Steady State System Size Probabilities– Little's Formula – Customer Impatience Priority Queues – M/G/1 Queuing System – PK Formula .

**L: 45 T: 15 Total: 60**

### **TEXT BOOKS**

1. S. Narayanan T. K. Manichvachagam Pillay and G. Ramanaiah, “Advanced Mathematics for Engineering Students”, S.Viswanathan Pvt Ltd, Vol 2, 1986.
2. Taha H. A., “Operations Research An Introduction”, Sixth Edition, PHI, 1997.

### **REFERENCES**

1. Sankara Rao K, “Introduction to Partial Differential Equation”, PHI, 1995.
2. Churchi R. V., “Operational Mathematics”, McGraw Hill, 1972.
3. Richard A. Johnson, “Miller and Freund's Probability and Statistics for Engineers”, Fifth Edition, PHI, 1994.

## CO5102 – MODERN DIGITAL COMMUNICATION TECHNIQUES

L	T	P	C
3	0	0	3

### UNIT I POWER SPECTRUM AND COMMUNICATION OVER MEMORYLESS CHANNEL 9

PSD of a Synchronous Data Pulse Stream – M-ary Markov source – Convolutionally Coded Modulation – Continuous Phase Modulation – Scalar and Vector Communication over Memoryless Channel – Detection Criteria

### UNIT II COHERENT AND NON-COHERENT COMMUNICATION 9

Coherent Receivers – Optimum Receivers in WGN – IQ Modulation & Demodulation – Non-Coherent receivers in Random Phase Channels – M-FSK Receivers – Rayleigh and Rician Channels – Partially Coherent Receivers – DPSK – M-PSK – M-DPSK – BER Performance Analysis

### UNIT III BANDLIMITED CHANNELS AND DIGITAL MODULATIONS 9

Eye pattern – Demodulation in the presence of ISI and AWGN – Equalization techniques – IQ modulations – QPSK – QAM – QBOM – BER Performance Analysis – Continuous Phase Modulation – CPM – CPFSK – MSK – OFDM

### UNIT IV BLOCK CODED DIGITAL COMMUNICATION 9

Architecture and Performance – Binary Block Codes – Orthogonal – Bi-orthogonal – Trans-orthogonal – Shannon's Channel Coding Theorem – Channel Capacity – Matched Filter – Concepts of Spread Spectrum Communication – Coded BPSK and DPSK Demodulators – Linear Block Codes – Hamming-Golay Cyclic – BCH – Reed-Solomon Codes

### UNIT V CONVOLUTIONAL CODED DIGITAL COMMUNICATION 9

Representation of Codes using Polynomial – State Diagram – Tree Diagram and Trellis Diagram – Decoding Techniques using Maximum Likelihood – Viterbi Algorithm – Sequential and Threshold methods – Error probability performance for BPSK and Viterbi Algorithm – Turbo Coding

**Total: 45**

### TEXT BOOKS

1. M. K. Simon, S. M. Hinedi and W. C. Lindsey, "Digital Communication Techniques, Signaling and Detection", Prentice Hall India, 1995.
2. Simon Haykin, "Digital communications", John Wiley and Sons, 1998.

### REFERENCES

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 4<sup>th</sup> Edition Pearson Education, 1998.
2. B. P. Lathi, "Modern Digital and Analog Communication Systems", 3<sup>rd</sup> Edition, Oxford University Press, 1998.

## AN5101 – ADVANCED DIGITAL SIGNAL PROCESSING

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

[Review of discrete-time signals and systems – DFT and FFT – Z-Transform – Digital Filters is recommended]

### **UNIT I      DISCRETE RANDOM SIGNAL PROCESSING      9**

Discrete Random Processes – Ensemble averages – Stationary processes – Autocorrelation and Auto covariance matrices – Parseval's Theorem – Wiener –Khintchine Relation – Power Spectral Density – Periodogram Spectral Factorization – Filtering Random Processes – Low Pass Filtering of White Noise – Parameter Estimation – Bias and Consistency

### **UNIT II      SPECTRUM ESTIMATION      9**

Estimation of Spectra from Finite Duration Signals – Non-Parametric Methods –Correlation Method – Periodogram Estimator – Performance Analysis of Estimators –Unbiased – Consistent Estimators – Modified Periodogram – Bartlett and Welch methods – Blackman – Tukey method – Parametric Methods – AR – MA – ARMA model based Spectral Estimation – Parameter Estimation – Yule – Walker Equations – Solutions using Durbin's Algorithm

### **UNIT III      LINEAR ESTIMATION AND PREDICTION      9**

Linear prediction – Forward and Backward predictions – Solutions of the Normal equations – Levinson – Durbin algorithms – Least Mean Squared error criterion –Wiener Filter for filtering and prediction – FIR Wiener Filter and Wiener IIR filters –Discrete Kalman Filter

### **UNIT IV      ADAPTIVE FILTERS      9**

FIR Adaptive filters – Adaptive filter based on steepest descent method – Widrow–Hoff LMS Adaptive Algorithm – Normalized LMS – Adaptive channel Equalization –Adaptive echo cancellation – Adaptive noise cancellation – Adaptive recursive filters (IIR) – RLS adaptive filters – Exponentially weighted RLS – Sliding Window RLS

### **UNIT V      MULTIRATE DIGITAL SIGNAL PROCESSING      9**

Mathematical description of change of Sampling Rate – Interpolation and Decimation Decimation by an Integer Factor – Interpolation by an Integer Factor – Sampling rate conversion by a rational factor – Filter implementation for sampling rate conversion – Direct form FIR structures – Poly-phase Filter Structures – Time-Variant Structures – Multistage implementation of Multi-rate System – Application to sub band coding – Wavelet transform and filter bank implementation of Wavelet expansion of signals.

**L: 45 T: 15 Total: 60**

## **TEXT BOOKS**

1. Monson H. Hayes, "Statistical Digital Signal Processing and Modeling", John Wiley and Sons, Inc., 2002.
2. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing", Pearson Education, 2002.

## **REFERENCES**

1. John G. Proakis et.al., "Algorithms for Statistical Signal Processing", Pearson Education, 2002.
2. Dimitris G. Manolakis et.al., "Statistical and Adaptive Signal Processing", McGraw Hill, 2000.
3. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 2<sup>nd</sup> Edition, Pearson Education, Inc., 2004. (For Wavelet Transform Topic)



## **TEXT BOOK**

1. Daniel Tabak, "Advanced Microprocessors", McGraw Hill Inc., 1995.

## **REFERENCES**

1. James L. Antonakos, "The Pentium Microprocessor", Pearson Education, 1997.
2. Steve Furber, "ARM System On-Chip Architecture", Addison Wesley, 2000.
3. Gene H. Miller, "Micro Computer Engineering", Pearson Education, 2003.
4. John B. Peatman, "Design with PIC Microcontroller", Prentice hall, 1997.
5. James L. Antonakos, "An Introduction to the Intel family of Microprocessors", Pearson Education, 1999.
6. Barry B. Breg, "The Intel Microprocessors Architecture - Programming and Interfacing", PHI, 2002.
7. Valvano, "Embedded Microcomputer Systems", Thomson Asia, First reprint,2001.

