I- SEMESTER
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED SYSTEMS DESIGN

M.Tech (ES) I Year - I Semester
Course Code: GR15D5072 L/P/C: 4/0/4

COURSE OBJECTIVES

- To introduce the difference between embedded systems and general purpose systems.
- To optimize hardware designs of custom single-purpose processors.
- To compare different approaches in optimizing general-purpose processors.
- To introduce different peripheral interfaces to embedded systems.
- To apply knowledge gained in software-hardware integration in team-based projects.

COURSE OUTCOMES: After going through this course the student will be able to

- Compare Embedded system design models using different processor technologies (single-purpose, general-purpose, application specific processors).
- Describe and compare the various types of peripherals used in embedded systems.
- Analyze a given embedded system design and identify its performance critical points.
- Use modern engineering tools necessary for integrating software and hardware components in embedded system designs.
- Familiarize Embedded Firmware Design Approaches and Development Languages.
- Utilize a top-down modular design process to complete a medium complexity embedded system design project under instructor specified design constraints.
- Decide which operating system/real time operating system is best suitable for the decided embedded application.

UNIT-I


UNIT-II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.
UNIT-III
**Embedded Firmware:** Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV
**RTOS Based Embedded System Design:** Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT-V
Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

**TEXT BOOKS**
1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

**REFERENCE BOOKS**
1. Embedded Systems - Raj Kamal, TMH.
4. An Embedded Software Primer - David E. Simon, Pearson Education.
COURSE OBJECTIVES

- To introduce the outline architecture of ARM7 microcontroller including basics of pipelines, registers, exception modes.
- To set up and customize a microcontroller development environment.
- To give an overview of system peripherals which cover bus structure, memory map, register programming and much more.
- To write programs that interact with other devices.
- To learn the Memory Management of RISC Microcontrollers.

COURSE OUTCOMES: After going through this course the student will be able to

- An ability to understand the hardware implementation of the ARM7 microcontrollers.
- An ability to Integrate peripherals based on I/O functions.
- An ability to learn the concept of pipelines, registers and exception modes
- An ability to program in ARM and THUMB modes.
- An ability to interpret the functions of Memory Management Unit (MMU).
- An ability to compare the performance of various ARM families of Microcontrollers.
- An ability to know the software development flow and working with projects.

UNIT-I

ARM Architecture: ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT -II

ARM Programming Model – I: Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT –III:

ARM Programming Model – II: Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT –IV:

UNIT –V

Memory Management: Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

TEXT BOOKS


REFERENCE BOOKS

COURSE OBJECTIVES

- To use Unix/Linux operating system as the working platform for embedded system development.
- To demonstrate system programming for input output file operations and process control operations.
- To demonstrate coding techniques involving multiprocessing.
- To apply the techniques of establishing synchronization among different tasks.
- To apply the coding techniques for the embedded applications involving interrupts and real time responses.
- To judge about which particular real time operating system is best suitable for the underlined application.
- To outline the features of different existing Real Time Operating Systems.

COURSE OUTCOMES: After going through this course the student will be able to

- Students will be able to operate on a Unix/Linux operating system for embedded system application code development.
- Students will be skilful to perform some basic level system programming.
- Students will acquire the techniques for coding applications involving multiprocessing using the real time operating system provided functions.
- Students will be equipped with the coding techniques to establish synchronization in embedded systems involving multiprocessing.
- Students will acquire the skills to design and deal with the real time embedded applications with/without interrupts.
- Students will be in a position to recommend about an operating system/real time operating system for the decided embedded application.
- Students will be able to compare the different Real Time Operating Systems and can choose the best one for the underlined embedded application.

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O (open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Task States and Scheduling, Task Operations,
Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

UNIT - III
Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV

UNIT - V
Case Studies of RTOS: RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

TEXT BOOKS

REFERENCE BOOKS
1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh
COURSE OBJECTIVES

- To study and possess the knowledge on radio-frequency implementation issues
- To study and possess the knowledge on multi-rate signal processing and digital generation of signals vital to software defined radio
- To study and possess the knowledge on ideal and practical A-to-D and D-to-A converters and To study and possess the knowledge on smart antennas.
- To have a discussion on digital hardware issues.
- To carry out case studies of SDRs.

