

CURRICULUM AND SYLLABUS (R2015)

CHOICE BASED CREDIT SYSTEM

M.TECH-DIGITAL COMMUNICATION AND NETWORKING

(FULL TIME)

I – IV SEMESTERS

| SEMESTER I | | | | | | |
|------------|--------|---|---|---|---|---|
| S.NO | CODE | SUBJECT NAME | L | T | P | C |
| 1 | MMA101 | Applied Mathematics for Electronics Engineers | 3 | 1 | 0 | 4 |
| 2 | MDC102 | Modern Digital Communication System | 3 | 0 | 0 | 3 |
| 3 | MAE102 | Advanced Digital System Design | 3 | 0 | 0 | 3 |
| 4 | MDC101 | Optical Communication | 3 | 0 | 0 | 3 |
| 5 | MDC1E1 | Elective-I | 3 | 0 | 0 | 3 |
| 6 | MDC1L1 | Communication Lab | 0 | 0 | 4 | 2 |
| | | TOTAL CONTACT HOURS - 23 | | | | |

Total Credits: 18

SEMESTER II

| | | | | | | |
|---|--------|---|---|---|---|---|
| 1 | MDC201 | Cellular Mobile Communication | 3 | 0 | 0 | 3 |
| 2 | MDC203 | High Performance Communication Networks | 3 | 0 | 0 | 3 |
| 3 | MDC201 | Satellite Communication | 3 | 0 | 0 | 3 |
| 4 | MDC2E2 | Elective – II | 3 | 0 | 0 | 3 |
| 5 | MDC2E3 | Elective-III | 3 | 0 | 0 | 3 |
| 6 | MDC2L2 | Networking Lab | 0 | 0 | 4 | 2 |
| | | TOTAL CONTACT HOURS - 22 | | | | |

Total Credits: 17

SEMESTER III

| | | | | | | |
|---|--------|---------------------------------|---|---|----|---|
| 1 | MDC3E4 | Elective – IV | 3 | 0 | 0 | 3 |
| 2 | MDC3E5 | Elective – V | 3 | 0 | 0 | 3 |
| 3 | MDC3E6 | Elective – VI | 3 | 0 | 0 | 3 |
| 4 | MDC3P1 | Project Work Phase I | 0 | 0 | 12 | 6 |
| | | TOTAL CONTACT HOURS - 21 | | | | |

Total Credits: 15

SEMESTER IV

| | | | | | | |
|---|--------|---------------------------------|---|---|----|-----------|
| 4 | MDC4P2 | Project Work Phase II | 0 | 0 | 24 | 12 |
| | | TOTAL CONTACT HOURS - 24 | | | | 12 |

Total Credits: 62

LIST OF ELECTIVES

| | | | | | | |
|---|--------|---|---|---|---|---|
| 1 | MDC001 | Digital Communication Receivers | 3 | 0 | 0 | 3 |
| 2 | MDC002 | Blue Tooth Technology | 3 | 0 | 0 | 3 |
| 3 | MDC003 | Microwave Integrated Circuits | 3 | 0 | 0 | 3 |
| 4 | MDC004 | Network Management Protocols and Remote Monitoring | 3 | 0 | 0 | 3 |
| 5 | MAE202 | Computer Architecture and Parallel Processing | 3 | 0 | 0 | 3 |
| 6 | MAE101 | Advanced Digital Signal Processing | 3 | 0 | 0 | 3 |
| 7 | MAE004 | Electromagnetic Interference and compatibility in System Design | 3 | 0 | 0 | 3 |
| 8 | MAE006 | Artificial Intelligence and Expert System | 3 | 0 | 0 | 3 |
| 9 | MDC005 | Global Tracking and Positioning System | 3 | 0 | 0 | 3 |

| | | | | | | |
|----|--------|--|---|---|---|---|
| 10 | MDC006 | Network Design Security and Management | 3 | 0 | 0 | 3 |
| 11 | MDC007 | RF System Design | 3 | 0 | 0 | 3 |
| 12 | MDC008 | Switching System for Communication | 3 | 0 | 0 | 3 |
| 13 | MDC009 | Radar Systems and Navigational Aids | 3 | 0 | 0 | 3 |
| 14 | MDC010 | Internet Working Multimedia | 3 | 0 | 0 | 3 |
| 15 | MDC011 | Advanced Radiation Systems | 3 | 0 | 0 | 3 |
| 16 | | Research Methodology | 3 | 0 | 0 | 3 |

| | | | | | | | | |
|--|---|---|------------------------|----------------------------|--------------------|---|----------|----------|
| MMA101 | APPLIED MATHEMATICS FOR ELECTRONIC ENGINEERS | | | | L | T | P | C |
| | Total Contact Hours:60 | | | | 3 | 1 | 0 | 4 |
| | Prerequisite: ENGINEERING MATHEMATICS | | | | | | | |
| | Course Designed by : Dept of Mathematics | | | | | | | |
| OBJECTIVES | | | | | | | | |
| To apply all taught techniques to unseen problems, and queuing is a major branch of optimization, Random variable compute and interpret means, correlation/covariance, PERT and CPM chart is mainly used for documenting the data(visually) on projects. | | | | | | | | |
| COURSE OUTCOMES (COs) | | | | | | | | |
| CO1 | The student will learn to analyse and solve the fundamental problems with prescribed conditions in simple cases. | | | | | | | |
| CO2 | The student will learn to understand how signals, systems, inference combine in prototypical tasks of communication. | | | | | | | |
| CO3 | The student will learn to manipulate matrices and to do matrix algebra, determinants, eigen values Eigen vectors and to solve the system of linear equations. | | | | | | | |
| CO4 | The student will learn to understand how signals, systems, control. | | | | | | | |
| CO5 | The student will learn to understand how signals, systems, signal processing. | | | | | | | |
| Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low | | | | | | | | |
| 1 | COs/Pos | a | b | c | d | E | | |
| 2 | CO1 | H | | | | | | |
| | CO2 | | M | | | | | |
| | CO3 | H | | | | | | |
| | CO4 | | | M | | | | |
| | CO5 | | | | L | | | |
| 3 | Category | Professional Mathematics (PM) | Professional Core (PC) | Professional Elective (PE) | Open Elective (OE) | Project/ Term Paper Seminar/ Internship (PR) | | |
| | | | √ | | | | | |
| 4 | Approval | 37 th , 38 th & 39 th Meeting of Academic Council, May 2015, Jan 2016 & April 2016 | | | | | | |

UNIT I ONE DIMENSIONAL RANDOM VARIABLES 12

Random variables and their functions - Probability function – moments – moment generating functions and their properties – Binomial, Poisson, Exponential, Gamma, Weibull and Normal distributions.

UNIT II MATRIX THEORY 12

Eigen values using QR Transformations generalized eigenvectors – Canonical forms, singular valued composition and application – matrix norms and induced norms Psuedo inverse – least square approximations

UNIT III SPECIAL FUNCTIONS 12

Bessel's Equation- Bessel Functions- Legendre's Equation- Legendre Polynomials- Rodrigue's Formula- Recurrence Relations- Generating Functions and Orthogonal Property for Bessel Function of the First Kind.

UNIT IV OPERATIONS RESEARCH 12

Network Definitions – Minimal Spanning Tree algorithm – Shortest Route Problem – Maximal Flow model – Minimum Cost Capacitated Flow Problem – CPM and PERT.

UNIT V QUEUING THEORY 12

Single and Multiple Server Markovain Queuing Models – Customer Impatience Priority Queues M/g / I Queuing System –Queuing Applications.

TEXT BOOKS:

1. Handy A.Taha., “Operations Research An Introduction”, 7th Edn. Pearson Education , Chennai-113. 2002.
2. Donald Gross and Carl M. Harris, “Fundamentals of Queuing Theory”, 2nd Edn.
3. Wiley India Pvt Ltd, New Delhi.

REFERENCE BOOKS:

1. Freund J.D. and Miller JR “Probability Statistics for Engineers” Prentice Hall of India, 5th Edition, New Delhi. 1994.
2. Gupta.SC and Kapoor V.K. “Fundamentals of Mathematics Statistics“ Sultan Chand & Sons, New Delhi.
3. Stewart G.W. “Introduction to Matrix Computaions“ Academic Press, New York.

MDC102 MODERN DIGITAL COMMUNICATION SYSTEMS 3 0 0 3

Course Objectives:

- To manipulate across various number system.
- To compute binary arithmetic operations.
- To design combinational and sequential circuits using gates.

