DIGITAL DATA COMMUNICATIONS

SUBJECT CODE: R19PC101

OUTCOMES:

At the end of this course the student can able to:

- Model digital communication system using appropriate mathematical techniques (error probability, constellation diagrams, phasor diagrams).
- Understanding the basic concepts of how digital data is transferred across computer networks.
- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Identify the different types of network devices and their functions within a network
- Understand and building the skills of sub netting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used
- To assist in network design and implementation.

DIGITAL SYSTEM DESIGN

SUBJECT CODE: R19PC102

OUTCOMES:

At the end of this course the student can able to:

- Understand the basic concepts of a Karnaugh Map ("K-map") for a 2-, 3-, 4-, or 5-variable
- logic function and to identify the prime implicants, essential prime implicants, and non-essential prime implicants of a function depicted on a K-map.
- Perform the minimization of a Boolean function using tabular method, QM algorithm and
- CAMP algorithm and determine the Adjacencies, DA, CSC, SSMs, EPCs and SPCs.
- Draw the block diagram of PLA and identify the size of PLA and PLA design aspects.
- Perform the minimization of PLA using IISc algorithm and folding using COMPACT algorithm.
- Can design a digital circuit by steps involving ASM chart.
- Understand the digital system design approaches using CPLDs, FPGAs and ASICs.
- Rectify a single fault and multiple faults in combinational circuits using Path sensitization method, Booleandifference method and Kohavi algorithm.

- Perform fault diagnosis in sequential circuits.

1. .

ADVANCED COMPUTER ARCHITECTURE
(ELECTIVE- I)

SUBJECT CODE: R19PC103A

OUTCOMES:

At the end of this course the student can able to:

- Through this course, students are expected to become conversant with a large body of concepts and accompanying terminology in computer architecture.
- The course will be helpful for students to read and understand technical articles or promotional brochures that describe new computer architectures and appreciate the design issues and tradeoffs of that architecture.
- This course will introduce the current trends in computer architecture so that students have some sense of the future directions of computational machines.
- Students will also learn how to quantitatively analyze, compare, and evaluate the performance of computer systems.

INFORMATION THEORY AND CODING TECHNIQUES
(ELECTIVE- I)

SUBJECT CODE: R19PC103B

OUTCOMES:
At the end of this course the student can able to:

- Understand the Basic Concepts of Information theory Probabilistic (stochastic) systems. Reasoning under uncertainty Quantifying information State and discuss coding theorems
- Understand the overview of coding theory and practice Properties and coding for discrete memory less sources, prefix codes, Kraft inequality etc. Data compression (Source coding) Error Detection and Correction (Channel coding).

DATABASE MANAGEMENT SYSTEMS
(ELECTIVE- I)

SUBJECT CODE: R19PC103C

OUTCOMES:

At the end of this course the student can able to:

Learn the basic concepts and applications of database systems.

- Able to construct queries using SQL.
- Understands relational database theory and be able to write relational algebra expressions.
- Knows the design principles for logical design of databases, including the E-R model and normalization approach.
- Understands basic database storage structures and access techniques: file and page organizations, indexing methods including B-trees, and hashing.
- Applies query evaluation techniques and query optimizations.
- Learn basic issues of transaction processing and solve concurrency control problems.
- Able to design and development of a database application system.

BIG DATA ANALYTICS
(ELECTIVE- I)

SUBJECT CODE: R19PC103D

OUTCOMES:

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

WIRELESS COMMUNICATIONS AND NETWORKS
(ELECTIVE- II)

SUBJECT CODE: R19PC104A

OUTCOMES:

At the end of this course the student can able to:

- Understand the concepts of Cellular communications.
- Analyse the concepts of Diversity, equilisation,
- Know about the Wireless systems and Standards(1G/2G/3G systems)
- Understand different Multiple access techniques: FDMA, TDMA, CDMA, ALOHA, Slotted ALOHA, CSMA
- Learn about Wireless networks and some important protocols and IEEE standards

INTERNET PROTOCOLS
(ELECTIVE II)

SUBJECT CODE: R19PC104B

OUTCOMES:

At the end of this course the student can able to:

- Understanding basic network routing concepts and algorithms;
- Understanding how to apply them into given topologies;
- Understanding how the Internet protocol suite operates; describe the functions of various protocols;
- Explain the concept and usage of node addressing; classify addresses into network layers.