COURSE OUTCOMES: After going through this course the student will be able to

- To apply the digital domain for the design of RF amplifiers.
- To channelize the operating band into various communication channels.
- To create arbitrary modulations directly within the digital domain.
- To incorporate sophisticated algorithms such as smart antennas into the radio to enhance performance.
- To design direct digital synthesizer.
- To design up converters and down converters
- To design a software-defined radio.

UNIT-I


UNIT-II


UNIT-III
Analog to Digital (A-to-D) and Digital to Analog Conversions and Smart antennas:
Introduction to A-to-D conversion, parameters of ideal data converters, parameters of practical data converters, techniques to improve data converter performance. Introduction to Smart antennas, Vector channel modeling, benefits of smart antennas, Structures for beamforming systems, smart antenna algorithms, diversity and space-time adaptive signal processing 3G smart antenna requirements and smart antenna architectures.

UNIT-IV
Digital hardware components and Digital hardware choice:
Digital frequency up-and down-converters, digital NCO, digital mixers, cascading of digital converters and digital frequency converters, 3G transmitter requirements. Introduction to digital hardware choice, DSP processors, Field programmable arrays, Trade-offs in using DSPs, FPGAs and ASICs, power management issues, using combination of DSPs FPGAs and ASICs.

UNIT-V

TEXT BOOKS

REFERENCE BOOKS
1. Abrie, Pieter L D Design of RF and Microwave Amplifiers and oscillators, Artech House. 1999
4. Frank B Gross, Smart antennas with Matlab
6. RF and DSP for SDR, Elsevier newness Press, 2008
COURSE OBJECTIVES

- To enable the student to visualize MOS fabrication technologies and to understand electrical properties of MOS, CMOS and Bi CMOS circuits.
- To train the student to draw integrated circuit layouts following design rules.
- To enable the student design combinational circuit, do verification, power optimization and network testing.
- To enable the student to use power optimization techniques, design validation procedures and testing of sequential circuits.
- To train the student to use different floor planning methods and different low power architectures.

COURSE OUTCOMES: After going through this course the graduate student will be able to

- Visualize the steps taken for MOS fabrication technologies.
- Analyze electrical behavior of MOS, CMOS and Bi CMOS circuits.
- Draw the layout of integrated circuits following design rules.
- Able to design combinational circuit.
- Design sequential circuits using different clocking disciplines.
- Carry out power optimization techniques, design validation procedure and testing of circuits.
- Carry out floor planning for different low power architectures.

UNIT-I

Review of Microelectronics and Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: $I_d$ – $V_d$ relationships, Threshold Voltage $V_t$, $g_m$, $g_{ds}$ and $\omega_0$, Pass Transistor, MOS, CMOS & BiCMOS Inverters, $Z_{p.u}/Z_{p.d}$, MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT-II


UNIT –III

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design,
Power optimization, Switch logic networks, Gate and Network testing.

UNIT –IV

**Sequential Systems:** Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT -V

**Floor Planning:** Floor planning methods, Global Interconnect, Floor Plan Design, Off-chip connections.

**TEXT BOOKS**


**REFERENCE BOOKS**

GR15 Regulations (2015-16)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED COMPUTING
(Elective – I)

M.Tech (ES)  
Course Code: GR15D5078  
I Year - I Semester  
L/P/C: 4/0/4

COURSE OBJECTIVES
• To demonstrate the student to program on linux platform.
• To have an outline on operating systems.
• To explain the overview of software development tools.
• To illustrate different interfacing modules.
• To explain the basics of networking.
• To compare various network security techniques.
• To summarize IA32 Instruction set and explain the students to work with simulation and debugging tools.