- To give exposure to digital logic families and PLDs.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Recall the different number systems.

CO2: Demonstrate the simplification of Boolean expressions using Boolean algebra & K-Map method.

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CO3: Analyze the Combinational building blocks & Memory elements. **CO4:** Develop a state diagram and simplify the given sequential logic.

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CO5: Summarize the different programmable logic devices & digital logic families.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | S | | | | | | | | | | | |
| CO2 | S | S | | | | | | | | | | |
| CO3 | M | M | W | | | | | | | | | |
| CO4 | M | | M | | S | | | | | | | |
| CO5 | S | M | M | | | | | | | | | |

UNIT I INTRODUCTION

8

Elements of a digital communication system. An overview of source coding techniques for analog sources : temporal waveform coding. Spectral waveform coding model based source coding. Channel capacity & coding : channel models and channel capacity achieving channel with orthogonal signals.

UNIT II LINEAR BLOCKS CODES

10

The generator matrix & the parity check matrix. Example of linear block codes Cyclic codes. Hard decision and soft decision decoding of block codes. Performance Comparison of the above two schemes. Convolutional Codes: Transfer function of a conventional code. Optimum decoding of convolutional codes the viterbi Algorithm , Probability of error for soft decision and hard decision decoding schemes. Practical considerations on the application of convolutional codes : coded modulation for bandwidth – constrained codes : coded modulation for bandwidth – constrained channels.

UNIT III BASE BAND TRANSMISSION

10

Characterisation of band limited channels. Signal design for band limited channels. Nyquist criterion for zero ISI. Partial response signaling, design of band limited signals with controlled ISI, data detection for controlled ISI. Signal design for channels with distortion. Optimum receivers for channel with ISI and AWGN. Equalisation : Linear , Decision feedback equalization. Adaptive linear equalizer, Adaptive decision feedback.

UNIT IV DIGITAL MODES**10**

Principles of modern techniques. Power efficient modems. Review of ASK, FSK, PSK, QPSK, MSK and OMSK schemes. Constant envelope and non constant envelope modulation schemes. Power efficient modulation techniques and their receiver structure. Probability of error for binary modulation schemes.

UNIT V SPREAD SPECTRUM COMMUNICATION**7**

Model of spread spectrum digital communication system. Direct sequence spread spectrum signals – some application. Effect of pulse interference on DS spread spectrum systems. Generation of PN sequence. Frequency hopped spread spectrum signals. CDMA system based on F + 1 spread spectrum signals. Other types of spread spectrum signals. Synchronisation of spread spectrum signals.

Total periods: 45**TEXT BOOKS:**

1. J. G. PROAKIS: Digital communication 4th Edition. Mcgraw Hill, 2001.
2. K. FEHER. Wireless Digital Communication, P. H. New Delhi, 1995.

MAE102**ADVANCED DIGITAL SYSTEM DESIGN****3 0 0 3****Course Objectives**

The students will be able to design, simulate, built and debug complex combinational and sequential circuits based on an abstract functional specification.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1:This subject covers the basics of digital logic circuits and design.

CO2:Through the basic understanding of Boolean Algebra and Number systems,it introduces the student to the fundamentals of combination logic design and then to sequential circuits(both synchronous and asynchronous).

CO3:Memory systems are also covered.

CO3:There is an introduction to VHDL.

CO4:Students will be provided with an opportunity to implement the PLD based designs(using both schematic capture and VHDL) in actual chips.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | S | M | | | | | | | | | | |
| CO2 | S | M | W | W | | | | | | | | |
| CO3 | S | S | | | | | | | | | | |
| CO4 | S | M | M | | | | | | | | | |
| CO5 | M | W | | | | | | | | | | |

UNIT-1 ADVANCED TOPICS IN BOOLEAN ALGEBRA**9**

Shannon's expansion theorem, Consensus theorem, Octal designation, Run measure, INHIBIT/INCLUSION/AOI/Driver /Buffer gates ,Gate expander, Reed Muller expansion,

Synthesis of multiple output combinational logic circuits by product map method ,Design of static hazard free and dynamic hazard free logic circuits.

UNIT-II THRESHOLD LOGIC

9

Linear separability, Unateness, Physical implementation, Dual comparability, reduced function, various theorems in threshold logic, Synthesis of single gate and multigate threshold Network

UNIT-III SYMMETRIC FUNCTIONS

9

Elementary symmetric functions, partially symmetric and totally symmetric functions, Mc Cluskey decomposition method, Unity ratio symmetric ratio functions, Symmetric ratio functions, Synthesis function by contact networks

UNIT-IV SEQUENTIAL LOGIC CIRCUITS

9

Mealy machine, Moore Machine, Trivial/ Reversible /Isomorphic sequential machines, state diagrams, State table minimization incompletely specified sequential machines ,State assignments ,Design of synchronous and asynchronous sequential logic circuits working in the fundamental mode and pulse mode, Essential Hazards.

UNIT-V PROGRAMMABLE LOGIC DEVICES

9

Basic concepts, Programming technologies, Programmable Logic Element (PLE),Programmable Logic Array(PLA),System Design using PLD's-Design of combinational and sequential circuits using PLD's(CPLD).Programming PAL device using PALSAM ,Design of state machine using Algorithmic State Machines (ASM) chart as a design tool, Introduction to Field Programmable Gate Arrays –Types of FPGA, Xilinx XC 3000 series, Logic Cell Array (LCA),Configurable Logic Blocks(CLB) INPUT/OUTPUT Block(IOB)-Programmable Interconnect Point (PIP),Introduction to Actel AACT2 FAMILY AND XILINX XC 4000 families ,Design examples.

Total Periods:45

References:

1. William I.Fletcher, “An Engineering Approach to Digital Design”, PrenticeHall of India.
2. James E.Palmer, David E.Perlman, “Introduction to Digital Systems”, Tata Mc Graw Hill, 1996.
3. N.N.Biswas, “Logic Design Theory “, Prentice Hall of India, 1993
S.Devadas, A.Ghosh and K.Keutzer, “Logic Synthesis”, McGraw Hill, 1994.

MDC101 OPTICAL COMMUNICATION

3 0 0 3

Course Objective:

- Develop the fundamental knowledge about the need for biasing and its various methods.
- Analyze the small signal equivalents circuits and high frequency analysis of BJT and FET.
- Examine the characteristics of multistage amplifiers.
- Classify and compare the types of large signal amplifier.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Discuss the concepts of various biasing methods for BJT.

CO2: Analyze the BJT configurations and BJT amplifiers using small signal model.

CO3: Analyze the FET Biasing concepts, FET and MOSFET amplifier small signal analysis.

CO4: Analyze the frequency response of BJT, FET and multistage amplifiers

CO5: Explain the classification and performance of large signal amplifiers.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | W | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | W | | | | | | | | | | |
| CO5 | M | W | W | | | | | | | | | |

UNIT I INTRODUCTION TO OPTICAL FIBRES

9

Evolution of Fiber Optics System – Element of an Optical Fiber Transmission Links – Ray Optics – Optical Fiber modes and configuration – mode theory of circular wave Guides – Overview of model Concept – Linearly Polarized modes – single Mode Fiber – Graded Index Fiber structure.

UNIT II SIGNAL DEGRADATION IN OPTICAL FIBERS

9

Attenuation – Absorption losses Scattering losses, bending Losses, Core Cladding losses. Signal distortion in Optical Fibers, information capacity determination – group delay – material dispersion, wave guide dispersion, signal distortion in SM Fibers – polarization mode dispersion intermodal dispersion – pulse broadening in GI Fibers – mode coupling – design optimization of SM Fibers RI profiles and cut off wavelength.

UNIT III FIBER OPTICAL SOURCE

9

Direct and indirect bandgap materials – LED structures – Light source materials – quantum efficiency and LED power. Modulation of an LED, Laser diodes – Modes and Threshold condition – rate equations – external quantum efficiency – Resonant frequencies – Laser diode structures and radiation patterns – single mode lasers – modulation of Laser diodes, Temperature effects, introduction to quantum laser, fiber amplifiers.

UNIT IV FIBER OPTICAL RECEIVERS

9

PIN AND APD Diodes – Photo detector noise, SNR, detector response time, Avalanche Multiplication noise – Comparison of Photo detectors – Fundamental Receiver Operation – Pre-Amplifier – Error sources – Receiver configuration – Probability of error quantum limit.