## **Web links**

[www.ocw.nit.edu](http://www.ocw.nit.edu)

[www.arm.com](http://www.arm.com)

## CP5101 – SYSTEM PROGRAMMING AND OPERATING SYSTEM

L	T	P	C
3	0	0	3

### UNIT I FUNDAMENTALS 9

Language Processors – Basic concept – Language processing Activities – Fundamentals of Language Processing – Data Structures – Search Data Structures – Allocation Data Structures – Scanning and Parsing

### UNIT II ASSEMBLERS 9

Assemblers – Elements of Assembly Language Programming – Simple Assembly Scheme – Pass Structure of Assemblers – Design of two pass Assemblers – Macros and Macro Processor – Macro definition and call – Macro expansion – Nested Macro calls – Advanced Macro Facilities – Design of a Macro Preprocessor

### UNIT III COMPILERS & INTERPRETERS 9

Compilers and Interpreters – Aspects of Compilation – Memory Allocation – Compilation of Expressions – Compilation of control structures – Code Optimization – Interpreters Linkers – Relocation and Linking concept – Design of a Linker – Self Relocating Programs

### UNIT IV PROCESS MANAGEMENT 9

Introduction to OS – Types of OS – I/O Structure – Storage structure – Network Structure – System calls – Process Management – Process concept – Multithreading Models – CPU Scheduling criteria – Algorithms – Multiple Processor Scheduling – Real Time Scheduling – Algorithm Evaluation – Critical Section problem – Synchronization Hardware – Semaphores – Monitors – Classical Problems of Synchronization – Deadlock characterization – Prevention – Avoidance – Detection and Recovery

### UNIT V STORAGE MANAGEMENT 9

Storage Management – Swapping – Memory Allocation – Contiguous and noncontiguous – Paging – Segmentation – Virtual Memory – Demand paging – Page replacement – Allocation of frames – Thrashing – File concept – Access methods – File system structure. I/O Systems – I/O hardware – Disk – Structure – Scheduling – Disk Management and swap space management

**Total: 45**

### TEXT BOOKS

1. D. M. Dhamdhare, “Systems Programming and Operating Systems”, 2<sup>nd</sup> Revised Edition, Tata McGraw, Hill Publishing Company limited, 2003.
2. Silberschatz, Galvin and Gagne, “Operating System Concepts”, 6<sup>th</sup> Edition, John Wiley & Sons, 2003.

### REFERENCES

1. Andrew S. Tanenbaum, Albert S. and Wood Hull, “Operating System Design and Implementation”, 2<sup>nd</sup> Edition, PHI.
2. William Stallings, “Operating Systems”, 2<sup>nd</sup> Edition, PHI, 6<sup>th</sup> print
3. John J. Donovan, “System Programming”, 23<sup>rd</sup> reprint, Tata McGraw-Hill Publishing Company limited, 2000.

## **CP5102 – COMPUTER AND COMMUNICATION LABORATORY I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>3</b>

1. Simulation of Modulation and Coding in a AWGN Communication Channel using Simulation Packages.
2. Implementation of Linear and Cyclic Codes
3. Implementation of Adaptive Filters- periodogram and multistage multirate system in DSP Processor
4. Simulation of QMF using Simulation Packages.
5. System Design using PIC Microcontroller
6. Implementation of Lexical analyzer.
7. Implementation of Semaphores and Monitors in classical problems of synchronization.
8. Usage of System Calls.

## SEMESTER II

### OC5102 – OPTICAL FIBER COMMUNICATION

L	T	P	C
3	0	0	3

#### UNIT I OPTICAL FIBERS 9

Geometrical description – Wave Propagation – Dispersion in Single Mode (SM) and Multimode (MM) fibers – Limitations due to Dispersion – Fiber Losses – Non linear Optical Effects

#### UNIT II OPTICAL AMPLIFIERS 9

Concepts – Semiconductor Optical Amplifier – Raman and Brillouin Amplifier – Fiber Amplifiers – Erbium doped Amplifiers – System applications

#### UNIT III DISPERSION MANAGEMENT 9

Need – Pre-compensation schemes – Post compensation Techniques – Dispersion compensating fibers – Optical filters – Fiber Bragg Gratings – Optical Phase Conjugation – Long Haul Light Wave Systems – High Capacity Systems

#### UNIT IV MULTICHANNEL SYSTEMS 9

WDM light wave systems – WDM Components – System performance issues – Time Division Multiplexing (TDM) – Sub Carrier Multiplexing – Code Division Multiplexing – DWDM

#### UNIT V COHERENT LIGHTWAVE SYSTEMS 9

Concepts – Modulation Formats – Demodulation Formats – Bit Error Rate (BER) – Sensitivity Degradation – System performance

**Total: 45**

#### TEXT BOOKS

1. G. P. Agrawal, “Fiber optic communication systems”, 3<sup>rd</sup> Edition, John Wiley & Sons, 2002.
2. H. Franz and V. K. Jain, “Optical communication - Components and Systems”, Narosa Publications, 2002.

#### REFERENCES

1. H. Franz and V. K. Jain, “Optical Communication Systems”, Narosa Publications, 1995.
2. G. Keiser, “Optical fiber communication systems”, McGraw Hill, 3<sup>rd</sup> Edition, 2000.
3. Selvarajan, S. Kar and T. Srinivas, “Optical fiber Communication - Principle and Systems”, Tata McGraw Hill, 2002.

# AN5152 – COMPUTER ARCHITECTURE AND PARALLEL PROCESSING

L	T	P	C
3	0	0	3

## UNIT I PRINCIPLES OF PARALLEL PROCESSING 9

Multiprocessors and Multicomputers – Multi-Vector and SIMD Computers – PRAM and VLSI Models – Conditions of Parallelism – Program Partitioning and Scheduling – Program flow mechanisms – Parallel processing applications – Speed up performance law

## UNIT II PROCESSOR AND MEMORY ORGANIZATION 9

Advanced processor technology – Superscalar and vector processors – Memory hierarchy – Virtual memory technology – Cache memory organization – Shared memory organization

## UNIT III PIPELINE AND PARALLEL ARCHITECTURE 9

Linear pipeline processors – Non linear pipeline processors – Instruction pipeline Design – Arithmetic Pipeline Design – Superscalar and Super Pipeline Design – Multiprocessor System – Interconnects – Cache Coherence and Synchronization mechanism – Message Passing mechanisms

## UNIT IV VECTOR, MULTITHREAD AND DATAFLOW ARCHITECTURE 9

Vector Processing Principle – Multi-Vector Multiprocessors – Compound Vector Processing – Principles of Multithreading – Fine Grain Multi-Computers – Scalable and Multithread Architectures – Dataflow and Hybrid Architectures

## UNIT V PARALLEL PROGRAMMING 9

Parallel Programming models – Parallel Languages and Compilers – Parallel programming environments – Synchronization and Multiprocessing modes – Message Passing program development – Mapping programs onto multi-computers – multiprocessor UNIX design goals – MACH/OS kernel architecture – OSF/1 architecture and applications

**Total: 45**

### TEXT BOOK

1. Kai Hwang, “Advanced Computer Architecture”, TMH, 2001.

### REFERENCES

1. William Stallings, “Computer Organization and Architecture”, McMillan Publishing Company, 1990.
2. M. J. Quinn, “Designing efficient Algorithms for parallel computer”, McGraw Hill International, 1994.