COURSE OUTCOMES: After going through this course the student will be able to
• An ability to develop programming on linux platform.
• To analyse operating system overview.
• An ability to design using various software development tools.
• To analyse interfacing modules.
• To interpret basics of networking
• To distinguish various network security techniques.
• An ability to work with simulation and debugging tools.

UNIT-I

UNIT –II
Introduction to Software Development Tools: GNU GCC, make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches, lint, code profiling tools.,

UNIT –III:
Interfacing Modules: Sensor and actuator interface, data transfer and control, GPS, GSM module interfacing with data processing and display, OpenCV for machine vision, Audio signal processing.
UNIT-IV

**Networking Basics:** Sockets, ports, UDP, TCP/IP, client server model, socket programming, 802.11, Bluetooth, ZigBee, SSH, firewalls, network security.

UNIT –V

**IA32 Instruction Set:** application binary interface, exception and interrupt handling, interrupt latency, assemblers, assembler directives, macros, simulation and debugging tools.

**TEXT BOOKS**

3. Assembly Language for x86 Processors by Kip R. Irvine
4. Intel® 64 and IA-32 Architectures Software Developer Manuals

**REFERENCE BOOKS**

2. The Design of the UNIX Operating System by Maurice J. Bach Prentice-Hall
3. UNIX Network Programming by W. Richard Stevens
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SYSTEM DESIGN
(ELECTIVE -II)

M.Tech (ES)
Course Code: GR15D5079

COURSE OBJECTIVES
• Learn digital design of Sequential Machines.
• Learn drawing state graphs.
• Learn realization and implementation of SM Charts.
• Learn Fault modeling and test pattern generation of Combinational circuits.
• Learn fault diagnosis in sequential circuits and understand machine design, identification of fault detection experiment.

COURSE OUTCOMES: After going through the course students will be able to
• Create understanding of the design techniques of sequential Machines.
• Create understanding of the fundamental concepts of PLD's, design of FPGA's.
• Learn implementation of SM charts in combinational and sequential circuits.
• Develop skills in modelling fault free combinational circuits.
• Develop skills in modelling Sequential circuits in terms of reliability, availability and safety.
• Develop skills in modelling combinational circuits in terms of reliability, availability and safety.

UNIT -I

UNIT -II
Digital Design: Digital Design Using ROMs, PALs and PLAs, BCD Adder, 32 – bit adder, State graphs for control circuits, Scoreboard and Controller, A shift and add multiplier, Array multiplier, Keypad Scanner, Binary divider.

UNIT -III
SM Charts: State machine charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier, dice game controller.
UNIT -IV


UNIT -V

**Fault Diagnosis in Sequential Circuits:** Circuit Test Approach, Transition Check Approach – State identification and fault detection experiment, Machine identification, Design of fault detection experiment

**TEXT BOOKS**

3. Logic Design Theory – N. N. Biswas, PHI

**REFERENCE BOOKS**

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFT COMPUTING TECHNIQUES
(ELECTIVE-II)

M.Tech (ES)  I Year - I Semester
Course Code: GR15D5080  L/P/C: 4/0/4

COURSE OBJECTIVES

• Identify to soft computing concepts and techniques and foster their abilities in
designing and implementing soft computing based solutions for real-world and
engineering problems.
• Illustrate necessary mathematical background for understanding and implementing
soft computing Techniques, such as neural networks, fuzzy systems, genetic
algorithms etc.
• Relate of the neural networks with supervised and unsupervised learning networks.
• Discriminate the basic principle behind the fuzzy set theory and Comprehend neuro
fuzzy modeling.
• Evolution the criteria for selecting computational techniques like Genetic/ Evolutionary
algorithms, Artificial Neural Networks, Fuzzy Systems, Machine learning and
probabilistic reasoning etc for a particular application.
• Interpret physical principles applied in optimization algorithms concepts and their
relations.
• Define case studies where soft computing techniques can be implemented.