UNIT V DIGITAL TRANSMISSION SYSTEM

9

Point to Point links – System Consideration – Fiber Splicing and Connectors – link power budget – risetime budget – noise effect on system performance – operation principles of WDM, solutions.

Total Period : 45

Text Book:

1.Gerd Keiser, “Optical Fiber Communication” McGraw Hill International, Singapore, 3rd edition. 2000.

References:

- 1.J.Senior, “Optical communication, Principles and Practice” , Prentice Hall of India. 1994.
- 2.J Gower, “Optical Communication System” Prentice Hall of India. 2001

MDC1LI**COMMUNICATION LAB****0042****Course Objectives:**

- Analyze the operation of LEDs, laser diodes, and PIN photodetectors (spectral properties, bandwidth, and circuits) and apply in optical systems.
- Explain the principles of, compare and contrast single- and multi-mode optical fiber characteristics. 3. Analyze and design optical communication and fiber optic sensor systems.
- Design, build, and demonstrate optical fiber experiments in the laboratory.
- Locate, read, and discuss current technical literature dealing with optical fiber systems.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Understand the basic principles of fiber amplifiers

CO2: Be able to perform bit error rate testing and to understand how it is limited by system Impairments and how to optimize system performance.

CO3: Be able to quickly assemble a fiber optic link, including source, receiver, and Propagation medium and understand its main performance limitations.

CO4: Determine the appropriateness of the choice of the ICs used in a given digital circuit.

CO5: Understand how to perform eye-diagram measurements and how to utilize this to understand system jitter, intersymbol interference, and signal-to-noise ratio.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | S | | | | | | | | M | M | | |
| CO2 | M | | M | | | | | | M | M | | |
| CO3 | M | | S | | | | | | M | M | | |
| CO4 | | | M | W | | | | | M | M | | |
| CO5 | | | | M | | | | | M | M | | |

MDC1L1**LIST OF EXPERIMENTS**

- 1.Bpsk Generation And Detection
- 2.Bfsk Generation And Detection
- 3.Study Of Pll Using Ne565.
- 4.Fm Detection Using Pll

5. Two Channel Analog Tdm
6. Pcm Generation
7. Flat Top Sampling.
8. Pwm & Ppm Generation.

MDC201 CELLULAR MOBILE COMMUNICATION

3 0 0 3

Course objectives:

- Be acquainted with the role of cellular and mobile communications in frequency management issues.
- Be acquainted with different interference factors influencing cellular and mobile communications.
- Be able to efficiently use the background behind developing different path loss and/or radio coverage in cellular environment.

Course Outcomes:

After successful completion of this course, the students should be able to

- CO1:** Apply the cellular concepts to evaluate the signal reception performance in a cellular network.
- CO2:** Apply the traffic analysis to design cellular network with given quality of service constraints.
- CO3:** Determine the type and appropriate model of wireless fading channel based on the system parameters and the property of the wireless medium.
- CO4:** Analyse and design receiver and transmitter diversity techniques.
- CO5:** Determine the appropriate transceiver design of multi-antenna systems and evaluate the data rate performance.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | S | M | M | | M | | | | | | | |
| CO2 | M | M | | M | M | | | | | | | |
| CO3 | S | | M | M | S | | | | | | | |
| CO4 | S | M | M | M | S | | | | | | | |
| CO5 | M | M | | M | M | | | | | | | |

UNIT I INTRODUCTION TO WIRELESS MOBILE COMMUNICATIONS 9

Histry and evolution of mobile radio systems. Types of mobile wireless services / system – 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-I BASIC OF NETWORKS | 9 |
| Telephone, computer, cable Television and Wireless network, Networking principles, Digitalization , service integration, network services, and layered Architecture, traffic characterization and QOS, networks services, network elements and network mechanisms | |
| UNIT-II PACKET SWITCHED NETWORKS | 9 |
| CSI and IP models: Ethernet (IEEE 802.3), token ring (IEEE 802.5) FDDL, DQDB, frame relay, SMDS, internet working with SMDS | |
| UNIT-III INTERNET AND TCP/IP NETWORKS | 9 |
| Overview , internet protocol , TCP and VDP, performance of TCP/IP networks circuit switched networks , SONET , DWDM, Fibre to home ,DSL, Intelligent networks, CATV. | |
| UNIT-IV ATM AND WIRELESS NETWORKS | 9 |
| Main features- addressing , signaling and routing , ATM header structure- adaptation layer, management and control, BISDN, Interworking with ATM, Wireless channel, link level design, channel access, Network design and wireless networks. | |
| UNIT-V OPTICAL NETWORKS AND SWITCHING | 9 |
| Optical links- WDM systems, cross –connects, optical LAN'S, optical paths and networks, TDS and SDS, modular switch designs- packet switching , distributed, shared, input and output buffers | |

Total Periods:45

TEXT BOOKS:

1. Jean Warland and Pravin Varaiya, High Performance Communication Networks, 2nd Edition , Harcourt and Morgan Kauffman , London, 2000
2. Leon Gracia, Widjaja , Communication networks, Tata McGraw Hill, New Delhi. 2000
3. Sumit Kaseera, Pankaj sethi, ATM Networks, Tata McGraw Hill, New Delhi 2000.
4. Behrouz. a. Forouzan ,Data communication and Networking , Tata McGraw Hill, New Delhi, 2000.

MDC201 SATELLITE COMMUNICATION 3 0 0 3

Course Objectives:

- To provide an in-depth understanding of satellite communication technologies. To know the tools necessary for the calculation of basic parameters in a satellite communication system.
- To have an exposure to orbital mechanics, launching techniques and satellite link design.
- To analyze the different satellite access system.
- To understand GPS technology.

Course Outcomes:

After successful completion of this course, the students should be able to

- CO1:** To able to design satellite links- transmitter and receiver design.
- CO2:** To be able to design various satellite access techniques.
- CO3:** To be able to design and implement GPS systems applications
- CO4:** Specify systems design for satellite communications
- CO5:** Analyse the performance of satellite communications systems

| CO/PO Mapping | |
|---|-------------------------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | |
| COs | Programme Outcomes(POs) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | M | W | | | M | | | | | | | |
| CO2 | M | | | M | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | S | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I

ORBITAL PARAMETERS

9

Orbital parameters, Orbital – Perturbations, Geo Stationary Orbits. Low Earth and medium Earth Orbits. Frequency Selection, Frequency Co-ordination and regulatory services. Sun transit outages, Limits of Visibility, Attitude and Orientation control. Spin Stabilization Techniques, Gimbal Platform.

UNIT II LINK CALCULATIONS

9

Space Craft Configuration, Payload and Supporting Subsystems. Satellite up link – down link, Link power Budget, C / NO , G / T , Noise Temperature. System Noise, Propagation factors, Rain and Ice Effects, Polarization Calculations.

UNIT III ACCESS TECHNIQUES

9

Modulation and Multiplexing : Voice, Data, Video, Analog and Digital Transmission Systems, Multiple Access Techniques : FDMA, TDMA, T1-T2 Carrier systems, SPADE, SS-TDMA, CDMA, Assignment Methods. Spread Spectrum Communication, Compression – Encryption and Decryption techniques.

UNIT IV EARTH STATION PARAMETERS

9

Earth station location, Propagation effect of ground, High Power Transmitter – Klystron, Crossed Field devices, Receivers: Low Noise front end amplifiers, MIC Devices, Antenna: Reflector Antennas, Cassergranian feeds. Measurements on G/T and Eb/No.

UNIT V SATELLITE APPLICATION

9

INTELSAT Series, INSAT, VSAT, Remote Sensing, Service: GSM, GPS, INMARSAT, Satellite Navigation system, Direct to homes Service (DTH), Special Service : E-Mail, Video Conferencing and internet Connectivity.

Total Periods:45

Text Books:

1. Bruce R. Elberi, “The Satellite Communication Application Hand Book” , Artech House, Boston, 1997.
 2. Wilbur L. Pritchurd, Hendri Suyderwood G. Robert A. Nelson, “Satellite Communication System Engineering” , II Edition, Prentice Hall , New Jersey, 1993.
 3. Dennis Rody, “Satellite Communication” , Regents / Prentice Hall, Englewood cliffs, New Jersey, 1989.
 4. Tri T. Ha, “Digital Satellite Communication”, 2nd Edition McGraw Hill, New York, 1990.
- Feher K. “Digital Communication Satellite Earth Station Engineering” , Prentice Hall, Inc New Jercy, 1983.

