JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

Course Structure Electronics and Communication Engineering

B. Tech Course
(2013-14)

IV B. Tech – I Sem

S.No.	Course Code	Subject	Theory	Tu	Lab	Credits
1	13A52702	Management Science	3	1	-	3
2	13A04701	VLSI Design	3	1	-	3
3	13A04702	Optical Fiber Communication	3	1	-	3
4	13A04703	Embedded Systems	3	1	-	3
5	13A04704 13A02605 13A04705	Theory-V (CBCC) -2 a. Digital Image Processing b. Neural Networks & Fuzzy Logic c. Spread Spectrum Techniques	3	1	-	3
6	13A04706 13A04707 13A04708	Theory-VI (CBCC) - 3 a. Wireless Communication b. Operating Systems c. Satellite communication	3	1	-	3
7	13A04709	VLSI & Embedded Systems Laboratory	-	-	4	2
8	13A04710	Microwave & Optical Communications Laboratory	-	-	4	2
		Total	**18**	**06**	**08**	**22**

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B.Tech IV-I Sem (E.C.E)	**T**	**Tu**	**C**
	3	**1**	**3**

(13A52702) MANAGEMENT SCIENCE

Course Objective:

The objectives of this course are to equip the student the fundamental knowledge of Management Science and its application to effective management of human resources, materials and operations of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.

Learning outcome:

This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient managerial decisions on physical and human resources of an organization. Besides, the knowledge of Management Science facilitates for his/her personal and professional development.

UNIT I

INTRODUCTION TO MANAGEMENT

Definition of Management- Function of Management- Management as a Science and Art-Management as a Profession- Universality of Management- Henri Faylo's Administrative Theory –Elton Mayo's Human Relations Movement- Systems theory – Contingency theory- Monetary and non-monetary incentives to motivate work teams- Leadership –Definition- Qualities of successful leaders- Different leadership styles.

UNIT II

ORGANIZATION DESIGN AND STRUCTURE

Organization design and structure- Principles—Types of organization structure-Mechanic and Organic Structures- Line organization- Line & Staff organization- Functional Organization – Matrix organization structures- merits and demerits- Departmentation and Decentralization-Power and Authority- Delegation of authority-Principles for effective delegation of authority.

UNIT III

HUMAN RESOURCE AND MATERIALS MANAGEMENT

Concept of HRM-functions – Human Resource Planning-Job Analysis-Recruitment and Selection-Training and Development- Performance appraisal –methods- Wage and Salary Administration-Grievances handling Procedure-Material Management- Need for Inventory control- Economic order quantity- ABC analysis- Management of purchase, stores and stores records.-Marketing Management – Concept- Channels of distribution- Marketing mix and product mix.

UNIT IV

MANAGEMENT OF OPERATIONS & PROJECT MANAGEMENT

Nature of organizational control- Marketing control- HR control- effective control systems- Operations Management- Essentials of operations management- Trends in operational management- Designing operation system for effective management of an organization-Project Management –Network Analysis-PERT and CPM-Project crashing (Simple problems)

UNIT V

CONTEMPORARY MANAGEMENT ISSUES

Strategic Management-Concept- Mission-Vision-Core values-Setting objectives-Corporate planning – Environmental scanning-SWOT analysis- Steps in strategy formulation & implementation- Management

Information System (MIS)- Enterprise Resource Planning (ERP)-Just-in-Time (JIT)- Total Quality Management (TQM) – Supply Chain Management-Six Sigma-Business Process Outsourcing (BPO).

Text Books:

1. *Stoner, Freeman, Gilbert, Management, Pearson, Six Edition 2008*
2. *Aryasri: Management Science, Fourth Edition TMH, 2012.*

Reference Books:

1. Vijay Kumar & Apparo, Introduction to Management Science, Cengage, 2011.
2. Kotler Philip & Keller Kevin Lane: Marketing Management, 14th Edition, Pearson, 2012.
3. Aswathappa, Human Resource Management, Himalaya, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2011.
5. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2012.
6. Joseph M Putti, Management Principles, Mc Millan Publishers, 2012.

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(13A04701) VLSI DESIGN

Course Outcomes:

- Complete Knowledge about Fabrication process of ICs
- Able to design VLSI circuits as per specifications given.
- Capable of optimizing the design of Arithmetic / logic building Blocks at all levels of Design /Fabrication.
- Can implement circuit through various design styles (semi- Custom, Full Custom)

UNIT-I

Introduction: Basic steps of IC fabrication, PMOS, NMOS, CMOS &BiCMOS, SOI process technologies, MOS transistors - MOS transistor switches – Basic gate using switches, working polar transistor Resistors and Capacitors.