COURSE OUTCOMES: After going through this course the student will be able to

• Implement numerical methods in soft computing.
• Apply knowledge of computing, sciences and mathematics to solve
computer engineering problems.
• The modern techniques and engineering tools necessary for computer engineering
practices.
• Design experiments, gather/acquire, analyze, interpret data and make decisions to
understand computing requirements.
• Describe, analyze and design digital computing and representation systems.
• Relate appropriate computer engineering concepts and programming languages in
solving computing problems.
• apply Genetic/ Evolutionary algorithms, Artificial Neural Networks, Fuzzy Systems,
Machine learning and probabilistic reasoning etc as computational tools to solve a
variety of problems in various area of interest ranging from Optimization problems to
Text Analytics.
UNIT – I
Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT – II
Artificial Neural Networks: Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT – III
Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Selforganizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT – IV
Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and Ant-colony search techniques for solving optimization problems.

UNIT – V

TEXT BOOKS

REFERENCE BOOKS
COURSE OBJECTIVES

- To learn the fundamentals, purpose, structure and functions of operating systems.
- To understand how the operating system abstractions can be used in the development of application programs, or to build higher level abstractions.
- To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory and commit protocols.
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms.
- To explain how to characterize and cope with processor deadlock, including prevention, avoidance, detection, and recovery.
- To know the components and management aspects of Real time, Mobile operating systems.
- To provide experience in low-level systems programming in a realistic development environment.

COURSE OUTCOMES: After going through this course the student will be able to

- An ability to describe the basic principles used in the design of modern operating systems.
- An ability to understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
- An ability to understand the difference between process & thread and use of locks, semaphores, monitors for synchronizing multiprogramming with multithreaded systems.
- An ability to distinguish between various resource management techniques for distributed systems.
- An ability to understand the concepts of deadlock in operating systems and how they can be managed / avoided and implement them in multiprogramming system.
- An ability to identify the different features of real time and mobile operating systems.
- An ability to modify existing open source kernels in terms of functionality or features used.

UNIT –I

Introduction to Operating Systems: Overview of computer system hardware, Instruction execution, I/O function, Interrupts, Memory hierarchy, I/O Communication techniques, Operating system objectives and functions, Evaluation of operating System
UNIT –II
Introduction to UNIX and LINUX: Basic commands & command arguments, Standard input, output, Input / output redirection, filters and editors, Shells and operations

UNIT –III
System Calls: System calls and related file structures, Input / Output, Process creation & termination. Inter Process Communication
Introduction, file and record locking, Client – Server example, pipes, FIFOs, Streams & Messages, Name Spaces, Systems V IPC, Message queues, Semaphores, Shared Memory, Sockets & TLI.

UNIT –IV
Introduction to Distributed Systems: Goals of distributed system, Hardware and software concepts, Design issues.

UNIT –V
Synchronization in Distributed Systems:
Clock synchronization, Mutual exclusion, E-tech algorithms, Bully algorithm, Ring algorithm, Atomic transactions
Deadlocks: Dead lock in distributed systems, Distributed dead lock prevention and distributed dead lock detection

TEXT BOOKS
1. The design of the UNIX Operating Systems – Maurice J. Bach, 1986, PHI.
2. Distributed Operating System - Andrew. S. Tanenbaum, 1994, PHI.

REFERENCE BOOKS
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
EMBEDDED C LAB

M.Tech (ES) I Year - I Semester
Course Code: GR15D5082 L/P/C: 0/4/2

COURSE OBJECTIVES

• To impart the knowledge of AVR/8051 architecture & its programming
• To extract the features of microcontroller and interfacing with different peripherals.
• To understand the concept of Embedded C/Arduino programming.
• To know the working environment on Arduino IDE/Keil IDE.
• To develop an application with Atmel/8051 microcontroller in Embedded C.

COURSE OUTCOMES: After going through this course the student will be able to

• Familiarize with programming and interfacing microcontrollers to various devices using Arduino.
• Acquire the knowledge of Atmel/8051 microcontroller architecture & its programming.
• Work on Arduino Uno/8051 microcontroller based boards.
• Develop an application in Arduino IDE using Embedded C.
• Interface Atmel Microcontroller with different peripherals.
• Implement a wireless based appliance control.
• Define and Design a project on the exposure with AVR/8051.