MDC2L2

NETWORKING LAB

0042

Course Objective:

- To understand the functioning of various protocols in Wired and Wireless Environment.
- To perform real time experimentation using the existing infrastructure.

- To impart programming skill using NS2/QUALNET.
- Gain knowledge to construct LAN, WLAN, and VLAN in a real-time environment.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Ability to design MAC and routing protocols in Wired and Wireless Environment using NS2/QUALNET.

CO 2:To acquire the technical competence to meet out the industry expectation on the state – of the art wired / wireless technologies.

CO3: To acquire the ability to design WLAN/ LAN systems meeting out real time requirements.

CO 4:To understand and be able to explain security and ethical issues in computer networking.

CO5:. To be able to implement key networking algorithms in simulation.

| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | S | | | | | | | |
| CO2 | S | | | W | | | | | | | | |
| CO3 | S | | | M | | M | | | | | | |
| CO4 | S | M | | | | | | | | | | |
| CO5 | M | | M | | | | | | | | | |

LIST OF EXPERIMENTS:

1. Implement a simple TCP client – server where in a server acts as a time and date server.
2. Print a client address at server end.
3. Write a program in which a process is made to handle posix signals.
4. Program an echo UDP server.
5. Create a daemon.
6. Create a simple chat program.
7. Create a simple out of band sending and receiving program.
8. Program to capture each packet and examine its checksum fields.

MDC3P1 PROJRCTWORK PHASE-I

00126

Course Objectives:

- Develop hardware solutions for simple applications.
- Learn to work in a team.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Apply knowledge of basic science and engineering to electronics and communication

engineering problems.

CO2: Identify, formulate simple problem statements and find solutions.

CO3: Implement the hardware and test.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | S | M | M | | | | | | | | | |
| CO2 | | S | M | M | | | | | | | | |
| CO3 | | | S | M | | | | | | | | |

Every student will be required to undertake a suitable project work in the Department during VI semester in consultation with the Head of the Department and the faculty guide and submit the project at the end of the Semester on dates announced by the Institute/Department.

MDC3P1 PROJRCTWORK PHASE-II

0 0 24 12

Course Objectives:

- Learn to work as a member of a project team.
- Understand project management tasks.
- Develop a hardware / software solution for a real-time, industry relevant problem.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Apply knowledge of basic science and engineering to electronics and communication engineering problems

CO2: Recognize the real world applications and to solve with core engineering knowledge.

CO3: Analyze and work on multidisciplinary tasks

CO4: Choose latest tools, software and equipment to solve real world problems

CO5: Identify, formulate, and model engineering equipment

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | S | M | M | | | | | | | | | |
| CO2 | | S | M | M | | | | | | | | |
| CO3 | | M | M | S | S | | | | | | | |
| CO4 | | | S | S | M | | | | | | | |
| CO5 | | | | S | S | | | | | M | M | |

| | | | | | | | | | | | | |
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Every student will be required to undertake a suitable project work in Industry / Department during VIII semester in consultation with the Head of the Department and the faculty guide and submit the project at the end of the Semester on dates announced by the Institute/Department.

MDC001 DIGITAL COMMUNICATION RECEIVERS 3 0 0 3

Course Objectives:

- To understand the building blocks of digital communication system.
- To prepare mathematical background for communication signal analysis.
- To understand and analyze the signal flow in a digital communication system
- To analyze error performance of a digital communication system in presence of noise and other interferences.
- To understand concept of spread spectrum communication system.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.

CO2: Perform the time and frequency domain analysis of the signals in a digital

CO3: Communication system. Select the blocks in a design of digital communication system.

CO4: Analyze Performance of spread spectrum communication system.

| CO/PO Mapping | | | | | | | | | | | | |
|---|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I REVIEW OF DIGITAL COMMUNICATION TECHNIQUES 9

Base band and band pass communication, Signal Space representation, Linear and Non Linear Modulation Techniques and spectral characteristics of digital modulation.

UNIT II OPTIMUM RECEIVERS FOR AWGM CHANNELS 9

Correlation demodulator, matched filter, maximum likelihood sequence detector, optimum receiver for CPM Signals. M-ray orthogonal signals, envelope detectors for M- Ray and correlated binary signals.

UNIT III RECEIVERS FOR FADING CHANNELS 9

Characterization of fading multiple channels, statistical models, slow fading, frequency selective fading, diversity technique. RAKI: demodulator, coded waveform for fading channel.

UNIT IV SYNCHRONIZATION TECHNIQUES 9

Carrier and signal synchronization, carrier phase estimation – PLL, decision director loops symbol timing estimation, maximum likelihood and non decision director timing estimation, joint estimation.

UNIT V ADAPTIVE EQUALIZATION

9

Zero facing Algorithm, LMS Algorithm, Adaptive decision – feedback equalizer and equalization of Trellis – coded signals. Kaiman Algorithm, Blind equalizers and Stochastics gradient algorithm, echo cancellation.

Total Periods : 45

Reference:

1. Heinrich Meyer, Mare Moeneclacy, Stefan A. Fechtel, “Digital Communication Receivers” Vol I and Vol II, John wiley, New York, 1997
2. John. G. Proakis, “Digital Communication” 4th Edition, McGraw-Hill, New York, 2001
3. E. A. Lee and D. G. Messerschmitt, “Digital Communication” , 2nd Edition, Allied Publishers, New Delhi, 1994
4. Simon Marvin, “Digital Communication over Fading Channel : An Unified approach to performance analysis” , John wiley, New York, 2000

MDC002

BLUETOOTH TECHNOLOGY

3 0 0 3

Course Objectives:

- The students will learn how Bluetooth devices operate in the frequency band where other devices operate including wireless LAN, microwave ovens, Cordless telephones, Wireless video cameras and others.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Graduates will demonstrate the ability to identify, formulate and solve engineering problems

CO2: Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.

CO3 Graduates will demonstrate the ability to visualize and work on laboratory and multidisciplinary tasks.

CO 4 Graduate will demonstrate the skills to use modern engineering tools, software’s and equipment to analyze problems. j) Graduate will develop confidence for self education and ability for life-long learning.

CO5 Graduates will show the ability to participate and try to succeed in competitive examinations

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

Origin, blue tooth sig, protocol stack, security, applications and profiles, management, test and qualification and technology basics, RF and IR wireless communication

UNIT-II BLUETOOTHMODULE

9

Antennas patterns, gain and losses : types of antennas: on chip antennas radio interface: Fh modulation symbol timing, power emission and control , performance parameters, Rf Architecture, Blur R f, based band: blue tooth device address system timing, physical links, packet, structuring types and construction ,channel coding and time base synchronisation

UNIT-III LINK CONTROLLER AND MANAGEMENT

9

Lep, controller states, pico net and scattered operations, master/slave role switching Lc Architectural overview, Lmc<Link set up , quality of service, Lmp version, name represent, test mode

UNIT-IV BLUETOOTH HOST

9

LIC and adaptation protocol L2cap signaling : connection; Bluetooth profiles, version 1.0 , generic profiles, serial and object exchange

UNIT-V SECURITY

9

Encryption and security key genetration, security mode and architecture, low power operation and Qos management

Total Periods:45

References:

1. 1. Bluetooth connect without cables Jenniffer Bray and C. F. Stuntman pearson education 2001
2. Bluetooth reveled: Brent A. Miller and C. Bisdikian, pearson education 2001
3. Bluetooth Demystified Nathan J. Miller Tata Mc graw Hill 2001

MDC003 MICROWAVE INTEGRATED CIRCUITS

3 0 0 3

Course Objectives:

- Understand microwave distributed circuit elements.
- Understand RF and Microwave circuit elements.
- Understand microwave circuit analysis techniques.
- Understand transmission line circuits and Microstrip lines.
- Understand S-parameters and network characterization techniques.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Ability to apply knowledge of advanced principles to the analysis of electrical engineering problems.

CO2: Ability to apply knowledge of advanced techniques to the design of electrical engineering systems.

CO3: Ability to apply the appropriate industry practices, emerging technologies, state-of-the-art design techniques, software tools, and research methods of solving electrical engineering problems.

CO4: Ability to learn new subjects that are required to solve problems in industry without Being dependent on a classroom environment.

CO5: Ability to be competitive in the engineering job market or be admitted to an excellent Ph. D. program.

| CO/PO Mapping | |
|--|-------------------------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | |
| COs | Programme Outcomes(POs) |

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I MICROSTRIPS LINES, DESIGN, ANALYSIS

9

Introduction, types of MICs and their technology, Propagating modes, Analysis of MIC by conformal transformation, Numerical analysis, Hybrid mode analysis losses in Microstrip. Introduction to slot line and coplanar wave guide.