# AN5010 – HIGH PERFORMANCE COMMUNICATION NETWORKS

L T P C  
3 0 0 3

## UNIT I PACKET SWITCHED NETWORKS 9

OSI and IP models – Ethernet (IEEE 802.3) – Token Ring (IEEE 802.5) – Wireless LAN (IEEE 802.11) FDDI – DQDB – SMDS – Internetworking with SMDS

## UNIT II ISDN AND BROADBAND ISDN 9

ISDN – Overview – Interfaces and functions – Layers and services – Signaling System – Broadband ISDN Architecture and Protocols

## UNIT III ATM AND FRAME RELAY 9

ATM – Main features – Addressing – Signaling and Routing – ATM Header Structure – Adaptation Layer – Management and Control – ATM Switching and Transmission – Frame Relay – Protocols and services – Congestion Control – Internetworking with ATM – Internet and ATM – Frame Relay via ATM

## UNIT IV ADVANCED NETWORK ARCHITECTURE 9

IP forwarding Architectures overlay model – Multi Protocol Label Switching (MPLS) – Integrated Services in the Internet – Resource Reservation Protocol (RSVP) – Differentiated services

## UNIT V BLUETOOTH TECHNOLOGY 9

The Bluetooth module – Protocol stack Part II – Antennas – Radio interface – Base band – The Link Controller – Audio – The Link Manager – The Host Controller Interface – Bluetooth module – Protocol stack Part I – Logical link control and adaptation protocol – RFCOMM – Service Discovery Protocol – Wireless Access Protocol – Telephony Control Protocol.

**Total: 45**

### TEXT BOOKS

1. William Stallings, “ISDN and Broadband ISDN with Frame Relay and ATM”, 4<sup>th</sup> Edition, Pearson education 2002.
2. Leon Gracia and Widjaja, “Communication Networks”, Tata McGraw -Hill,2000
3. Jennifer Bray and Charles F.Sturman, “BlueTooth”, Pearson education, 2001.
4. Sumit Kasera and Pankaj Sethi, “ATM Networks”, Tata McGraw -Hill, 2000.

### REFERENCES

1. Rainer Handel, Manfred N.Huber and Stefan Schroder, “ATM Networks”, 3<sup>rd</sup> Edition, Pearson education, 2002.
2. Jean Walrand and Pravin Varaiya, “High Performance Communication networks”, 2<sup>nd</sup> Edition, Harcourt and Morgan Kauffman, 2000.
3. William Stallings, “High - speed Networks and Internets”, 2<sup>nd</sup> Edition, Pearson education 2003.

## CP5151 – INTERNET CONCEPTS AND PROGRAMMING

L	T	P	C
3	0	0	3

### UNIT I BASIC CONCEPTS OF INTERNET 9

Internet Protocol – Ethernet technology – Fiber distributed Data Interface – Synchronous Transfer Mode – ARPANET Technology – ANSNET – Application Level Interconnection Networks – Internet Architecture – Interconnection through IP routers – Primary classes of IP addresses and relevant properties – Direct mapping.

### UNIT II ADVANCE RESOLUTION PROTOCOL AND SUBNET 9

ARP refinements and Implementation – Encapsulation and identification – ARP protocol format – Reverse Address Resolution Protocol – Timing RARP transactions – Primary and Backup RARP servers – Subnet and Super-net Extensions – Proxy ARP – Subnet addressing – Flexibility in subnet address assignment – Implementation of subnet – Routing in the presence of subnet – Subnet Routing Algorithm – A Unified Routing Algorithm – Broadcasting to subnets – Super-net addressing.

### UNIT III JAVA FUNDAMENTALS 9

Java features – Difference between Java, C and C++ – Java and Internet – Java Environment – Java Fundamentals – Program structure – Multiple Inheritance – Packages – Multi-threaded programming – Errors and exceptions – Applet programming – Graphics programming and problems in Java.

### UNIT IV CLIENT SIDE PROGRAMMING 9

HTML concepts of tags – Layout – comments – Paragraphs – Aligning – Line break – style tags – Address – Links – Formatting – Relative and absolute path – Images – Graphical link to Images – CGI – Introduction to Java script and Perl – Web browsers.

### UNIT V SERVER SIDE PROGRAMMING 9

XML – DHTML – Overview of e-commerce and Internet Security – JSP – ASP – Java Beans – Servlets.

**Total: 45**

### REFERENCES

1. Comer D. and Stevans D, “Internetworking with TCP/IP Vol 1”, 3<sup>rd</sup> Edition, PHI, 1998.
2. John R. Habbard, “Programming with Java, Schaum’s outline series”, McGraw Hill, 1999.

## CP5152 – COMPUTER AND COMMUNICATION LABORATORY II

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>3</b>

1. DC characteristics of PIN PD and APD.
2. P –I characteristics of LED and LASER.
3. Optical link simulation using simulator packages.
4. Web design with HTML.
5. Web design with JAVA.
6. Simulation of ATM switches.
7. Simulation and Implementation of ATM congestion control algorithm. (Using free ATM network simulator software)

## ELECTIVES

### CP5001 – CELLULAR MOBILE COMMUNICATIONS

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**UNIT I            FUNDAMENTALS TO WIRELESS MOBILE COMMUNICATIONS            9**

History and Evolution of Mobile Radio Systems – Types of Mobile Wireless Services / Systems – Cellular – WLL – Paging – Satellite Systems – Standards – Future trends in Personal Wireless Systems

**UNIT II            CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS            9**

Cellular concept and Frequency Reuse – Multiple Access Schemes – Channel Assignment and Handoff – Interference and System Capacity – Trunking and Erlang Capacity Calculations

**UNIT III           MOBILE RADIO PROPAGATION            9**

Radio Wave Propagation – Issues in personal wireless systems – Propagation models – Multipath Fading and Base Band Impulse Response models – Parameters of Mobile Multipath Channels – Antenna Systems in mobile radio

**UNIT IV           MODULATIONS AND SIGNAL PROCESSING            9**

Analog and Digital modulation Techniques – Performance of various Modulation Techniques – Spectral Efficiency – Error-rate – Power Amplification – Equalization Rake Receiver Concepts – Diversity and Space-Time Processing – Speech Coding and Channel Coding

**UNIT V            SYSTEM EXAMPLES AND DESIGN ISSUES            9**

Multiple Access Techniques – FDMA – TDMA and CDMA Systems – Operational Systems – Wireless Networking – Design issues in Personal Wireless Systems.