Note:

• Minimum of 10 experiments have to be conducted.
• The following programs have to be tested on 89C51 Development board/equivalent using Embedded C Language on Keil IDE or Equivalent.

1. Program to toggle all the bits of Port P1 continuously with 250 mS delay.
2. Program to toggle only the bit P1.5 continuously with some delay. Use Timer 0, mode 1 to create delay.
3. Program to interface a switch and a buzzer to two different pins of a Port such that the buzzer should sound as long as the switch is pressed.
4. Program to interface LCD data pins to Port P1 and display a message on it.
5. Program to interface keypad. Whenever a key is pressed, it should be displayed on LCD.
6. Program to interface seven segment display unit.
7. Program to transmit a message from Microcontroller to PC serially using RS232.
8. Program to receive a message from PC serially using RS232.
9. Program to get analog input from Temperature sensor and display the temperature value on PC Monitor. Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions.
10. Program to Sort RTOS on to 89C51 development board.
11. Program to interface Elevator.
OPEN ELECTIVE - I
GR15 Regulations (2015-16)

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

E - COMMERCE AND APPLICATIONS
(Open Elective I)

M.Tech (CSE) I Year - I Semester
Course Code: GR15D5178 L/P/C: 4/0/4

Course Objectives
- To understand the interest and opportunity of e-commerce
- To know and understand the critical success factors in implementing an ecommerce System
- To know how to plan and how to manage e-commerce solutions
- To have hands on, real-life experience with electronic commerce applications
- To analyze and understand the human, technological and business environment
- Associated with e-commerce

Course Outcomes: At the end of the course, the student will be able to
- Understand the trends in e-Commerce and the use of the Internet.(Level 2)
- Analyze, Understand and Compare the principles of E-commerce and basics of World Wide Web.(Level 2&4)
- Analyze, Understand the concept of electronic data interchange and its legal, social and technical aspects.(Level 2&4)
- Understand and Evaluate the security issues over the web, the available solutions and future aspects of e-commerce security .(Level 2&5)
- Understanding and Validating the concept of E-banking, electronic payment system.(Level 2&5)
- Understand, Analyze and Compare the capabilities and limitation of agents, Web based marketing and various security Issues. (Level 2&4)
- Understanding and Evaluation of online advertisements, website design issues and Creating a business transaction using an e-commerce site.(Level 2,5 &6)

UNIT-I
INTRODUCTION Traditional commerce and E commerce – Internet and WWW – role of WWW – value chains – strategic business and Industry value chains – role of E commerce, advantages of E commerce, anatomy of e-commerce applications.

UNIT-II
UNIT-III

UNIT- IV

UNIT-V

TEXT BOOKS
1. Ravi Kalakota, “Electronic Commerce”, Pearson Education,

REFERENCES BOOK
GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENTERPRISE RESOURCE PLANNING
(Open Elective-I)

M.Tech (IT)
Course Code: GR15D5179

I Year - I Semester
L/P/C: 4/0/4

PREREQUISITES

• Fundamentals of enterprise resource planning (ERP) systems concepts
• Importance of integrated information systems in an organization.

COURSE OBJECTIVES: The objective of the course is to provide the student

• Understanding of the basic concepts of ERP systems for manufacturing or service companies, and the differences among MRP, MRP II, and ERP systems
• Thinking in ERP systems: the principles of ERP systems, their major components, and the relationships among these components
• Capability to adapt in-depth knowledge of major ERP components, including material requirements planning, master production scheduling, and capacity requirements planning
• Understanding knowledge of typical ERP systems, and the advantages and limitations of implementing such systems
• Understanding the business process of an enterprise
• Grasp the activities of ERP project management cycle
• Understanding the emerging trends in ERP developments

COURSE OUTCOMES: At the end of the course the student will be able to

• Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components
• Understand production planning in an ERP system, and systematically develop plans for an enterprise
• Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management
• Understand the difficulties of a manufacturing execution system, select a suitable performance measure for different objectives, and apply priority rules to shop floor control
• Knowledge of ERP implementation cycle
• Awareness of core and extended modules of ERP
• Apply emerging trends in ERP

UNIT-I

UNIT-II


UNIT- III


UNIT- IV


UNIT- V

ERP-Present and future: Turbo Charge the ERP System – EIA – ERP and E-Commerce – ERP and Internet – Future Directions in ERP.