UNIT II COUPLED MICROSTRIP, DIRECTIONAL COUPLERS AND LUMPED ELEMENTS FOR MICs

9

Introduction to coupled Microstrip, Even and odd mode analysis, Directional couplers, branch line couplers, Design and Fabrication of Lumped elements for MICs, Comparison with distributed circuits.

UNIT III NON-RECIPROCAL COMPONENTS AND ACTIVE DEVICES FOR MICs

9

Ferromagnetic substrates and insert, Microstrip circulation, Phase shifter, Microwave transistor, Parameter diodes and Amplifiers, PIN Diodes. Transferred electron devices. IMPATT, BARITT, Avalanche diodes, Microwave transistor circuits.

UNIT IV MICROSTRIP CIRCUIT DESIGN AND APPLICATION

9

Introduction, Impedance transformers, Filters, High Power Circuits, Low Power Circuits, MICs in satellite and Radar.

UNIT V MMIC TECHNOLOGY

9

Fabrication process of MMIC, Hybrid MICs, Configuration Dielectric substances, thick and thinfilm technology, testing methods, Encapsulation and mounting of devices.

Total Period : 45

REFERENCE:

1. Huffman R. K "Hand book of Microwave Integrated Circuits" , Artech House Boston 1989
2. Guta K. C. S Amarjit singh "MIC" John Willey , New York, 1975

MDC004 NETWORK MANAGENENT PROTOCOLS AND REMOTE MONITORING

3 0 0 3

Course Objectives:

- The objective of the course is to provide basics of network management.
- Appreciate the need for interoperable network management
- Understand general concepts and architecture behind standards based network management Understand concepts and terminology associated with SNMP and TMN
- Appreciate network management as a typical distributed application Get a feeling of current trends in network management technologies
- Understand Advanced Information Processing Techniques such as Distributed Object Technologies, Software Agen

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Simple Network Management

- CO2:** Remote Network Monitoring in TCP/IP Networks
CO3: Advanced Management of TCP/IP Networks
CO4: Management of Telecommunication Networks
CO5: Internet Technologies for Converged Networks Management

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I NETWORK MANAGEMENT FUNDAMENTALS

9

Network monitoring-Network control

UNIT II SNMP I

9

SNMP network management concepts SNMP management information standard MIBBS-Simple network managements protocol

UNIT III RMON

9

Remote network monitoring, Statistics collection – remote network monitoring – Alarms and filters – RMONS2

UNIT IV SNMP-3

9

Management information protocol MIBs and conformance

UNIT V SNMP-3

9

Cryptographic Algorithms Architecture and Application – Manage Processing and user based security models – View based access control model – TCP/IP protocol suite – TCP/IP standards

Total Periods : 45

References:

1. “Network Management protocols and Remote Monitoring”, William Stalling, 3rd Edition, Pearson Education

MAE202 COMPUTER ARCHITECTURE AND PARALLEL PROCESSING 3 0 0 3

Course Objectives:

- To learn the parallel models and processors
- Pipelining and scalable architectures
- To learn the multithread and data flow architecture

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: An ability to understand the operations of multiprocessor and multicomputer systems.

CO 2:To understand the various advanced processor technology, pipelining and scalable architectures.

CO 3:To know the working of superscalar pipeline, cache memory organization.

CO 4:To understand the principles of multithreading, multithread architecture.

CO5: Static and dynamic data flow.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I THEORY OF PARALLELISM – PART I

8

Parallel computer models – the state of computing. Multiprocessors and multicomputer and Multivectors and SIMD computers, PRAM and VLSI mode Architectural development tracks. Program and network properties conditions of parallelism.

UNIT II THEORY OF PARALLELISM – PART – II

7

Program portioning and scheduling, Program flow mechanism, System interconnect Architectures, Principles of scalable performance – performance matrices and measures, parallel processing application speedup performance laws, scalability analysis and approaches.

UNIT III HARDWARE TECHNOLOGIES

10

Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory – backplane bus systems, cache memory organization, shared memory organization, sequential and weak consistency model.

UNIT IV PIPELINING AND SUPERSCALAR TECHNOLOGIES

10

Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and SSIMD computers, Scalable, Multithreaded and data flow architectures.

UNIT V SOFTWARE AND PARALLEL PROGRAMMING

10

Parallel Models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF / 1 for parallel computers.

Total Periods: 45

Reference:

1. Kai Hwang, “Advanced Computer Architecture” , McGraw Hill International, 1993.
2. William Stallings, “Computer Organization and Architecture” , Macmillan Publishing Company, 1990.
3. M. J. Quinn, “Designing Efficient Algorithms for Parallel Computer,” McGraw Hill International 1994.

MAE101

ADVANCED DIGITAL SIGNAL PROCESSING

3 0 0 3

Course Objectives:

- Sampling, aliasing and the relationship between discrete and continuous signals

- Review of Fourier transforms, the Z-transform, FIR and IIR filters, and oscillators
- Filter implementation techniques, structures and numerical round-off effects
- Filter design techniques

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Auto-correlation, cross-correlation, and power spectrum estimation techniques

CO2: Linear prediction Wiener filters .

CO3: Multi-rate signal processing and subband transforms.

CO4: Time-frequency analysis, the short time Fourier transform, and wavelet- transforms

CO5: LMS adaptive filters, and applications

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I DISCRETE RANDOM SIGNAL PROCESSING

9

Discrete Random Processing – Expectations – Variance – Co-Variance – Scalar Product – Energy of Discrete Signals – Parseval’s Theorem – Wiener Khintchine Relation – Power Spectral Density – Periodogram – Sample Autocorrelation – Swum Decomposition Theorem – Spectral Factorization Theorem – Discrete Random Signal Processing by Linear Systems – Simulation of White noise – Low Pass Filtering of White Noise.

UNIT II SPECTRUM ESTIMATION

9

Non – Parametric Methods – Correlation Method – Co-Variance Estimator – Performance Analysis of estimation Unbiased – Consistent Estimators – Periodogram Estimator – Barlett Spectrum Estimation – Welch Estimation – model Based Approach – AR, MR, ARMA Signal Modelling – Parameter Estimation Using Yule – Walker Method

UNIT III LINEAR ESTIMATION AND PREDICTION

9

Maximum likelihood criterion – Efficiency of Estimator – Least Mean Square error criterion – Wiener Filter – Discrete Wiener Hoff equation – Recursive estimators – Kalman filter – Linear prediction, Prediction error whitening filter, inverse filter – Levinson recursion, Lattice Realization and Levinson Recursion Algorithm for Solving Toeplitz System of Equations.

UNIT IV ADAPATIVE FILTERS

9

FIR adaptive Filters – Network’s steepest descent method – Adaptive Filter based on Steepest descent method – Widrow Hoff LMS adaptive algorithm – Adaptive Channel Equalization – Adaptive enochocarcellor – Adaptive Noise cancellation – RLS adaptive filter – Exponential Weighted Ris – Sliding Window RLS – Simplified IIRLMS adaptive filter.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING

9

Mathematical description of change of sampling rate – Interpolation and Decimation – Continuous line model direct digital domain approach – Decimation by an integer factor – interpolation by an integer factor – Single and Multistage Realization – Poly phase realization –

Application to sub band coding – Wavelet Transform and Filter bank implementation of wavelet expansion of signals.

Total Periods: 45 Hrs

Text Books:

1. Monson H. hayes, Stastical Digital Signal Processing and Modeling, John Wiley and Sons, Inc., New York, 1996.

References:

1. Sopcles, J. Orfanidis, Optimum Signal Processing, McGraw Hill, 1910.
2. John G. Proakis, Dimitris G. Manolakis, “Digital Signal Processing” Prentice Hall of India, 1995.

MAE004 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY IN SYSTEM DESIGN 3 0 0 3

Course Objectives:

- To familiarize with the fundamentals that are essential for electronics industry in the field of EMI / EMC
- To understand EMI sources and its measurements.
- To understand the various techniques for electromagnetic compatibility

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Real-world EMC design constraints and make appropriate tradeoffs to achieve the most cost-effective design that meets all requirements.

CO 2: Designing electronic systems that function without errors or problems related to electromagnetic compatibility

CO 3: Diagnose and solve basic electromagnetic compatibility problems.