Basic Electrical Properties of MOS and BiCMOS Circuits: Working of MOS transistors – threshold voltage; MOS design equations: I_{ds}–V_{ds} relationships, Threshold Voltage, Body effect, Channel length modulation , g_m, g_{ds}, figure of merit ω_0; Pass transistor, NMOS Inverter, CMOS Inverter analysis and design, Various pull ups loads, Bi-CMOS Inverters.

UNIT-II

Basic Circuit Concepts: Capacitance, resistance estimations- Sheet Resistance R_s, MOS Device Capacitances, routing Capacitance, Analytic Inverter Delays, Driving large Capacitive Loads, Fan-inand fan-out.

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-III

Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing

UNIT-IV

Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High Density Memory Elements.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

VHDL Synthesis: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout,Design capture tools, Design Verification Tools.

Test and Testability: Fault-modelling and simulation, test generation, design for testability, Built-inself-test.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, "Essentials of VLSI circuits and systems", PHI, 2013 Edition.
2. K.Lal Kishore and V.S.V. Prabhakar, "VLSI Design", IK Publishers

REFERENCES:

1. Weste and Eshraghian, "Principles of CMOS VLSI Design", Pearson Education, 1999.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
3. John P. Uyemura, "Chip Design for Submicron VLSI: CMOS layout and Simulation", ThomsonLearning.
4. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John wiley, 2003.
5. John M. Rabaey, "Digital Integrated Circuits", PHI, EEE, 1997.

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(13A04702) OPTICAL FIBER COMMUNICATION

Course Outcomes:

- Analyze the performance of both digital and analog optical fiber systems
- Calculate the system bandwidth, noise, probability of error and maximum usable bit rate of adigital fiber system
- Calculate the system link loss, distortion and dynamic range of an RF photonic link
- To perform characteristics of fiber sources and detectors, design as well as conduct experimentin software and hardware, and analyze the results to provide valid conclusions.
- To learn the various optical source materials, LED structure, quantum efficiency, laser diodes.

UNIT-I

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical FiberTransmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of CircularWave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Modefibers-Graded Index fiber structure.

UNIT-II

Signal Degradation Optical fibers: Attenuation – Absorption losses, Scattering losses, BendingLosses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacitydetermination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SMfibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-ModeCoupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT-III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures –Lightsource materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modesand Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensingschemes, Fiber –to- Fiber joints, Fiber splicing.

UNIT-IV

Fiber Optical Receivers : PIN and APD diodes –Photo detector noise, SNR, Detector Response time,Avalanche Multiplication Noise –Comparison of Photo detectors – Fundamental Receiver Operation –preamplifiers, Error Sources –Receiver Configuration – Probability of Error – Quantum Limit.

UNIT-V

System Design and Applications: Design of Analog Systems: system specification, power budget, bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity.

Text Books:

1. Gerd Keiser, "Optical Fiber Communication" McGraw –Hill International, Singapore, 3rd ed.,2000.
2. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.

References:

1. Max Ming-Kang Liu, "Principles and Applications of Optical Communications", TMH, 2010.
2. S.C.Gupta, "Text book on optical fiber communication and its applications", PHI, 2005.
3. Satish Kumar, "Fundamentals of Optical Fiber communications", PHI, 2009.

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(13A04703) EMBEDDED SYSTEMS

Course Outcomes:

- Able to understand the fundamental concepts of embedded systems.
- Able to learn the architecture of Advanced ARM microcontrollers.
- Able to learn the architecture of Advanced MSP430 microcontrollers.
- Able to learn various programming techniques and interfacing using ARM and MSP430.

UNIT I

Embedded system overview, applications, features and architecture considerations - ROM, RAM, timers, data and address bus, I/O interfacing concepts, memory mapped I/O. CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture. Low power RISC MSP430 – block diagram, features and architecture, Instruction set, instruction formats, and various addressing modes of 16-bit microcontroller e.g. MSP430, Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, Sample embedded system on MSP430 microcontroller.

UNIT-II

MSP430x5x series block diagram, address space, on-chip peripherals (analog and digital), and Register sets. I/O ports pull up/down registers concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.

UNIT-III

Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

Case Study: MSP430 based embedded system application using ADC & PWM demonstrating peripheral intelligence. "Remote Controller of Air Conditioner Using MSP430".

UNIT-IV

Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices.

Case Study: MSP430 based embedded system application using the interface protocols for communication with external devices: "A Low-Power Battery less Wireless Temperature and Humidity Sensor with Passive Low Frequency RFID"

UNIT-V

IoT overview and architecture, Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless and Networking applications, Building IoT applications using CC3100 user API for connecting sensors.

Case Study: MSP430 based Embedded Networking Application: "Implementing Wi-Fi Connectivity in a Smart Electric Meter"

Text Books:

1. MSP430 microcontroller basics 1st Edition by John H. Davies (Author), Newnes Publication ISBN-13: 978-0750682763
2. Gettingstarted with the MSP430 Launchpad by Adrian Fernandez, Dung Dang, Newness publication ISBN-13: 978-0124115880
3. Embedded Systems 2E Raj Kamal, Tata McGraw-Hill Education, 2011 ISBN-0070667640, 9780070667648

References:

1. http://processors.wiki.ti.com/index.php/MSP430_LaunchPad_Low_Power_Mode
2.http://processors.wiki.ti.com/index.php/MSP430_16-Bit_Ultra-Low_Power_MCU_Training
3.CC3100/CC3200 SimpleLink™ Wi-Fi® Internet-on-a-Chip User Guide Texas Instruments Literature Number: SWRU368A April 2014–Revised August 2015

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(13A04704) DIGITAL IMAGE PROCESSING
(CBCC-II)

Course Outcomes:

- Able to apply the Image processing concept for various fields of engineering and real life toprocess as per needs &specifications.
- Get the skills to heuristically develop new techniques to process images of any context.
- Can experiment, analyze & interpret imagedata /processing data.

UNIT–I

Introduction to Digital Image processing – Example fields of its usage- Image sensing andAcquisition – image Modeling - Sampling, Quantization and Digital Image representation – Basicrelationships between pixels, - Mathematical tools/ operations applied on images - imaging geometry.

UNIT–II

2D Orthogonal and Unitary Transforms and their properties - Fast Algorithms - Discrete FourierTransform - Discrete Cosine Transforms- Walsh- Hadamard Transforms- Hoteling Transforms ,Comparison of properties of the above.

UNIT–III

Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement infrequency Domain, Image smoothing, Image sharpening, Colour image Enhancement

UNIT–IV

Degradation model, Algebraic approach to restoration – Inverse filtering – Least Mean Square filters,Constrained Least square restoration. Blind DeconvolutionImage segmentation: Edge detection -,Edgelinking, Threshold based segmentation methods – Regionbased Approaches - Template matching –use of motion in segmentation

UNIT–V

Redundancies in Images - Compression models, Information theoretic perspective-Fundamentalcoding theorem. Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Transformcoding, Image Formats and compression standards.

Text Books:

1. R.C .Gonzalez & R.E. Woods, “Digital Image Processing”, Addison Wesley/Pearson education,3rd Edition, 2010.
2. A .K. Jain, “Fundamentals of Digital Image processing”, PHI.

References:

1. Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, “Digital Image processing usingMATLAB”, Tata McGraw Hill, 2010.
2. S jayaraman, S Esakkirajan, T Veerakumar, “Digital Image processing”, Tata McGraw Hill.
3. William K. Pratt, “Digital Image Processing”, John Wilely, 3rd Edition, 2004.

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(13A02605) NEURAL NETWORKS & FUZZY LOGIC
(CBCC-II)

Course Outcome:

After completion of the course the students will be able to

- Get an overview of different types of neural network models.
- Understand the functioning of single; multi-layer feed forward neural networks, associative memories and their rules and algorithms.
- Understand about fundamentals of fuzzy logic, their rules and applications.

UNIT I

Introduction to Neural Networks: Biological neuron, McCulloh-pitts neuron model, Neuron Modellingfor Artificial Neural Systems, Models of Artificial Neural Networks-feed forward and feedbacknetworks, Neural Processing, Learning as approximation, Supervised and unsupervised learning,Neural Network Learning rules- Hebbian, Perceptron, Delta, Widrow-Hoff, Correlation, Winner-Take-All learning rules.

UNIT II

Single-Layer Neural Networks: Classification Model, Features and Decision Regions, DiscriminantFunctions, Linear Machine and Minimum Distance Classification, Training and Classification usingDiscrete Perceptron, Single-Layer Continuous Perceptron Networks, Multicategory Single-LayerPerceptron Networks, Hopfield Network – Discrete-time, Gradient type.Multi-Layer Neural Networks: Linearly Nonseparable Pattern Classification, Delta Learning Rule forMultiperceptron Layer, Generalized Delta Learning Rule, Feed forward Recall and Error Back propagation training, Learning Factors.

UNIT III

Associative Memories: Basic concepts, Linear Associator, Recurrent Auto associate Memory, Performance Analysis of Recurrent Auto associate Memory, Bidirectional Associate Memory (BAM):Memory Architecture, Association Encoding and Decoding, Stability Considerations, MemoryExample and Performance Evaluation, Improved coding of memories, Multidirectional AssociativeMemory, Associative Memory of Spatio-Temporal Patterns.

UNIT IV

Fuzzy Set– Introduction: Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory andoperations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT V

Fuzzy Logic - Fuzzy Membership, Rules: Membership functions, interference in fuzzy logic, fuzzy ifthenrules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, FuzzyController, Industrial applications.

Text Books:

1. JacekM.Zurada," Introdution to Artificial Neural Systems", West Publishing Company
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", Wiley Indian 3rd Edition

Reference Books:

1. George J.Klir/Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and applications", Prentice-HallEdition
2. S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to Neural Networks using MATLAB6.0", TMH, 2006.
3. S.N.Sivanandam, S.Sumathi, S.N.Deepa, "Introduction to Fuzzy Logic using MATLAB 6.0",TMH, 2006
4. Simon Haykins, "Neural Networks", Pearson Education.

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(13A04705) SPREAD SPECTRUM TECHNIQUES
(CBCC-II)

Course Outcomes:
At the end of the course the students should be able to:

- Understand the general concepts of spread spectrum techniques.
- Generate spread spectrum signals through hardware and computer simulations.
- Know various applications of spread spectrum techniques and working operation of CDMA systems of 2G and 3G standards.

UNIT – I
Fundamentals of Spread Spectrum: General concepts, Direct sequence (DS), Bi-phase and quadriphasemodulations, Pseudo noise (PN) signal characteristics, Direct Sequence receiver, FrequencyHopping – transmitter, receiver, Time Hopping, Comparison of modulation methods.

UNIT – II
Analysis of Direct-Sequence & Avoidance type Spread Spectrum Systems: Properties of PN sequences, Properties of m-sequences, Partial Correlation, PN signals from PN sequences, Partialcorrelation of PN signals, Generation of PN signal, Despreading the PN signal, Interference rejection,Output Signal – to – Noise ratio, Antijam characteristics, Interception, Energy and Bandwidthefficiency. The frequency hopped signal, Interference rejection in a Frequency – Hopping receiver,The Time-Hopped Signal.

UNIT – III
Generation and Detection of Spread Spectrum Signals: Shift register sequence generators, Discrete-Frequency Synthesis, Saw device PN generators, Charge coupled devices, Coherent Direct – sequencereceivers, Other methods of carrier tracking, Delay lock loop analysis, Tau-Dither loop, Coherentcarrier tracking, Non-coherent frequency hop receiver, Acquisition of Spread Spectrum Signals,Acquisition by cell-by-cell searching, Reduction of Acquisition time, Acquisition with matched filter,Matched filters for PN sequences, Matched filters for Frequency Hopped signals, Matched filters withacquisition aiding waveforms.

UNIT – IV
Application of Spread Spectrum to Communications: General characteristics of Spread spectrum,Multiple access considerations – number of active users (equal powers), number of active users(unequal powers), bandwidth limited channels, power limited channels, Energy and bandwidthefficiency in multiple access, Selective calling and identification, Antijam

considerations, Jammingdirect-sequence systems, Jamming Frequency – Hopping Systems, Intercept considerations.

UNIT – V

CDMA Digital Cellular Systems: Introduction, Cellular radio concept, CDMA Digital cellular systems,Specific examples of CDMA digital cellular systems based on 2G, and 3G standards and theirtechnical specifications.

TEXT BOOKS:

1. George. R. Cooper and Clare D. McGillem, "Modren Communications and Spread Spectrum",
McGraw – Hill Book Company, 1986.
2. Roger L. Peterson, Rodger E. Ziemer& David E. Borth, "Introduction to Spread Spectrum Communications", McGraw Hill, 2011.

REFERENCES:

1. Dr. KamiloFeher, "Wireless Digital Communications – Modulation & Spread Spectrum Applications", PHI, 1999.
2. T. S. Rappaport, "Wireless Communications – Principles and Practice," PHI, 2001.
3. Simon Haykin, "Communication Systems" 4th edition
4. Andrea Goldsmith "Wireles Communications", Cambridge University Press, 2005

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(13A04706) WIRELESS COMMUNICATION
(CBCC-III)

Course Objective:

- To understand basics of Wireless Communications and its evolution process.
- To learn about the mechanism of radio mobile propagation and its effects.
- To understand various types of diversity and equalization techniques to counter balance the effects of Wireless Channel.
- To Study about importance of Wireless Networking and multiple access techniques in the present day mobile communications
- To design and analyze mobile systems using OFDM technology for mitigating the ISI effects at higher data rates.

Course Outcome:

After completion of this course the students will be able to

- Understand basics of Wireless Communications and its evolution process.
- Know about the mechanism of radio mobile propagation and its effects.
- Apply various types of diversity and equalization techniques to counter balance the effects of Wireless Channel.
- Recognize the importance of Wireless Networking and multiple access techniques in the present day mobile communications
- Analyze and design mobile systems using OFDM technology for mitigating the ISI effects at higher data rates.

UNIT – I

Introduction to Wireless Communication Systems&Cellular Concept:
Evolution of Mobile Radio Communication Systems, Examples of Wireless CommunicationSystems, 1G, 2G, 2.5G, and 3G Wireless Cellular Networks and Standards, Frequency Reuse
Concept, Channel Assignment Strategies, Interference and System Capacity, Trunking andGrade of Service, Improving Coverage and Capacity in Cellular Systems, Problem Solving.

UNIT - II
Mobile Radio Propagation:
Large Scale Path Loss: Introduction, Free Space Propagation Model, PropagationMechanisms – Reflection, Diffraction, and Scattering, Practical Budget Design using PathLoss Models, Outdoor Propagation Models, Indoor Propagation Models.Small Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse ResponseModel of

a Multipath Channel, Small Scale Multipath Measurements, Parameters of MobileChannels, Types of Small Scale Fading (all variations), Statistical Models – Clarke's Modelfor Flat Fading, Jake's Model, Level Crossing Rate, Simulation of Clarke's/Jake's Model,Two Ray Rayleigh Fading Model, Problem Solving.

UNIT - III

Equalization & Diversity Techniques:

Equalization: Survey of Equalization Techniques, Linear and Non-linear Equalizers – Linear Transversal Equalizer, Decision Feedback Equalizer (DFE), Algorithms for AdaptiveEqualization – Zero Forcing, LMS, RLS, Fractionally Spaced Equalizers.Diversity Techniques: Realization of Independent Fading Paths, Receiver Diversity –System Model, Selection Combining, Threshold Combining, Maximal Ratio Combining,Rake receiver, Equal Gain Combining, Transmit Diversity–Channel known at Transmitter,Channel unknown at Transmitter – the Alamouti Scheme, analysis.

UNIT – 1V

Multiple Access Techniques & Networking:

Introduction to Multiple Access: FDMA, TDMA, CDMA, SDMA, Packet Radio, Capacity of Cellular Systems, Problem Solving.

Introduction to Wireless Networking: Introduction to Wireless Networks, Differencesbetween Wireless and Fixed Telephone Networks, Development of Wireless Networks,Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling.

UNIT - V

Multicarrier Modulation:

Data Transmission using Multiple Carriers, Multicarrier Modulation with OverlappingSubchannels, Discrete Implementation of Multicarrier Modulation, The Cyclic Prefix,Orthogonal Frequency Division Multiplexing (OFDM), Matrix Representation of OFDM,Vector Coding, Challenges in Multicarrier Systems, Problem Solving.

References:

1. T. S. Rappaport, "Wireless Communications, Principles and Practice," Prentice Hall, 2nd Edition, 2002
2. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005.
3. David Tse, PramodViswanath, "Fundamentals of Wireless Communications,"Cambridge University Press, 2006.
4. Dr. KamiloFeher, "Wireless Digital Communications," Prentice Hall, 1995.

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(13A04707) OPERATING SYSTEMS
(CBCC-III)

Course Objective:

• To make the students understand the basic operating system concepts such as processes,threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystemsand protection.