TEXT BOOKS

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY

MODERN CONTROL THEORY
(Open Elective-I)

M.Tech (EEE)  I Year - I Semester
Course Code: GR15D5180  L/P/C: 4/0/4

PREREQUISITE: Control Systems, Mathematics.

COURSE OBJECTIVES
- To familiarize students with the modelling of systems
- To familiarize the students with the state space analysis of dynamic systems and observe their controllability and Observability.
- To make students understand the concepts of describing function analysis of nonlinear systems and analyze the stability of the systems.
- To analyze the stability of the nonlinear systems.

COURSE OUTCOMES
- Ability to obtain the mathematical model of any system.
- Ability to obtain the state model for dynamic systems.
- Ability to analyze the controllability and Observability for various types of control systems.
- Ability to understand the various types of nonlinearity.
- Ability to analyze the stability of the nonlinear systems.
- Ability to synthesize the nonlinear systems.

UNIT-I

UNIT-II
STATE VARIABLE ANALYSIS: linear Continuous time models for Physical systems-- Existence and Uniqueness of Solutions to Continuous- time State Equations — Solutions of Linear Time Invariant Continuous-Time State Equations—State transition matrix and it's properties.

UNIT- III
NON LINEAR SYSTEMS -I
Introduction to Non Linear Systems - Types of Non-Linearities-Saturation-Dead-Zone - Backlash
Jump Phenomenon etc;— Singular Points-Introduction to Linearization of nonlinear systems,
Properties of Non Linear systems-Describing function-describing function analysis of nonlinear
systems-Stability analysis of Non-Linear systems through describing functions.

UNIT-IV
NON LINEAR SYSTEMS-II
Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular
points, phase- plane analysis of nonlinear control systems.

UNIT-V
STABILITY ANALYSIS
Stability in the sense of Lyapunov, Lyapunovs stability and Lyapunov’s instability theorems -
Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method
— Generation of Lyapunov functions Variable gradient method — Krasooviski’s method.

TEACHING METHODOLOGIES
1. White board
2. PPTs
3. Seminars

EXT BOOKS
1. Modern Control System Theory by M.Gopal — New Age International -1999

REFERENCE BOOK
COURSE OBJECTIVES

- To develop the skill of solving linear algebraic systems by direct and iteration methods.
- To illustrate advanced matrix techniques in the determination of Eigen values and Eigen vectors of square matrix.
- To analyze the performance of various interpolation technique and perform error analysis.
- To compare various numerical differentiation and integration techniques.
- To explain the various techniques to study Initial and Boundary value problems in ODE.
- To solve a range of problems on applicable software.

COURSE OUTCOMES: At the end of the course the student will be able to

- Solve linear algebraic system by direct and iteration methods.
- Apply the knowledge of Eigen values and Eigen vectors to some contents in engineering.
- Develop the skill of working with symmetric matrices in the study of Engineering problems.
- Apply the knowledge of interpolation and extrapolation of uniform and non uniform data to certain contents of Civil Engineering.
- Apply the knowledge of numerical differentiation and integration to some contents of Civil Engineering.
- Learn grid based methods to solve Initial and Boundary value problems that arise in engineering problems.
- Develop the skill of solving computational problems using software.

UNIT-I


UNIT-II

UNIT - III


UNIT-IV


UNIT-V


*NOTE:* Demonstration of solutions using open source software in Numerical Methods only for the knowledge of students to apply in their Project Works. Not for examination.