To be able to apply Maxwell’s equations for electromagnetic systems.

CO 4: To able to design systems to mitigate the effects of Electromagnetic Interference.

CO 5 To design systems with Electromagnetic compatibility

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | M | | | | | | | |
| CO2 | M | | | M | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | S | | | | | | | |
| CO5 | M | | | S | | | | | | | | |

UNIT I EMI ENVIRNONMENT

6

Sources of EMI, Conducted and radiated EMI, Transient EMI, EMI – EMC Definition and units of Parameters.

UNIT II EMI COUPLING, PRINCIPLES

9

Conducted, Radiated and Transient coupling, Common impedance ground coupling radiation common mode and ground loop coupling, radiated differential mode coupling near Field, cable to cable Coupling, power mains and power supply coupling.

UNIT III EMI SPECIFICATIONS / STANDARDS / LIMITS 7

Units of specifications civilian standard, military standards.

UNIT IV EMI MEASUREMENTS 7

EMI test instruments / systems, EMI test / EMI shielded chamber, open area test site, TEM cell antennas, conductors sensors / injectors / couplers, military test method and procedures, calibration procedures.

UNIT V EMI CONTROL TECHNIQUES 7

Shielding, filtering, grounding, bonding, isolation transformation, transient suppressor, cable routing, signal control, component selection and mounting.

EMC DESIGN OF PCB'S 9

PCB traces crosstalk, impedance control, power distribution decoupling, zoning, mother board design and propagation delay models.

Total Periods: 45 Hours

Textbooks:

1. Bernard Keiser, "Principles of EMC", Artech House, 3rd, 1986.
2. Henry W. Ott "Noise Techniques in electronics systems" Willey and sons, New York, 1998.
3. B.P Kodali, "Engineering EMC Principles, Measurements and technologies", IEEE Press, 1996.

MAE006 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS 3 0 0 3

Course Objectives:

- AI programs that achieve expert-level competence in solving problems in task areas by bringing to bear a body of knowledge about specific tasks are called knowledge-based or expert systems.
- The term expert systems is reserved for programs whose knowledge base contains the knowledge used by human experts, in contrast to knowledge gathered from textbooks or non-experts.
- More often than not, the two terms, expert systems (ES) and knowledge-based systems (KBS), are used synonymously.
- The area of human intellectual endeavor to be captured in an expert system is called the task domain. Task refers to some goal-oriented, problem-solving activity.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Concepts of Artificial Intelligence and Expert System Concepts. Examine methods that have emerged from both fields

CO 2: Explain the various current mirror circuits and analyze differential amplifier with active load.

CO3: Analyze and design a fuzzy logic system using fuzzy logic tool box.

CO 4: Analyze and design a neural network system using neural network toolbox.

CO 5: Analyze and design a rule-based expert system.

CO/PO Mapping

| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | S | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | S | | | | | | | | |
| CO4 | M | | | | M | | | | | | | |
| CO5 | M | | | M | | | | | | | | |

UNIT-I-INTRODUCTION TO ARTIFICIAL INTELLIGENCE 9

Overview of AI-general concepts- problem spaces and search- Search techniques –BFS, DFS- Heuristic search techniques

UNIT-II KNOWLEDGE REPRESENTATION 9

Knowledge- general concepts – predicate logic – representing simple fact- instance and ISA relationships- Resolution – Natural deduction

UNIT-III KNOWLEDGE ORGANISATION AND MANIPULATION 9

Procedural versus Declaration knowledge – forward vs Backward reasoning- matching techniques- control knowledge/strategies – symbol reasoning under uncertainty- introduction to non –monotonic- reasoning- logic for monotonic reasoning

UNIT-IV PERCEPTION-COMMUNICATION AND EXPERT SYSTEMS 9

Natural language processing – pattern recognition- visual image understanding – Expert system architecture

UNIT-V KNOWLEDGE ACQUISITION 9

Knowledge acquisition- general concepts – learning – learning by introduction- Explanation based learning

Total periods: 45

Text books:

1. Elaine Rich and kelvin Knight, Artificial Intelligence, Tata mcgraw Hill, New Delhi
2. Stuart Russell and peter Norvig , Artificial Intelligence : A modern approach, Prentice Hall,1995

References:

1. Nilson N. J.Principles of Artificial Intelligence ,SpringrVerlag – Bergin,1980.
2. Patrtrson, Introdution of Artificial intelligence and Expert systems prentice Hall of India, New Delhi,1990

MDC005 GLOBAL TRACKING AND POSITIONING SYSTEMS 3

003

Course Objectives:

- There have only been limited analyses on how key parameters vary across various GPS devices.
- To examine the capabilities and accuracy of several commercially-available portable GPS devices.
- To assess their feasibility for human time-activity tracking in air pollution epidemiological studies. When compared to the previous studies, we focus more on challenging locations that often raise problems in studies that need continuous time activity profiles.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Explain the workings of GPS, and understand the acquisition of locational data using the hardware;

CO 2:produce a simple map from field data acquired using hand-held GPS.

CO 3:The candidate shall have an in-depth understanding of satellite positioning and navigation, especially American GPS.

CO4: The candidate shall have obtained ability to work independently and in a team towards relevant research front in Global positioning and navigation systems

CO5: Ability to identify the global positioning satellite data interface and relation with other related disciplines, ability to understand the international perspective of satellite positioning

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | S | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | M | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I INTRODUCTION

9

GPS and GLONASS Overview – Satellite Navigation – Time and GPS – User Position and Velocity Calculations – GPS – Satellite Constellation – Operation Segment – User Receiving Equipment – Spacing Segment Phased Development.

UNIT II SIGNAL CHARACTERISTICS

9

GPS signal component – purpose. Properties and power level – signal acquisition and tracking – Navigation information extraction – pseudorange estimation – frequency estimation – GPS satellite position calculation.

UNIT III GPS RECEIVERS AND DATA ERRORS

9

Receiver Architecture – Receiver design Options – Antenna design – SA errors – Methods of Multipath mitigation – Ephemeris data errors – Clock errors.

UNIT IV DIFFERENTIAL GPS

9

Introduction – LADGPS – WADGPS, Wide area Augmentation Systems – GEO uplink Subsystem – GEO downlink Systems – Geo Orbit Determination – Geometric analysis – covariance analysis – GPS / INS Integration Architectures.

UNIT V GPS APPLICATIONS

9

GPS in Surveying, Mapping and Geographical Information System – Precision Approach Aircraft landing system – military and space application – intelligent transportation system

Total Periods: 45

TEXT BOOKS:

1. Mohinder S. Grewal, Lawrence R. Weill, Angus P. Andrews, “Global Positioning System – Inertial Navigation and Integration”, John Wiley & Son, 2001.
2. E.D. Kaplan, “Understanding GPS Principles and applications”, Arctech house Boston 1996.

Course Objectives:

- Describe and analyze the hardware, software, components of a network and the interrelations.
- Explain networking protocols and their hierarchical relationship hardware and software. Compare protocol models and select appropriate protocols for a particular design.
- Manage multiple operating systems, systems software, network services and security. Evaluate and compare systems software and emerging technologies.
- Develop solutions for networking and security problems, balancing business concerns, technical issues and security.

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: The students shall have knowledge about firewall technologies to secure the network perimeter

CO2: The students shall have knowledge Intrusion Prevention, Configure IPS to mitigate attacks on the network

CO3: The students shall have knowledge secure network management and reporting

CO4: The students shall have knowledge an adaptive security appliance (ASA) firewall technologies to secure the network perimeter.

CO5: The students shall have knowledge site-to-site IP Sec VPNs

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I PRINCIPLES OF NETWORK AND DESIGN 9

Design Objectives – Understanding Networking Environment – Achieving Design Goals – Importance of being predictable and fundamental design principles. Designing the campus LAN – Campus Network Design Goals – Understanding the Campus Network – Designing the LAN Topology – Campus Hierarchical design.

UNIT II DESIGNING THE WAN 9

Designing the WAN topology – Flat versus Hierarchical – Flat WAN Topology – Limitation of a Flat Design – Hierarchical WAN Topology – PVC and Leased Line Aggregation – Issues with Hierarchical design – Hierarchical layers – WAN design Parameters – Choosing the WAN technology - Design consideration for Serial links – Designing IP Over frame relay and ISDN Design issues with IP – Fundamental IP routing design – Designing an IP addressing plan – Categorising IP routing protocol and RIP.