• To get acquaintance with the class of abstractions afford by general purpose operating systemsthat aid the development of user applications.

Course Outcome:

•Able to use operating systems effectively.

•Write System and application programs to exploit operating system functionality.

•Add functionality to the exiting operating systems

•Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operatingsystems Operations, protection and security, Kernel data Structures, Computing Environments, Open-Source Operating Systems

Operating System Structure: Operating System Services, User and Operating-System Interface, systemscalls, Types of System Calls, system programs, operating system structure, operating system debugging,System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication,Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicitthreading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson‘s Solution, Synchronization Hardware,Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples,Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-ProcessorScheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of thepage table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-MappedFiles, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlockprevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Diskscheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File systemmounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requeststo Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix,Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Basedsystems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as asecurity tool, User authentication, Implementing security defenses, Firewalling to protect systems andnetworks, Computer–security classifications.

Text Books:

1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Ninth Edition,2012, Wiley.

Reference Books:

1. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, McGraw Hill.
8. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.

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(13A04708) SATELLITE COMMUNICATION
(CBCC-III)

Course Outcomes:

- Students can determine the location of Satellite.
- Students can design Satellite Uplink and Downlink.
- Students can design earth station transmitter, receiver and antenna systems.

UNIT I

INTRODUCTION:

Origin of satellite communications, Historical background, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

ORBITAL MECHANICS AND LAUNCHERS:

Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT II

SATELLITE SUBSYSTEMS:

Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

UNIT III

SATELLITE LINK DESIGN:

Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

MULTIPLE ACCESS:

Frequency division multiple access (FDMA) Inter modulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

UNIT IV

EARTH STATION TECHNOLOGY:

Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS:

Orbit consideration, coverage and frequency considerations, delay and throughput considerations, system considerations, operational NGSO constellation designs

UNIT V

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM:

Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS.

TEXT BOOKS:

1. Satellite communications-Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley publications, 2nd Edition, 2003.
2. Satellite communications Engineering-Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Satellite communications: Design principles-M. Richharia, BS publications, 2nd Edition, 2003.
2. Satellite communications-D.C.Agarwal, Khanna publications, 5th Ed.
3. Fundamentals of Satellite communications-K.N.Rajarao, PHI, 2004.
4. Satellite communications-Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech IV-I sem (E.C.E) **L C**
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(13A04709) VLSI & EMBEDDED SYSTEMS LABORATORY

Note: The students are required to perform any **Six** Experiments from each Part of the following.

Part-A: VLSI Lab

Course Objective:

- *To design and draw the internal structure of the various digital integrated circuits*
- *To develop VHDL/Verilog HDL source code, perform simulation using relevant simulator andanalyze the obtained simulation results using necessary synthesizer.*
- *To verify the logical operations of the digital ICs (Hardware) in the laboratory.*

Course Outcome:

After completion of the course the students will be able to

- *Design and draw the internal structure of the various digital integrated circuits*
- *Develop VHDL/Verilog HDL source code, perform simulation using relevant simulator andanalyze the obtained simulation results using necessary synthesizer.*
- *Verify the logical operations of the digital IC s (Hardware) in the laboratory*

Note: For the following list of experiments students are required to do the following.

- ✓ **Target Device Specifications**
- ✓ **Simulation**
- ✓ **Synthesize the design**
- ✓ **Generate RTL Schematic.**
- ✓ **Generate Technology Map.**
- ✓ **Generate Synthesis report.**
- ✓ **Design Summary.**

List of Experiments:

Note: Use VHDL/ Verilog HDL

1. Realization of Logic Gates.
2. 3- to - 8Decoder- 74138.
3. 8 x 1 Multiplexer-74151 and 2 x 4 De-multiplexer-74155.
4. 4-Bit Comparator-7485.
5. D Flip-Flop-7474.
6. Decade counter-7490.
7. Shift registers-7495.

8. ALU Design.

Part-B: Embedded C Experiments using MSP430:

Course Objective:

- *To develop an algorithm, the flow diagram, source code and perform the compilation*
- *To generate the required binary file which can be dumped into the controller and obtain the respective output control on the connected peripheral.*
- *To verify the logic with the necessary hardware.*

Course Outcome:

After completion of the course the students will be able to

- *Develop an algorithm, the flow diagram, source code and perform the compilation.*
- *Generate the required binary file which can be dumped into the controller and obtain the respective output control on the connected peripheral.*
- *Verify the logic with the necessary hardware.*

1. Learn and understand how to configure MSP-EXP430G2 Launchpad digital I/O pins. Write a C program for configuration of GPIO ports for MSP430 (blinking LEDs, pushbuttons interface).

Exercises:

a) Modify the delay with which the LED blinks.
b) Modify the code to make the green LED blink.
c) Modify the code to make the green and red LEDs blink:
    i. Together
    ii. Alternately
d) Alter the code to turn the LED ON when the button is pressed and OFF when it is released.
e). Alter the code to make the green LED stay ON for around 1 second every time the button is pressed.
f). Alter the code to turn the red LED ON when the button is pressed and the green LED ON when the button is released.

2. **Usage of Low Power Modes:**

Configure the MSP-EXP430G2 Launchpad for Low Power Mode (LPM3) and measure current consumption both in active and low power modes. Use MSPEXP430FR5969 as hardware platform and measure active mode and standby mode current.

Exercises:

a) How many Low power modes are supported by the MSP430G2553 platform?
b) Measure the Active and Standby Current consumption in LPM3 mode for the same application using MSP430F5529 Launchpad

3. Learn and understand GPIO based Interrupt programming. Write a C program and associated GPIO ISR using interrupt programming technique.

Exercises:

a) Write the code to enable a Timer interrupt for the pin P1.1.
b) Write the code to turn on interrupts globally

4. Learn and understand how to configure the PWM and ADC modules of the MSP-EXP430G2 Launchpad to control the DC motor using external analog input.

Exercises:

a) Observe the PWM waveform on a particular pin using CRO.
b) What is the maximum resolution of PWM circuitry in MSP430G2 Launchpad and how it can be achieved using program?
c) Create a PWM signal of 75% duty cycle on particular PWM pin.
d) Create Switch case code from the example code to run the DC Motor in 3 set of speeds.

5. Understand the ULP Advisor capabilities and usage of ULP Advisor to create optimized, power-efficient applications on the MSP-EXP430G2 Launchpad.

Exercises:

a) How does the ULP Advisor software help in designing power-optimized code?
b) Which ULP rule violation helps us to detect a loop counting violation?

6. Understand and Configure 2 MSP430F5529 Launchpads in master-slave communication mode for SPI protocol.

Exercises:

a) Which port pins of MSP430 can be configured for SPI communication?
b) What is the data transfer rate supported by MSP430 for SPI communication?

7. A basic Wi-Fi application: Configure CC3100 Booster Pack connected to MSP430F5529 Launchpad as a Wireless Local Area Network (WLAN) Station to send Email over SMTP.

Exercises:

a) Identify the code that helps in establishing connection over SMTP. Modify the code to trigger E-mail application based upon external analog input.
b) How to configure the AP WLAN parameters and network parameters (IP addresses and DHCP parameters) using CC3100 API.

8. Understand Energy Trace Technology analysis tool that measures and displays the application's energy profile. Compute and measure the total energy of MSP-EXP430G2 Launchpad running an application and estimate the lifetime of an AA battery if the Launchpad is powered using standalone AA battery.

Exercises:

Compute the energy measurement and the estimated lifetime of a battery in various low power modes.

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(13A04710) MICROWAVE & OPTICAL COMMUNICATIONS LABORATORY

Course Outcomes:

- Capable of Applying microwave Concepts/ Microwave components and test them.
- Able to design and analyse an optical fiber communications link

Microwave Lab (PART – A) --- Any Seven (7) Experiments

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength measurements using slotted section.
8. Impedance Matching and Tuning
9. Scattering parameters of Magic Tee.
10. Radiation Pattern Measurement of horn Antennas (at least two antennas).

Optical Fiber Lab (PART – B) --- Any five (5) Experiments

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of Numerical Aperture of the given fiber.
6. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Regulated Klystron Power Supply 6 nos.
2. VSWR Meter 6 nos.
3. Milli/Micro Ammeters 10 nos.
4. Multi meters 10 nos.
5. CROs 8 nos.
6. GUNN Power Supply, Pin Moderator 4 nos.
7. Relevant Microwave components --
8. Fiber Optic Analog Trainer based LED 3 nos.
9. Fiber Optic Analog Trainer based laser 2nos.
10. Fiber Optic Digital Trainer 1 no.
11. Fiber cables - (Plastic, Glass)