**TEXT BOOKS**

2. S.S.Shastry, Numerical methods.

**REFERENCES BOOKS**

3. Dr. M.Shanta Kumar, Computer based numerical analysis, Khanna Book publishers, New Delhi.
COURSE OBJECTIVES

- To learn how to build the best processor/computing system understanding the underlying tradeoffs and ramifications.
- To identify and analyze the attributes of computer architecture design with recent trend technology.
- To identify the techniques to improve the speed and performance of computers – Parallelism in Instruction level – Hardware approaches - pipelining, dynamic scheduling, superscalar processors, and multiple issue of instructions.
- To implement the design aspects and categorize various issues, causes and hazards due to parallelisms.
- To examine and compare the performance with benchmark standards.
- To understand the framework for evaluating design decisions in terms of application requirements and performance measurements.
- To learn the design and analysis of complex and high performance multiprocessors and supporting subsystems from the quantitative aspect.

COURSE OUTCOMES: After going through this course the student will be able to

- An ability to discuss the organisation of computer-based systems and how a range of design choices are influenced by applications.
- An ability to understand the components and operation of a memory hierarchy and the range of performance issues influencing its design.
- An ability to interpret the organisation and operation of current generation parallel computer systems, including multiprocessor and multicore systems.
- An ability to understand the various techniques to enhance a processors ability to exploit instruction-level parallelism (ILP), and its challenges.
- An ability to know the classes of computers, and new trends and developments in computer architecture.
- An ability to develop the applications for high performance computing systems.
- An ability to undertake performance comparisons of modern and high performance computers.

UNIT -I

Instruction set principles and examples- Introduction, classifying instruction set- memory addressing type and size of operands, Operations in the instruction set.

UNIT-II
Pipelines: Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.


UNIT-III
Instruction Level Parallelism (ILP) - The Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo’s approach, Branch prediction, High performance instruction delivery- Hardware based speculation.

ILP Software Approach:
Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software.

UNIT-IV
Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism-Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – Memory architecture, Synchronization.

UNIT-V
Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS

REFERENCE BOOKS
COURSE OBJECTIVES: The Objective of this course is to provide

- Analysis of quantitative methods and techniques for effective Decision–making.
- Constructing models that are used in solving business decision problems.
- Introduce the students to the use of basic methodology for the solution of linear programs and integer programs.
- Introduce the students to methods for solving large-scale transportation and assignment problems.
- Illustrate how sequencing is carried out in assigning jobs to machines.
- Understand the concept of Inventory and apply different models in optimizing the same.
- Apply PERT/CPM: [Project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc. in an optimal way.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Apply various linear programming techniques for optimal allocation of limited resources such as machine, materials and money.
- Solve transportation problems to minimize cost and understand the principles of assignment of jobs and recruitment policies.
- Solve game theory problems.
- Solve problems of inventory and develop proper inventory policies.
- Apply PERT/CPM: [Project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc in a optimal way.
- Solve sequencing problems.
- Develop optimum replacement policy.

UNIT-I

Introduction: Definition and scope of operations research(OR), OR model, solving the OR model, art of modeling, phases of OR study.

Linear Programming:
Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

UNIT-II

Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms.
Assignment: Allocation and assignment problems and models, processing of job through machines.

UNIT-III
Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.
Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

UNIT-IV
Theory of Games: Rectangular games, Min-max theorem, graphical solution of 2xnormx2 games, game with mixed strategies, reduction to linear programming model.
Quality Systems: Elements of Queuing model, generalized Poisson queuing model.

UNIT-V
Inventory Control: Models of inventory, operation of inventory system, quantity discount.
Replacement models: Equipments that deteriorate with time, equipments that fail with time.

TEXT/REFERENCE BOOKS:

TEACHING METHODOLOGY
1. Lecture is delivered on blackboard, preparing OHP sheets and by preparing Power point presentations.
2. Seminars are conducted on new technologies related to subject.
3. Assignments are given.
4. Group discussions are conducted on familiar topics related to subject.
5. Industrial visits for practical exposure to understand and explore things.