IMAGE and VIDEO PROCESSING
(ELECTIVE II)

SUBJECT CODE: R19PC104C

OUTCOMES:

At the end of this course the student can able to:

- Defining the digital image, representation of digital image, importance of image resolution, applications in image processing.
- Know the advantages of representation of digital images in transform domain, application of various imagetransforms.
- Know how an image can be enhanced by using histogram techniques, filtering techniques etc
- Understand image degradation, image restoration techniques using spatial filters and frequency domain
- Know the detection of point, line and edges in images, edge linking through local processing, global processing.
- Understand the redundancy in images, various image compression techniques.
- Know the video technology from analog color TV systems to digital video systems, how video signal is sampled and filtering operations in video processing.

- Know the general methodologies for 2D motion estimation, various coding used in video processing.

OBJECT ORIENTED PROGRAMMING
(ELECTIVE II)

SUBJECT CODE: R19PC104D

OUTCOMES:

At the end of this course the student can able to:

- The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
- Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections
- How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
- How to test, document and prepare a professional looking package for each business project using java doc.

Research Methodology and IPR

SUBJECT CODE: R19LC105

Course Outcomes:

At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

DIGITAL DATA COMMUNICATION LAB

SUBJECT CODE: **R19LC106**

List of Experiments:

1. Block Codes
2. Implementation of PC to PC communication.
3. Implementation of different Topologies
4. Study of IP address generation
5. Phase Shift Keying
6. Differential Phase shift Keying
7. Time Divisioin Multiplexing
8. Frequency Division Multiplexing.
9. Error Correction Codes.
10. Frequency Division Multiple Access..

Lab Requirements:

Software and Equipment required:

1.MATLAB along with Simulink Licensed simulation software tool with communication and Signal processing toolbox.

2. Computer Systems with required specifications

Hardware Required:

- Data Communication Trainer kits
- Computers
- LAN Trainer kit
- ST 5001 Software/ NS2 Software
- Serial and parallel port cables
- Patch cords (2 mm), FOE/LOE Cables, Main power cords
- Ethernet Cables (CAT5, CAT5E, CAT6, CAT7)
- Hubs, Switches, MODEMs
- RS 232 DB25/DB9 Connectors

Digital System Design Lab

SUBJECT CODE : R19LC107

_ The students are required to design the logic to perform the following experiments using necessary Industry standard simulator to verify the logical /functional

operation, perform the analysis with appropriate synthesizer and to verify the implemented logic with different hardware modules/kits (CPLD/FPGA kits).

List of Experiments:

1. Determination of EPCs using CAMP-I Algorithm.
2. Digital system design using FPGA.
3. ROM design.
4. Kohavi algorithm.
5. RAM
6. Traffic Light Controller
7. Hamming experiments.
8. ALU
9. Binary Multiplier
10. FSM

Lab Requirements:

Software: Industry standard software with perpetual license consisting of required simulator, synthesizer, analyzer etc. in an appropriate integrated environment.

Hardware: Personal Computer with necessary peripherals, configuration and operating System and relevant VLSI (CPLD/FPGA) hardware Kits.

SEMESTER II

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OPTICAL COMMUNICATION AND NETWORKS

SUBJECT CODE: R19PC201

OUTCOMES:

At the end of this course the student can able to:

• Able to analyze characteristics of circular optical fiber and calculate the mode numbers. Also understand the types of fibers and their characteristics.
• Know the working principle and characteristics of LED/Laser optical sources and photo detectors of PIN/APD diodes.
• Understand the process of fabrication of fiber and able to design optical digital data link at different bit rates.
• Understand the importance of wavelength division multiplexing (WDM) and de-multiplexing, types of WDM techniques.
• Understand the Working principle of optical communication components are amplifiers, filters and isolators.
• Understand the network performance, coherent systems, and heterodyne/homodyne systems.

ADVANCED OPERATING SYSTEMS

SUBJECT CODE: R19PC202

OUTCOMES:

- On completion of this course the student should be able to understand and evaluate operating
- System implementations.
- Develop system software modules
- Write and debug concurrent programs
- Debug complex systems and low-level software and Work with distributed and real time OS.