**Total: 45**

#### **TEXT BOOKS**

1. Rappaport T. S., “Wireless Communications Principles and Practice”, Prentice Hall - NJ, 1996
2. Feher K., “Wireless digital communications”, PHI, 1995.

#### **REFERENCES**

1. Lee W. C. Y., “Mobile Communications Engineering, Theory and Applications”, 2<sup>nd</sup> Edition, McGraw -Hill, 1998.
2. Schiller, “Mobile Communications”, Pearson Education Asia, 2000.

# CP5002 – MICROWAVE CIRCUITS

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## **UNIT I TRANSMISSION LINES AND MICROWAVE CIRCUITS 9**

The smith chart as a conformal mapping from the normalized impedance plane to the reflection coefficient plane – Admittance Smith Chart – Impedance and Admittance Matrix – The ABCD Matrix – Cascading of Network – The S parameters – Conversion between Different Parameters – Matching of Impedance using Lumped Elements – Stubs and Quarter Wave Transformer – Using the Smith Chart

## **UNIT II NOISE AND DISTORTION IN MICROWAVE CIRCUITS 9**

Review of Random Process – Thermal Noise – Available Noise Power and Noise Voltage – Autocorrelation and Power Spectral Density in linear systems – Gaussian White Noise – Mixing of Noise – Narrow Band representation of Noise – Probability of Error for Threshold Detection – Noise Temperature – Noise factor and Noise Figure – Equivalent noise temperature of non thermal sources – Noise temperature of cascaded networks – Noise figure of passive two port networks – Dynamic range and inter modulation distortion – Gain compression – Third order intercept point – Intercept point of cascaded network

## **UNIT III FILTERS 9**

Filter design by Insertion loss method – Butterworth and Tchebycheff Low Pass Filters – Impedance and Frequency scaling for Low Pass Filters – Band Pass and Band Stop Transformation – Design examples – Filters using transmission line stubs – Stepped Impedance Low Pass Filters – Band Pass Filters using transmission Line Resonators – capacitively coupled quarter wave resonators

## **UNIT IV AMPLIFIERS 9**

FET and Bipolar Transistor models – Two port power gain – Derivation of stability circles and stability criteria – Unconditionally stable configuration and simultaneous conjugate matching – Amplifier design using S parameters – Constant noise figure circles – Design for maximum gain power amplifiers

## **UNIT V OSCILLATORS AND MIXERS 9**

Oscillator using common emitter BJT and Common Gate FET – Practical consideration – Voltage Controlled Oscillators – Negative Resistance Oscillators – Dielectric resonator Oscillators – Frequency synthesis methods – PLL Analysis – Oscillator Phase Noise

Mixer characteristics – Image Frequency – Conversion Loss – Noise figure – Intermediate Distortion – Single ended Diode Mixer – Balanced Mixer – Small signal Analysis – Image Reject Mixer

**Total: 45**

## **REFERENCES**

1. David M. Pozar, “Microwave and RF Design of Wireless systems”, John Wiley and sons, 2001
2. Collins R.E., “Foundations for Microwave Engineering”, 2<sup>nd</sup> Edition, The IEEE Press Series on Electromagnetic wave theory, 2002.

## CP5003 – OPERATING SYSTEM DESIGN

L	T	P	C
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### UNIT I CONCEPTS OF OPERATING SYSTEM DESIGN 9

Operating System and Services – CPU Scheduling Approaches – Process Structure and PCB – Process Synchronization – Semaphores – Deadlocks – Handling Deadlocks – Multithreading

### UNIT II MEMORY MANAGEMENT 9

Memory Management – Paging – Segmentation – Virtual Memory – Demand paging – Paging Replacement Algorithm

### UNIT III DISK SCHEDULING APPROACHES 9

Disk Scheduling Approaches – File System – File System Design Issues – User Interface to File System – I/O Device Management

### UNIT IV DISTRIBUTED OPERATING SYSTEM 9

Distributed Operating System – Design issues in Distributed Operating System – Distributed File System

### UNIT V CASE STUDY (LINUX / WINDOWS) 9

Case Study (Linux / Windows) – Design and Implementation of OS – Process Model and Structure in OS – Memory Management – File System – I/O Management and Device Drivers

**Total: 45**

### TEXT BOOKS

1. Abraham Silberschatz and Peter B. Galvin, “Operating system concepts”, 7<sup>th</sup> Edition, Addison Wesley Publishing Company, 2005.
2. Bach M.J., “Design of the UNIX operating system”, Prentice Hall, 1999.

### REFERENCES

1. Mukesh Singhal and Niranjana Shivratni, “Distributed operating system”, TMH, 2001.
2. Leffler, Mukusick, Karcls and Quarterman, “The design and implementation of 4.3 BSD UNIX operating system”, Addison Wesley, 2001.
3. Naji, “Linux OS”, Printice Hall of India, 2003.
4. Abraham Silberschatz and Peter B. Galvin, “Windows XP Update”, John Wesley, 2003.

## CP5004 – VISUAL PROGRAMMING

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### UNIT I      **WINDOWS PROGRAMMING**      **9**

Different types of Programming – Overview of Windows Programming – Structure of a Windows Program – Creating Windows – Windows support functions – Menus – Scroll bars – Mouse and Cursor functions – Keyboard support – Message processing Functions – Windows message – Device contexts – Color palette control – Document interface – Dynamic Link Libraries – SDK software Development kit tools – Front end tools

### UNIT II      **VISUAL BASIC ENVIRONMENT**      **9**

Forms and Controls – Menus and Dialogs – Programming Fundamentals – Classes and Instances – Programming User Events – Using Custom Controls – Inbuilt and User Defined Functions – Files – Accessing Databases with Data Control – Data Access Objects

### UNIT III      **VISUAL C++ ENVIRONMENT**      **9**

Graphics Device Interface (GDI) – GDI primitives – Device Contexts and Graphics Object – Defining Windows Structure – Registering – Display – Message handling methods – Programming with Windows Controls – Resources

### UNIT IV      **MFC PROGRAMMING**      **9**

Document/View Architecture – SDI and MDI – MFC Programming with Windows Controls and Resources – App Wizard and Class Wizards

### UNIT V      **ADVANCED CONCEPTS**      **9**

Communicating with other Applications – OLE Object Linking and Embedding concept MDI Applications – Programming other Application's Objects – Optimizing applications for size and speed – Calling procedures in DLL – Active X Document – Distribution of Applications – Database Management with ODBC – Database Applications

**Total: 45**

### TEXT BOOKS

1. Steve Brown, "Visual Basic 6 Complete", Sybex Inc, 1999.
2. Richard M. Jones, "Introduction to MFC Programming with Visual C++", by Prentice Hall, 1999

### REFERENCES

1. Harold Davis, "Visual Basic 6- Visual Quick Start Guide", Peachpit Press, 1999.
2. Ivor Horton Wrox, "Beginning Visual C++6", New Edition, 1998.
3. Francesco Balena, "Programming Microsoft VisualBasic 6.0", Microsoft Press, 1999.
4. Jeff Prosise, "Programming Windows with MFC", 2<sup>nd</sup> Edition, Microsoft Press, 1999.