UNIT III SECURITY PROBLEM AND CRYPTOGRAPHY 9

Security attacks – Services and mechanism – conventional and encryption model – Steganography – classical encryption techniques – simplified DES – Block cipher principles – DES Standards – Principles of Public Key Crypto systems –RSA Algorithm – Key management – Diffie Hellman Key Exchange – Authentication codes Hash functions – Kerberos.

UNIT IV NETWORK SECURITY

9

E-Mail Security – Pretty – Good Privacy – S / MIME – IP Security – Overview and Architecture – authentication header – encapsulating security payload – combining security associations – web security requirements SSL-TLS – Secured electronic transactions – intruders – higher wall design principles – trusted systems.

UNIT V NETWORK MANAGEMENT

9

Network management – requirements and systems – network monitoring architecture – performance monitoring – Account monitoring – configuration control – security control – SNMP background and concepts – structure of management information – SNMP protocols – basic concepts – specifications – transport level support – groups.

Total Periods: 45

TEXT BOOKS:

1. Cormac long “IP Network design” tmh 2001.
2. William stallings “cryptography and network security principles and practice” pearson education asia, prentice hall 2004
3. William Stalling SNMP, SNMP V2, SNMP V3, RMON 1 and 2 pearson education asia third edition 2001

REFERENCES:

1. Charles p. pfleeger “security in computing prentice hall, 1989
2. Bruce Schneier “applied cryptography” John Wiley & sons inc. second edition,. 2004.
3. Ed.taylor “networking handbook” tmh, 2000.
4. Mani subramaniam “network management” – principle and practice “Pearson Education Asia”.

MDC007

RF SYSTEM DESIGN

3 0 0 3

Course Objectives:

- To design and analyse basic resonators and RF Filters.
- To study the operation and device characteristics of RF Active components.
- To design and analyze RF transistor amplifier.
- To understand the operation of Oscillators and mixers used in RF design

Course Outcomes:

After successful completion of this course, the students should be able to

CO1:This course provides the foundation for designing and analysis of RF circuits. Through lecture and out-of-class assignments, students are provided learning experiences that enable them to

CO2: To discuss design and analysis of filters and amplifiers.

CO3: To understand the working concepts of RF active components.

CO4: To study the operation of mixers and oscillators.

CO5:Design active RF sub-systems for applications ranging from sensing, measurements and telecommu- nications;

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

| COs | Programme Outcomes(POs) | | | | | | | | | | | |
|-----|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I RF FILTER DESIGN

9

Basic resonator and filter configurations – special filter realization – filter implementation – coupler filter.

UNIT II ACTIVE RF COMPONENTS

9

RF diodes – bipolar junction transistor – RF field effect transistor – high electron mobility transistors – diode models – measurement of active devices – scattering parameter device characterization.

UNIT III MATCHING AND BIASING NETWORKS

9

Impedance matching using discrete components – microstrip line matching, networks – amplifier classes of operation and biasing networks.

UNIT IV RF TRANSISTOR AMPLIFIER DESIGN

9

Characteristics of amplifier – amplifier power relations – stability consideration – constant gain – broadband, high power and multistage amplifiers.

UNIT V OSCILLATORS AND MIXERS

9

Basic oscillator model – high frequency oscillator configuration – basic characteristics of mixer.

Total Period: 45

TEXT BOOK

1. Reinhold Ludwig “RF Circuit Design, theory and application” “Pearson Asia Education”, Edition 2001.

Reference Books:

1. D. POZAR, “Microwave Engineering”, John Wiley & Sons, New York, 1998.
2. Bahil and P. Bharatia “Microwave Solid State Circuit Design, John Wiley & Sons, New York, 1998.

MDC008 SWITCHING SYSTEM FOR COMMUNICATION

3 0 0 3

Course Objectives:

- The course objectives are to provide the student with knowledge of digital network switching and transmission design. These objectives will be achieved by providing students with an understanding of various types of technologies used by telecommunication companies and service provider networks that form the basis of the backbone network.
- Students will be provide with the necessary knowledge to examine the network design principles and concepts that are used to implemented networks by taking into account commercial realities and practices.
- Student capability development includes gaining an understanding of the factors associated with the provision of network services, including an understanding of how network switching and transmission design can impact on the operation of the network.
- **Course Outcomes:**

After successful completion of this course, the students should be able to

CO1: Independently understand basic computer network technology.

CO2: Understand and explain Data Communications System and its components.

CO3: Identify the different types of network topologies and protocols.

CO4: Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer

CO5: Identify the different types of network devices and their functions within a network

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUITS 9

Evolution of Public Switched Telecommunication Networks Stronger Exchange, Crossbar Exchange, Stored Program Exchange, Digital Exchange – Basic Telecommunication Equipments – Telephone Handset, Hybrid Circuit, Echo Suppressors and Cancellers, PCM encoders.

UNIT II ELECTRONIC SWITCHING 9

Circuit switching, Message Switching, Centralized program switching, line switching, Space switching, Combination switching – Digital switching system hardware configuration, switching system software, (organization), A Switching System call processing software. Hardware software integration.

UNIT III TELECOMMUNICATION SIGNALLING AND TRAFFIC 9

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, Concept of Telecommunication traffic, Grade of service, Modeling switching system, Blocking models and delay systems.

UNIT IV INTEGRATED DIGITAL NETWORKS 9

Subscriber loop characteristics, Local access wire line and wireless PCM / TDM carrier standards transmission line codes, Digital multiplexing techniques, Synchronous, Asynchronous, multiplexing techniques, SONHT / SDH, Integrated digital networks (IDN) environment – Principles of Integration Services Digital Network (ISDN) – Cellular Mobile Communication Principles

UNIT V DATA NETWORKS 9

Data transmission in PSTN – Connection oriented and connection less protocols – packet switching – ISO – OSI architecture – Satellite based data networks – Multiple access techniques – LAN, WAN – Standards – TCP / IP – Internet – Principles of ATM networks

Total Periods: 45

Text Books:

1. Viswanathan T, "Telecommunication Switching System and Networks", Prentice Hall of India, Ltd., 1994

2. Behrouz Forouzan, “Introduction to Data Communication and Networking”, McGraw – Hill, 1998

References:

1. L.S. Lawton, “Integrated Digital Networks”, Galgotta Publications Pvt. Ltd., New Delhi, 1996

MDC009 RADAR SYSTEMS AND NAVIGATIONAL AIDS

3 0 0 3

Course Objectives:

- Fundamentals of Radar
- Different types of Radar and their working
- Radar signal Detection technique

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: To become familiar with fundamentals of RADAR

CO2 To gain indepth knowledge about the different types of RADAR and their operations

CO3: Need for signal detection in RADAR and various detection techniques

CO4: To become familiar with RADAR navigation techniques

CO5: Graduates will demonstrate the ability to design a system, component or process as per needs and specifications

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I RADAR EQUATION

9

Radar block diagram and operation: Radar Frequencies, Radar Range equation: Prediction of range performance: minimum detectable signal; Radar cross section of targets, cross section Fluctuation: transmitter power; pulse repetition frequency and range ambiguities: system loss and propagation effects.

UNIT II CW AND FMCW RADAR

9

Doppler effect CW radar – basic principles and operation of FMCW radar, MTI and pulse Doppler radar – MTI Block diagram and description: delay line cancellers: range gated Doppler fitters: non coherent MTI: Pulse Doppler radar. Tracking radars – sequential lobbing: conical scan and simultaneous lobbing mono pulse.

UNIT III SYNTHETIC APERTURE AND AIR SURVEILLANCE RADAR

9

Synthetic radar – resolution: Radar equation: SAR signal processing, inverse SAR. Air Surveillance radar – Users requirements characteristics and frequency considerations

ECCM AND BISTATIC RADAR

Electronic counter measures: bistatic radar – description bistatic radar equation – comparison of monostatic and bistatic radars.

UNIT IV RADAR SIGNAL DETECTION AND PROPAGATION ON WAVES

9

Detection criteria: automatic detection, constant false alarm rate receiver, information available from a radar, earth, refraction, anomalous propagation and diffraction. Introduction to clutter, surface clutter, radar equation.

UNIT V ELECTRONIC NAVIGATION

9

Adcock directional Finder – automatic direction finder – VHF omnidirectional range – hyperbolic system of navigation – Toran and decca navigation system – tactical air navigation. (TACAN) ILS and GCA as aids to approach and landing.