ADVANCED DIGITAL SIGNAL PROCESSING

(ELECTIVE II)

SUBJECT CODE: R19PE203A

OUTCOMES:

At the end of this course the student can able to:

- Know the concept of multi rate signal processing and derive the Expression for sampling rate conversion by a rational factor I/D.
- Design the single and two stage multi rate structures from the given specifications.
- Know the conditions for perfect reconstruction of 2 channels QMF.
- Know the classifications of non-parametric methods and compare the performance of non-parametric methods.
- Derive the statistical properties (i.e. mean, variance) of non-parametric power spectrum estimations.
- Know the advantages and disadvantages of non-parametric methods.

- Derive the reflection coefficients of Lattice realization.
- Know the forward prediction error and back ward prediction error and advantages of Lattice structures,
- Derive the properties of Auto-correlation and Cross correlation.
- Know the different methods of parametric power spectrum estimation methods.
- Understand the Non-parametric and Parametric power spectrum estimation methods.

SOFT COMPUTING TECHNIQUES
(ELECTIVE -III)

SUBJECT CODE: R19PE203B

OUTCOMES:

At the end of this course the student can able to:

- Understand the basic concepts of Artificial neural network systems.
- Understand the McCulloch-Pitts neuron model, simple and multilayer Perception, Adeline and Madeline concepts.
- Data processing, Hopfield and self-organizing network.
- Difference between crisp sets to fuzzy sets, fuzzy models, fuzzification, inference,
- membership functions, rule based approaches and defuzzification.
- Self – organizing fuzzy logic control, non linear time delay systems.
- Understand the concept of Genetic Algorithm steps. Tabu, anD-colony search techniques for solving optimization problems.
- GA applications to power system optimization problems, identification and control of linear and nonlinear dynamic systems using MATLAB-Neural network toolbox.
- Know the application and importance stability analysis.

ARTIFICIAL INTELLIGENCE
(ELECTIVE-III)

SUBJECT CODE: R19PE203C

Course Outcomes:

At the end of this course, students will be able to

- Understand the concept of Artificial Intelligence, search techniques and knowledge representation issues
- Understanding reasoning and fuzzy logic for artificial intelligence
- Understanding game playing and natural language processing.

INTERNET OF THINGS
(ELECTIVE III)

SUBJECT CODE: R19PE203D

OUTCOMES:

- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

ADVANCED COMPUTER NETWORKS
(ELECTIVE IV)

SUBJECT CODE: R19PE204A

OUTCOMES:

At the end of this course the student can able to:

- Analyze a communication system by separating out the different functions provided by the network; and some example networks
- Understand various network topologies required for communication
- Understand that there are fundamental limits to any communications system
- Understand the general principles behind , addressing, routing, reliable transmission and other state full protocols as well as specific examples of each
- Have an informed view of both the internal workings of the Internet and of a number of common Internet applications and protocols

EMBEDDED SYSTEM DESIGN
(ELECTIVE-IV)

SUBJECT CODE: R19PE204B

OUTCOMES:

At the end of this course the student can able to:

- Understand the basic concepts of Current Technologies, Integration in system Design, Embedded system design flow, hardware design concepts, and software development.
- Understand the Processor in an embedded system and other hardware units, introduction to processor based embedded system design concepts with examples.
- Know the Embedded Hardware building blocks, Embedded Processors – ISA architecture models, internal processor design, and processor performance.
- Know the introduction to Board Memory – ROM, RAM, Auxiliary Memory, Memory

Management of External Memory, Board Memory and performance.

- Know the importance and requirement of real time operating system to perform the task by an embedded system on real time environment.
- Understand the Input-Output component interfacing in embedded board Input / output –
- Serial versus Parallel I/O, interfacing the I/O components, I/O components and performance.
- Know the Embedded Operating Systems RTOS basics, multitasking and process Management, Memory Management, I/O and file system management.
- Performing the Testing and Implementing in the design-The main software utility tool, CAD and the hardware, Translation tools, Debugging tools, testing on host machine, simulators, Laboratory tools, System Boot-Up.

RADAR SIGNAL PROCESSING
(ELECTIVE -IV)

SUBJECT CODE: R19PE204C

OUTCOMES:

At the end of this course the student can able to:

- Understand the operation of Radar and derive the radar range equation.
- Know the characteristics of Matched filter for non-white noise.
- Understand the various detection criterion and types of detectors that can be used to detect the Radar signals in noise.
- Understand the waveform design requirements and optimum waveforms for the detection of signals in clutter.
- Know the significance and types of pulse compression techniques in radar signals.
- Know the concepts of digital compression SAW pulse compression in Radar signals.
- Understand the requirements of phase coding in Radar and various poly phase codes used for phase coding.