## CP5005 – ADHOC NETWORKS

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### **UNIT I WIRELESS LAN, PAN, WAN AND MAN 9**

Characteristics of Wireless Channel – Fundamentals of WLANs – IEEE 802.11 Standard – HIPERLAN Standard – First, Second and Third Generation Cellular Systems – WLL – Wireless ATM – IEEE 802.16 standard – HIPERACCESS – Ad-Hoc Wireless Internet

### **UNIT II MAC ROUTING AND MULTICAST ROUTING PROTOCOLS 9**

MAC Protocols – Design issues – Goals and Classification – Contention-based protocols with reservation and scheduling mechanisms – Protocols using directional antennas – Routing protocols – Design issues and classification – Table-driven – On-demand and Hybrid routing protocols – Routing Protocols with efficient Flooding Mechanisms – Hierarchical and Power-Aware Routing Protocols Multicast Routing Protocols – Design issues and Operation – Architecture Reference Model – Classification – Tree-Based and Mesh-Based Protocols – Energy-Efficient Multicasting

### **UNIT III TRANSPORT LAYER AND SECURITY PROTOCOLS 9**

Transport Layer Protocol – Design issues – Goals and Classification – TCP over Ad-Hoc Wireless Networks – Security – Security Requirements – Issues and Challenges in Security Provisioning – Network Security Attacks – Security Routing – Quality of Service – Issues and Challenges in providing QoS – Classification of QoS solutions – MAC layer solutions – Network Layer Solutions – QoS Frameworks

### **UNIT IV ENERGY MANAGEMENT 9**

Need – Classification of Battery Management Schemes – Transmission Power Management Schemes – System Power Management Schemes – Wireless Sensor Networks – Architecture – Data Dissemination – Data gathering – MAC protocols – Location Discovery – Quality of Sensor Network

### **UNIT V PERFORMANCE ANALYSIS 9**

ABR beaconing – Performance parameters – Route –Discovery Time – End-to-End Delay Performance – Communication throughput Performance – Packet Loss Performance – Route Reconfiguration/Repair Time – TCP/IP based Applications.

**Total: 45**

### **TEXT BOOKS**

1. C. Siva Ram Murthy and B. S. Manoj, “Ad-Hoc Wireless Networks, Architectures and protocols”, Prentice Hall PTR, 2004.
2. C. K. Toh, “Ad-Hoc Mobile Wireless Networks - Protocols and Systems”, Prentice Hall PTR, 2001.

### **REFERENCES**

1. Mohammad Ilyas, “The Handbook of AdHoc Wireless Networks”, CRC press, 2002.
2. Charles E. Perkins, “AdHoc Networking”, Addison, Wesley, 2000.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, “Mobile AdHoc Networking”, Wiley, IEEE press, 2004.

## AN5001 – DIGITAL IMAGE PROCESSING

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### UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of Digital Image Processing Systems – Elements of visual perception – Psycho Visual Model – Brightness – Contrast – Hue – Saturation – Mach band effect – Color image fundamentals – RGB, HSI models – Image sampling – Quantization – Dither – Two-dimensional Mathematical Preliminaries

### UNIT II IMAGE TRANSFORMS 9

1D DFT – 2D transforms – DFT – DCT – Discrete Sine – Walsh – Hadamard – Slant – Haar – KLT – SVD – Wavelet Transform

### UNIT III IMAGE ENHANCEMENT AND RESTORATION 9

Histogram Modification and Specification Techniques – Noise Distributions – Spatial Averaging – Directional Smoothing – Median – Geometric Mean – Harmonic Mean – Contraharmonic and Yp mean filters – Homomorphic filtering – Color Image Enhancement – Image Restoration – Degradation model – Unconstrained and Constrained restoration – Inverse filtering – Removal of blur caused by uniform linear motion – Wiener filtering – Geometric transformations – spatial transformations – Gray Level interpolation

### UNIT IV IMAGE SEGMENTATION AND RECOGNITION 9

Edge Detection – Image Segmentation by region growing – Region Splitting and Merging – Edge linking – Image Recognition – Patterns and Pattern Classes – Matching by Minimum Distance Classifier – Matching by Correlation – Back Propagation Neural Network – Neural Network applications in Image Processing

### UNIT V IMAGE COMPRESSION 9

Need for Data Compression – Huffman – Run Length Encoding – Shift Codes – Arithmetic Coding – Vector Quantization – Block Truncation Coding – Transform Coding – DCT and Wavelet – JPEG, MPEG Standards – Concepts of Context based Compression.

**Total: 45**

### TEXT BOOKS

1. Rafael C. Gonzalez, Richard E.Woods, “Digital Image Processing”, 2<sup>nd</sup> Edition, Pearson Education, Inc., 2004.
2. Anil K. Jain, “Fundamentals of Digital Image Processing”, Prentice Hall of India, 2002.

### REFERENCES

1. David Salomon, “Data Compression - The Complete Reference”, 2<sup>nd</sup> Edition, Springer Verlag, 2001.
2. Rafael C. Gonzalez, Richard E.Woods, Steven Eddins, “Digital Image Processing using MATLAB”, Pearson Education, Inc., 2004.
3. William K.Pratt, “Digital Image Processing”, John Wiley,2002.
4. Milman Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, 2<sup>nd</sup> Edition, Brooks/Cole, Vikas Publishing House, 1999.
5. Sid Ahmed, M.A., “Image Processing Theory, Algorithms and Architectures”, McGrawHill, 1995.

**UNIT I BASIC LEARNING ALGORITHMS 9**

Biological Neuron – Artificial Neural Model – Types of Activation Functions – Architecture – Feed Forward and Feedback – Learning Process – Error Correction Learning – Memory Based Learning – Hebbian Learning – Competitive Learning – Boltzman Learning – Supervised and Unsupervised Learning – Learning Tasks – Pattern Space– Weight Space – Pattern Association – Pattern Recognition – Function Approximation – Control – Filtering – Beam forming – Memory – Adaptation – Statistical Learning Theory – Single Layer Perceptron – Perceptron Learning Algorithm– Perceptron Convergence Theorem – Least Mean Square Learning Algorithm – Multilayer Perceptron – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm

**UNIT II RADIAL BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES 9**

Cover’s Theorem on the Separability of Patterns – Exact Interpolator – Regularization Theory – Generalized Radial Basis Function Networks – Learning in Radial Basis Function Networks – Applications – XOR Problem – Image Classification

**SUPPORT VECTOR MACHINES**

Optimal Hyperplane for Linearly Separable Patterns and Nonseparable Patterns – Support Vector Machine for Pattern Recognition – XOR Problem –  $\square$ -insensitive Loss Function – Support Vector Machines for Nonlinear Regression

**UNIT III COMMITTEE MACHINES 9**

Ensemble Averaging – Boosting – Associative Gaussian Mixture Model – Hierarchical Mixture of Experts Model (HME) – Model Selection using a Standard Decision Tree – Apriori and Posteriori Probabilities – Maximum Likelihood Estimation – Learning Strategies for the HME Model – EM Algorithm – Applications of EM Algorithm to HME Model

**NEURODYNAMICS SYSTEMS**

Dynamical Systems – Attractors and Stability – Non-linear Dynamical Systems – Lyapunov Stability – Neurodynamical Systems – The Cohen–Grossberg Theorem

**UNIT IV ATTRACTOR NEURAL NETWORKS 9**

Associative Learning – Attractor Neural Network Associative Memory – Linear Associative Memory – Hopfield Network – Content Addressable Memory – Strange Attractors and Chaos – Error Performance of Hopfield Networks – Applications of Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional Associative Memory – BAM Stability Analysis – Error Correction in BAMs – Memory Annihilation of Structured Maps in BAMS – Continuous BAMs – Adaptive BAMs – Applications

**ADAPTIVE RESONANCE THEORY**

Noise – Saturation Dilemma – Solving Noise – Saturation Dilemma – Recurrent On-center – Off-surround Networks – Building Blocks of Adaptive Resonance – Substrate of Resonance Structural Details of Resonance Model – Adaptive Resonance Theory – Applications

**UNIT V      SELF ORGANISING MAPS****9**

Self-organizing Map – Maximal Eigenvector Filtering – Sanger’s Rule – Generalized Learning Law – Competitive Learning – Vector Quantization – Mexican Hat Networks – Self-organizing Feature Maps – Applications PULSED NEURON MODELS – Spiking Neuron Model – Integrate-and-Fire Neurons– Conductance Based Models – Computing with Spiking Neurons

**Total: 45****TEXT BOOKS**

1. Satish Kumar, “Neural Networks, A Classroom Approach”, Tata McGraw -Hill, 2004.
2. Simon Haykin, “Neural Networks, A Comprehensive Foundation”, 2nd Edition, Addison Wesley Longman,2001.

**REFERENCES**

1. Martin T.Hagan, Howard B. Demuth and Mark Beale, “Neural Network Design”, Thomson Learning, 2003.
2. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications and Programming Techniques”, Pearson Education, 2003.

## AN5005 – ASIC DESIGN

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### **UNIT I      FUNDAMENTALS OF ASICS, CMOS LOGIC AND ASIC LIBRARY DESIGN      9**

Types of ASICs - Design flow – CMOS Transistors CMOS Design Rules – Combinational Logic Cell – Sequential Logic cell – Data path Logic Cell – Transistors as Resistors – Transistor Parasitic Capacitance – Logical effort – Library Cell Design – Library Architecture .

### **UNIT II      PROGRAMMABLE ASICS – PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS      9**

Anti fuse – Static RAM – EPROM and EEPROM technology – PREP benchmarks – Actel ACT – Xilinx LCA – Altera FLEX – Altera MAX DC and AC inputs and outputs – Clock and Power inputs – Xilinx I/O blocks.

### **UNIT III      PROGRAMMABLE ASIC INTERCONNECT, DESIGN SOFTWARE AND LOW LEVEL DESIGN ENTRY      9**

Actel ACT –Xilinx LCA – Xilinx EPLD – Altera MAX 5000 and 7000 – Altera MAX 9000 – Altera FLEX –Design Systems – Logic Synthesis – Half gate ASIC –Schematic entry – Low level design language – PLA tools – EDIF – CFI design representation

### **UNIT IV      LOGIC SYNTHESIS - SIMULATION AND TESTING      9**

Verilog and Logic Synthesis - VHDL and Logic Synthesis - Types of Simulation -Boundary Scan Test - Fault simulation - Automatic Test Pattern Generation.

### **UNIT V      ASIC CONSTRUCTION - FLOOR PLANNING - PLACEMENT AND ROUTING      9**

System partition – FPGA partitioning – Partitioning methods – Floor planning – placement – Physical Design Flow – Global Routing – Detailed Routing – Special Routing – Circuit extraction – DRC.

**Total: 45**

### **TEXT BOOKS**

1. M. J. S. Smith, “Application Specific Integrated Circuits”, Addison, Wesley Longman Inc.,1997.

### **REFERENCES**

1. Farzad Nekoogar and Faranak Nekoogar, “From ASICs to SOCs – A Practical Approach”, Prentice Hall PTR, 2003.
2. Wayne Wolf, “FPGA–Based System Design”, Prentice Hall PTR, 2004.
3. R. Rajsuman, “System–on-a-Chip Design and Test”, Santa Clara, CA, Artech HousePublishers, 2000.
4. F. Nekoogar, “Timing Verification of Application-Specific Integrated Circuits (ASICs)”, Prentice Hall PTR, 1999.

**UNIT I EMBEDDED ARCHITECTURE 9**

Embedded Computers – Characteristics of Embedded Computing Applications – Challenges in Embedded Computing system design – Embedded system design process – Requirements – Specification – Architectural Design – Designing Hardware and Software Components – System Integration – Formalism for System Design – Structural Description – Behavioral Description – Design Example – Model Train Controller

**UNIT II EMBEDDED PROCESSOR AND COMPUTING PLATFORM 9**

ARM processor – Processor and Memory Organization – Data Operations – Flow of Control – SHARC processor – Memory Organization – Data Operations – Flow of Control – Parallelism with Instructions – CPU Bus Configuration – ARM Bus – SHARC Bus – Memory Devices – Input/output Devices – Component Interfacing – Designing with Microprocessor Development and Debugging – Design Example – Alarm Clock

**UNIT III NETWORKS 9**

Distributed Embedded Architecture – Hardware and Software Architectures – Networks for Embedded Systems – I2C – CAN Bus – SHARC link ports – Ethernet – Myrinet – Internet – Network –Based Design – Communication Analysis – System Performance Analysis – Hardware Platform Design – Allocation and Scheduling – Design Example – Elevator Controller

**UNIT IV REAL –TIME CHARACTERISTICS 9**

Clock Driven Approach – Weighted Round Robin Approach – Priority Driven Approach – Dynamic Versus Static Systems – Effective Release – times and deadlines – Optimality of the Earliest Deadline First (EDF) Algorithm – Challenges in Validating Timing Constraints in priority driven systems – Off–line Versus On–line Scheduling

**UNIT V SYSTEM DESIGN TECHNIQUES 9**

Design Methodologies – Requirement Analysis – Specification – System Analysis and Architecture Design – Quality Assurance – Design Example – Telephone PBX – System Architecture – Ink jet printer – Hardware Design and Software Design – Personal Digital Assistants – Set–top Boxes.

**Total: 45****TEXT BOOKS**

1. Wayne Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Morgan Kaufman Publishers, 2001.
2. Frank Vahid and Tony Givargi, “Embedded System Design - A Unified Hardware/Software Introduction”, John Wiley & Sons, 2000.

**REFERENCES**

1. Jane W.S. Liu, “Real -Time systems”, Pearson Education Asia, 2000
2. C. M. Krishna and K. G. Shin, “Real -Time Systems”, McGraw Hill, 1997

## DC5001 – HIGH SPEED SWITCHING ARCHITECTURE

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### UNIT I HIGH SPEED NETWORK 9

Fundamentals – LAN – WAN – Network evolution through ISDN to B –ISDN – Transfer Mode and control of B–ISDN – SDH Multiplexing Structure – ATM standard – ATM Adaptation Layers

### UNIT II LAN SWITCHING TECHNOLOGY 9

Switching Concepts – Switch forwarding techniques – Switch path control – LAN Switching – Cut through forwarding – Store and forward – Virtual LANs

### UNIT III ATM SWITCHING ARCHITECTURE 9

Switch Model – Blocking Networks – Basic and Enhanced Banyan Networks – Sorting Networks – Merge Sorting – Re–arrangable Networks – Full and Partial Connection Networks – Non–blocking Networks – Recursive Network Construction – Comparison of Non–blocking Network – Switching with Deflection Routing – Shuffle Switch – Tandem Banyan

### UNIT IV QUEUES IN ATM SWITCHES 9

Internal Queuing – input–output and shared queuing – Multiple Queuing Networks – Combined Input – Output and Shared Queuing – Performance Analysis of Queued Switches

### UNIT V IP SWITCHING 9

Addressing Model – IP Switching Types – Flow Driven and Topology Driven Solutions – IP over ATM address and next hop resolution – Multicasting – Ipv6 over ATM

**Total: 45**

### TEXT BOOKS

1. Achille Pattavina, “Switching Theory - Architectures and Performance in Broadband ATM networks”, John Wiley and Sons Ltd., , 1998.
2. Rainer Handel, Manfred N Huber and Stefan Schroder, “ATM Networks Concepts Protocols-Applications”, 3<sup>rd</sup> Edition, Addison Wesley, , 1999.

### REFERENCES

1. Christopher Y Metz, “Switching protocols and Architectures”, McGraw Hill Professional Publishing”, 1998.



## CO5006 – SPEECH AND AUDIO SIGNAL PROCESSING

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### UNIT I MECHANICS OF SPEECH 9

Speech Production Mechanism – Nature of Speech Signal – Discrete time Modelling of Speech Production – Representation of Speech signals – Classification of Speech Sounds – Phones – Phonemes – Phonetic and Phonemic Alphabets – Articulatory features – Music production – Auditory perception – Anatomical pathways from the ear to the perception of sound – Peripheral auditory system – Psycho acoustics

### UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time Domain Parameters of Speech Signal – Methods for extracting the Parameters – Energy – Average Magnitude – Zero Crossing Rate – Silence Discrimination using ZCR and Energy – Short Time Auto Correlation Function – Pitch Period Estimation using Auto Correlation Function

### UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING 9

Short Time Fourier Analysis – Filter Bank Analysis – Formant Extraction – Pitch Extraction – Analysis by Synthesis – Analysis Synthesis Systems – Phase vocoder – Channel Vocoder – Homomorphic Speech Analysis – Cepstral Analysis of Speech – Formant and Pitch Estimation – Homomorphic Vocoders

### UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH 9

Formulation of Linear Prediction problem in Time Domain – Basic Principle – Auto correlation Method – Covariance Method – Solution of LPC equations – Cholesky Method – Durbin's Recursive Algorithm – Lattice formation and solutions – Comparison of different methods – Application of LPC parameters – Pitch detection using LPC Parameters – Formant Analysis – VELP – CELP

### UNIT V APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING 9

Algorithms – Spectral Estimation – Dynamic Time Warping – hidden Markov model – Music analysis – Pitch Detection – Feature analysis for recognition – Music synthesis – Automatic Speech Recognition – Feature Extraction for ASR – Deterministic Sequence Recognition – Statistical Sequence Recognition – ASR systems – Speaker Identification and Verification – Voice Response System – Speech Synthesis – Text to Speech – Voice over IP.

**Total: 45**

### TEXT BOOKS

1. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing", John Wiley and Sons, 2004
2. L. R. Rabiner and R.W.Schaffer, "Digital Processing of Speech signals", Prentice Hall, 1978.

### REFERENCES

1. Quatieri, "Discrete -time Speech Signal Processing", Prentice Hall, 2001.
2. J. L. Flanagan, "Speech analysis - Synthesis and Perception", 2<sup>nd</sup> Edition, Berlin, 1972.
3. I. H. Witten, "Principles of Computer Speech", Academic Press, 1982.

# CO5010 – COMMUNICATION NETWORK SECURITY

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## **UNIT I SYMMETRIC CIPHERS (Techniques and Standards) I 9**

Fundamentals - Services – Mechanisms and Attacks – OSI security Architecture – Model for network Security – Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines – Steganography – Block Ciphers and Data Encryption Standard – Simplified DES – Block Cipher Principles – Data Encryption Standard – Strength of DES – Differential and Linear Cryptanalysis – Block Cipher Design Principles – Block Cipher Modes of Operation.

## **UNIT II SYMMETRIC CIPHERS (Techniques and Standards) II 9**

Advanced Encryption Standard – Evaluation Criteria for AES – AES Cipher – Contemporary Symmetric Ciphers – Triple DES – Blowfish – RC5 – Characteristics of Advanced Symmetric Block Ciphers – RC4 – Stream Cipher – Confidentiality using Symmetric Encryption – Placement of Encryption Function – Traffic Confidentiality – Key Distribution – and Random Number Generation

## **UNIT III PUBLIC KEY ENCRYPTION AND HASH FUNCTIONS 9**

Public Key Cryptography and RSA – Principles of Public Key Cryptosystems – RSA Algorithm – Key Management and other public key cryptosystems – Key Management – Diffie–Hellman Key Exchange – Elliptic Curve arithmetic – Elliptic Curve Cryptography – Message Authentication and Hash Functions – Authentication Requirements – Authentication Functions – Message Authentication Codes – Hash Functions and MACs – Hash Algorithms – MD5 Message Digest Algorithm – Secure Hash Algorithm – RIPEMD 160 – HMAC – Digital Signatures and Authentication Protocols – Digital Signatures – Authentication Protocols – Digital Signature Standards

## **UNIT IV NETWORK SECURITY PRACTICE 9**

Authentication Applications – Kerberos – X.509 Authentication Service – Electronic Mail Security – Pretty Good Privacy – S/MIME – IP Security – IP Security Overview – IP Security Architecture – Authentication Header – Encapsulating Security Payload – Combining Security Associations – Web Security – Web Security Considerations – Secure Sockets Layer and Transport Layer Security – Secure Electronic Transaction

## **UNIT V SYSTEM SECURITY 9**

Intruders – Intruder Detection – Password Management – Malicious Software – Virus and Related Threats – Virus Counter Measures – Firewalls – Firewall Design Principles – Trusted Systems

**Total: 45**

## **TEXT BOOK**

1. William Stallings, “Cryptography and Network Security”, 3<sup>rd</sup> Edition, Prentice Hall of India, 2004.

## **REFERENCES**

1. William Stallings, “Network Security Essentials”, 2<sup>nd</sup> Edition, Prentice Hall of India, 2004
2. Charlie Kaufman, “Network Security - Private Communication in Public World”, 2<sup>nd</sup> Edition, Prentice Hall of India, 2004.

# CS5104 – SOFTWARE ENGINEERING METHODOLOGIES

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## **UNIT I SOFTWARE PLANNING 9**

A Generic View of Processes – Process Maturity – Process Models – Agile Process and Models – Software Cost Estimation – Risk Analysis – Software Project Planning & Scheduling

## **UNIT II REQUIREMENT ANALYSIS 9**

System Engineering Hierarchy – Requirement Engineering – Tasks – Initiating the Process – Eliciting Requirements – Developing Use Cases – Negotiating Requirements – Validating Requirements – Building the Analysis Models – Concepts – Object Oriented Analysis – Scenario Based Modeling – Data and Control Flow Oriented Model – Class Based Model – Behavioral Model

## **UNIT III SOFTWARE DESIGN 9**

Design Concepts – Design Models – Pattern Based Design – Architectural Design – Component Level Design – Class Based and Conventional Components Design – Real-time System Design – User Interface – Analysis And Design

## **UNIT IV SOFTWARE TESTING 9**

Software Testing – Strategies – Issues – Test Strategies For Conventional And Object Oriented Software – Validation and System Testing – Testing Tactics – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Object Oriented Testing – Testing GUI – Testing Client/Server – Test Documentation

## **UNIT V SOFTWARE QUALITY ASSURANCE 9**

Software Quality Concepts – Quality Assurance – Software Technical Reviews – Formal Approach To Software Quality Assurance – Reliability – Quality Standards – Software Quality Assurance Plan – Software Maintenance – Software Configuration Management – Reverse Engineering and Reengineering – Use of CASE Tools

**Total: 45**

### **TEXT BOOK**

1. Roger S. Pressman., “Software Engineering, A Practitioner’s Approach”, 6<sup>th</sup> Edition, McGraw Hill, 2005.

### **REFERENCES**

1. Sommerville, “Software Engineering”, 5<sup>th</sup> Edition, Addison Wesley, 1996.
2. Pankaj Jalote, “An Integrated Approach to Software Engineering”, Springer Verlag, 1997.
3. James F. Peters and Witold Pedrycz, “Software Engineering - An Engineering Approach”, John Wiley and Sons, 2000.
4. Fairely, “Software Engineering Concepts”, McGraw Hill, 1995.

## CS5004 – DISTRIBUTED COMPUTING

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### UNIT I BASIC CONCEPTS 9

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies

### UNIT II PROCESSES AND DISTRIBUTED OBJECTS 9

Inter-process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study

### UNIT III OPERATING SYSTEM ISSUES I 9

The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System

### UNIT IV OPERATING SYSTEM ISSUES II 9

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems

### UNIT V DISTRIBUTED TRANSACTION PROCESSING 9

Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems

**Total: 45**

### TEXT BOOKS

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, 3<sup>rd</sup> Edition, Pearson Education, 2002.
2. Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems, “Principles and Paradigms”, Pearson Education, 2002.

### REFERENCES

1. Sape Mullender, “Distributed Systems”, 2<sup>nd</sup> Edition, Addison Wesley, 1993.
2. Albert Fleishman, Distributed Systems, “Software Design and Implementation”, Springer, Verlag, 1994.
3. M. L. Liu, “Distributed Computing Principles and Applications”, Pearson Education, 2004.
4. Mugesh Singhal, Niranjana G Shivaratri, “Advanced Concepts in Operating Systems”, Tata McGraw Hill Edition, 2001.

## CS5006 – XML AND WEB SERVICES

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### UNIT I INTRODUCTION 9

Role of XML – XML and The Web – XML Language Basics – SOAP – Web Services – Revolutions of XML – Service Oriented Architecture (SOA)

### UNIT II XML TECHNOLOGY 9

XML – Name Spaces – Structuring with Schemas and DTD – Presentation Techniques – Transformation – XML infrastructure

### UNIT III SOAP 9

Overview of SOAP – HTTP – XML – RPC – SOAP – Protocol – Message Structure – Intermediaries – Actors – Design Patterns and Faults – SOAP with attachments

### UNIT IV WEB SERVICES 9

Overview – Architecture – Key Technologies – UDDI – WSDL – ebXML – SOAP and Web Services in E-Com – Overview of .NET And J2EE

### UNIT V XML SECURITY 9

Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Digital Signature – XKMS Structure – Guidelines for Signing XML Documents – XML in Practice

**Total: 45**

### TEXT BOOKS

1. Frank P. Coyle, “XML Web Services and the Data Revolution”, Pearson Education, 2002.
2. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, “Developing Java Web Services”, Wiley Publishing Inc., 2004.

### REFERENCES

1. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services”, Pearson Education, 2004.
2. McGovern et al., “Java Web Services Architecture”, Morgan Kaufmann Publishers, 2005.

## CS5151 – DATABASE TECHNOLOGY

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### **UNIT I DATA BASE SYSTEM CONCEPT 9**

File Systems – Database Systems – Database Systems Architecture – Data models – Relational model – Hierarchical model – Network model – Entity–Relationship model – Data Dictionary – Database Administration and control

### **UNIT II RELATIONAL DATABASES 9**

Codd's rules – Base tables – Views – Domains and Key concept – Integrity rules – Relational Algebra – Relational Calculus – Commercial Query Languages – Embedded SQL – Normalization and Database design

### **UNIT III DATABASE SYSTEM DESIGN 9**

File and Storage Structures – Indexing and Hashing – Query Processing – Database Recovery – Concurrency Control – Transaction Processing – Security and Integrity – Triggers

### **UNIT IV DISTRIBUTED DATABASES 9**

Centralized versus distributed databases – Fragmentation – Distributed Database Architecture – Client / Server Databases – Distributed Transactions – Locking and Commit protocols – Distributed Concurrency Control – Security and Reliability – Parallel databases

### **UNIT V ADVANCED DATABASES 9**

The World Wide Web – Object oriented database – Object Relational database – XML – XML/QL – Data Analysis and OLAP – Data mining – Data warehousing.

**Total: 45**

### **TEXT BOOKS**

1. Abraham Silberschatz, Henry. F. Korth and S.Sudharsan, “Database System Concepts”, 4th Edition, Tata McGraw Hill, 2002.
2. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, 3rd Edition, Addison Wesley, 2004.

### **REFERENCES**

1. Jim Buyens, “Step by Step Web Database Development”, PHI, 2001.
2. Stefano Ceri and Giuesppe Pelagatti, “Distributed Databases - Principles and Systems”, McGraw Hill Book Company, 1987
3. C. J. Date, “An Introduction to Database system”, 7<sup>th</sup> Edition, Pearson Education, 2003.