Total Periods: 45

References:

1. M. I. Skolnik, “Introduction to radar system“ – McGraw Hill 2nd edition
2. N. S. Nagaraja, Elements of electronic navigation – Tata McGraw Hill, 1993.
3. NADAV Levanon, Radar Principles – John Wiley and sons 1989
4. Brookner, radar Technology – Artech Hons 1986.

MDC010 INTERNET WORKING MULTIMEDIA

3 0 0 3

Course Objectives:

Internet applications development and Internet programming. As a result of studying the discipline a student must understand and be able to explain the basic concepts and principles for the development of Internet applications and Internet programming

Course Outcomes:

After successful completion of this course, the students should be able to

CO1: Describe different realisations of multimedia tools and the way in which they are used

CO2: analyse the structure of the tools in the light of low-level constraints imposed by the adoption of various QoS schemes (ie bottom up approach)

CO3: analyse the effects of scale and use on both presentation and lowerlevel requirements (ie top down approach)

CO4: plan experiments to test user perception of multimedia tools

CO5:state the properties of different media streams; compare and contrast different multicast protocols Explain the various current mirror circuits and analyze differential amplifier with active load.

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT-I INTRODUCTION

9

Digital sound, basic multimedia networking, multimedia characteristics, evolution of internet services model, network requirements for audio/video transform, multimedia coding and compression for text, image audio and video

UNIT-IISUBNETWORKTECHNOLOGY

9

Broadband services, ATM and IP,IPV6 high speed switching, resource reservation, buffer

management, traffic shaping, caching, scheduling and policing, throughput, delay and jitter performance.

UNIT-III MULTICAST AND TRANSPORT PROTOCOL 9

Multicast over shared media network, multicast routing and addressing, scaping multicast and NBMA Networks, RTP, RTCP.

UNIT-IV MEDIA- ON – DEMAND 9

Storage and media serves, voice and video over IP, MPEG-2 over ATM/IP, Indexing synchronization of requests.

UNIT-V APPLICATIONS 9

MIME, Peer- to – peer computing, shared application , video conferencing, centralized and distributed conference control, light weight session philosophy

Total Periods: 45

Text Books:

1. Jon crow croft, Mark Handley, Ian Wakeman , Internetworking Multimedia, Harcourt Asia Pvt . Ltd. Singapore, 1998
2. B .O. Szuprowicz , Multimedia Networking, McGraw Hill, New York , 1995
3. Tay Vaughan, Multimedia making it to work, 4ed, Tata McGraw Hill, New Delhi, 2000

MDC011 ADVANCED RADIATION SYSTEM 3 0 0 3

Course Objectives:

- Introduction to Radiation Protection
- Interaction of X-Radiation with Matter
- Radiation Quantities and Units
- Radiation Monitoring
- Equipment Design for Radiation Protection

Course Outcomes:

After successful completion of this course, the students should be able to

CO1 Students demonstrate their knowledge of advanced radiation measurements techniques [

CO 2.:Students will communicate in writing their insights into radiation applications

CO3: Explain the various current mirror circuits and analyze differential amplifier with active load.

CO4: Describe the characteristics, linear and non linear application of operational amplifier

CO5:Analyze the internal modules of PLL, Analog Multiplier and review its applications

| CO/PO Mapping | | | | | | | | | | | | |
|--|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | | | | | | |
| COs | Programme Outcomes(POs) | | | | | | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | M | W | | | | | | | | | | |
| CO2 | M | | | | | | | | | | | |
| CO3 | S | M | M | | | | | | | | | |
| CO4 | M | | | | | | | | | | | |
| CO5 | M | | | | | | | | | | | |

UNIT I BASICS CONCEPT OF RADIATION 9

Radiation from surface current and current line current distribution basic antenna parameter, Radiation mechanism – current distribution of antennas, impedance concept – balance, unbalanced transformer.

| | |
|--|----------|
| UNIT II RADIATION FROM APERTURES | 9 |
| Field equivalence principle, Rectangular and circular apertures, uniform distribution on an infinite ground plane aperture fields of horn antenna – Babinet's principle, Geometrical theory of diffraction, reflection antennas, design considerations, slot antennas. | |
| UNIT III SYNTHESIS OF ARRAY ANTENNAS | 9 |
| Types of linear arrays, Current distribution in linear arrays, phased arrays, optimization of array patterns, continuous aperture sources, antenna synthesis techniques. | |
| UNIT IV MICROSTRIP ANTENNAS | 9 |
| Radiation mechanism, feeding structure, rectangular patch, circular patch, ring antenna, input impedance of patch antennas, microstrip dipole, microstrip arrays. | |
| UNIT V EMI / EMC / ANTENNA MEASUREMENTS | 9 |
| Log periodic, Biconical, log spiral ridge guide. Multi turn loop, traveling wave antenna, antenna measurement and instrumentation, amplitude and phase measurements, gain, directivity, impedance and polarization measurements. Antenna range. Design and evaluation. | |

Total Period: 45

References:

1. Kraus. J. D “Antennas”, 2nd edition John Wiley and sons, 1997
2. Balanis. A. “Antenna Theory analysis and design” John Wiley and sons. New York 1982
3. Collin. R. E and Zucker “E” Antenna theory part I McGraw Hill, New York 1969.

RESEARCH METHODOLOGY

Objectives

- To Get adequate knowledge about research concepts
- To describe mathematical modeling and simulation
- To understand experimental modeling
- To get knowledge about the interpretation of result

Course Outcomes after successful completion of this course, the students should be able to

- CO 1:** To describe research concepts.
CO 2: To Get adequate knowledge about mathematical modeling
CO 3: To describe experimental modeling
CO 4: To understand analysis of results.
CO 5: To know about report writing

| CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak | | | | | | | |
|---|-------------------------|-----|-----|-----|-----|-----|-----|
| COs | Programme Outcomes(POs) | | | | | | |
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
| CO 1 | S | M | | | | M | M |
| CO 2 | S | M | | | | M | M |
| CO 3 | S | M | | | | M | M |
| CO 4 | S | M | | | | M | M |
| CO 5 | S | M | | | | M | M |

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|---|--|--|--|--|--|--|--|
| 5 | | | | | | | |
|---|--|--|--|--|--|--|--|

1. RESEARCH CONCEPTS 9

Concepts, meaning, objectives, motivation, types of research, approaches, research (Descriptive research, Conceptual, Theoretical, Applied & Experimental).

Formulation of Research Task – Literature Review, Importance & Methods, Sources, quantification of Cause Effect Relations, Discussions, Field Study, Critical Analysis of Generated Facts, Hypothetical proposals for future development and testing, selection of Research task.

2. MATHEMATICAL MODELING AND SIMULATION 9

Concepts of modeling, Classification of Mathematical Models, Modeling with Ordinary differential Equations, Difference Equations, Partial Differential equations, Graphs, Simulation, Process of formulation of Model based on Simulation.

3 EXPERIMENTAL MODELING 9

Definition of Experimental Design, Examples, and Single factor Experiments, Guidelines for designing experiments. Process Optimization and Designed experiments, Methods for study of response surface, determining optimum combination of factors, Taguchi approach to parameter design.

4 ANALYSIS OF RESULTS 9

Parametric and Non-parametric, descriptive and Inferential data, types of data, collection of data (normal distribution, calculation of correlation coefficient), processing, analysis, error analysis, different methods, analysis of variance, significance of variance, analysis of covariance, multiple regression, testing linearity and non-linearity of model.

5 REPORT WRITING 9

Types of reports, layout of research report, interpretation of results, style manual, layout and format, style of writing, typing, references, tables, figures, conclusion, appendices.

TOTAL: 45

TEXT BOOKS

1. Wilkinson K. L, Bhandarkar P. L, „Formulation of Hypothesis“, Himalaya Publication.
2. Schank Fr., „Theories of Engineering Experiments“, Tata Mc Graw Hill Publication.

REFERENCE BOOKS

1. Douglas Montgomery, “Design of Experiments“, Statistical Consulting Services, 1990.
2. Douglas H. W. Allan, “Statistical Quality Control: An Introduction for Management“, Reinhold Pub Corp, 1959.
3. Cochran and Cocks, “Experimental Design“, John Willy & Sons.
4. John W. Besr and James V. Kahn, „Research in Education“, PHI Publication.
5. Adler and Granovky, “Optimization of Engineering Experiments“, Meer Publication.
6. S. S. Rao, „Optimization Theory and Application“, Wiley Eastern Ltd., New Delhi, 1996.