NETWORK SECURITY AND CRYPTOGRAPHY
(ELECTIVE IV)

SUBJECT CODE: R19PE204D

OUTCOMES:

At the end of this course the student can able to:

- Understands the basics of network security and cryptography, models and classical and modern techniques of security.
- Students understand and practice the encryption algorithms with computers.
- Students learn key managements techniques and number theory.
- Students learn message authentication and hash functions, digital signatures electronic

mail security.

- Students learn IP security, web security, Secure electronic transactions, intruders, viruses and worms and fire walls.

ADVANCED COMMUNICATIONS LAB

SUBJECT CODE : R19LC205

Note: The students are required to design the communication system using Simulink and they have to perform the simulation using MATLAB/CC Studio (programming) simulation software tool. Further they are required to compare the results. All Experiments may be Simulated using MATLAB and to be verified using related training kits

PART A: List of Experiments :(Minimum of Ten Experiments has to be performed)

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in Hamming code
3. Determination of output of Convolution Encoder for a given sequence
4. Determination of output of Convolution Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique
6. Simulation of Frequency Hopping (FH) system
7. Effect of Sampling and Quantization of Digital Image
8. Verification of Various Transforms (FT / DCT/ Walsh / Hadamard) on a given Image (Finding Transform and Inverse Transform)
9. Point, Line and Edge detection techniques using derivative operators.
10. Implementation of FIR filter using DSP Trainer Kit (C-Code/ Assembly code)
11. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code)
12. Determination of Losses in Optical Fiber
13. Observing the Waveforms at various test points of a mobile phone using Mobile Phone Trainer
14. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSSBER Trainer
15. Study of ISDN Training System with Protocol Analyzer
16. Characteristics of LASER Diode.

PART B: Equipment required for Laboratory

Software:

1. MATLAB along with Simulink Licensed simulation software tool with communication and Signal processing toolbox.

2. Computer Systems with required specifications

Hardware:

1. Hard ware kits for verification of BER
2. Hard ware kits of Convolution encoders ,Hamming encoders.
3. Frequency spectrum
4. Mobile Phone Trainer
5. DSP Trainer Kit
6. CDMA-DSS-BER Trainer

7. ISDN Training System with Protocol Analyzer
8. Optical fiber Transmitter and receiver kit along with different lengths of cables.

ERTOS LAB

SUBJECT CODE : R19LC206

- The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits and ARM-Cortex.
- The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs

developed for the implementation should be at the level of an embedded system design.

- The students are required to perform at least SIX experiments from Part-I and TWO experiments from Part-II.

List of Experiments:

Part-I: Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER'S algorithm.
7. Synchronize two identical threads using MONITOR.
8. Reader's Writer's Problem for concurrent Tasks.

Part-II Experiments on ARM-CORTEX processor using any open source RTOS.

(Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.
2. Interface ADC and DAC ports with the Input and Output sensitive devices.
3. Simulate the temperature DATA Logger with the SERIAL communication with PC.
4. Implement the developer board as a modem for data communication using serial port communication between two PC's.

Lab Requirements:

Software:

- Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.
- LINUX Environment for the compilation using Eclipse IDE & Java with latest

version.

Hardware:

- The development kits of ARM-926 Developer Kits and ARM-Cortex Boards.

- Serial Cables, Network Cables and recommended power supply for the board.

SEMESTER III

Wireless Sensor Networks
(ELECTIVE V)

SUBJECT CODE: : R19PE301B

Course Outcomes:

At the end of this course, students will be able to

- Design wireless sensor network system for different applications under consideration.
- Understand the hardware details of different types of sensors and select right type of sensor
- for various applications.
- Understand radio standards and communication protocols to be used for wireless sensor
- network based systems and application.
- Use operating systems and programming languages for wireless sensor nodes, performance
- of wireless sensor networks systems and platforms.
- Handle special issues related to sensors like energy conservation and security challenges.

Cyber security systems

(ELECTIVE V)

SUBJECT CODE: : R19PE301C

OUTCOMES:

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios