ACADEMIC REGULATIONS

PROGRAM STRUCTURE

and

DETAILED SYLLABUS

Master of Technology

(Embedded Systems)

(Two Year Regular Programme)

(Applicable for Batches admitted from 2018)

GokarajuRangaraju Institute of Engineering and Technology

(Autonomous)

Bachupally, Kukatpally, Hyderabad- 500 090

GokarajuRangaraju Institute of Engineering and Technology
Department of Electronics and Communication Engineering
EMBEDDED SYSTEMS

I YEAR - I SEMESTER

Sl. No	Group	Subject Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Core	GR18D5099	Embedded System Design	3	0	0	3	3	30	70	100
2	Core	GR18D5100	Microcontrollers for Embedded system Design	3	0	0	3	3	30	70	100
3	**PE I**	GR18D5101 GR18D5083 GR18D5102	1. Embedded Real Time Operating Systems 2.VLSI Technology and Design 3.Embedded Computing	3	0	0	3	3	30	70	100
4	**PE II**	GR18D5078 GR18D5103 GR18D5104	1.Digital System Design 2.Soft Computing Techniques 3.Sensors and Actuators	3	0	0	3	3	30	70	100
5	Core	GR18D5105	Embedded System Design Lab	0	0	4	4	2	30	70	100
6	Core	GR18D5106	Microcontrollers Lab	0	0	4	4	2	30	70	100
7	Core	GR18D5012	Research Methodology and IPR	2	0	0	2	2	30	70	100
		Total		**14**	**0**	**8**	**22**	**18**	**210**	**490**	**700**
8	Audit		Audit course -1	2	0	0	2	2	30	70	100

I YEAR - II SEMESTER

Sl. No	Group	Subject Code	Subject	Hours			Total Hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Core	GR18D5107	Embedded Networking	3	0	0	3	3	30	70	100
2	Core	GR18D5108	Digital Signal Processors	3	0	0	3	3	30	70	100
3	**PE III**	GR18D5093 GR18D5089 GR18D5109	1.Hardware Software CoDesign 2.System on Chip Architecture 3.Advanced Operating System	3	0	0	3	3	30	70	100
4	**PE IV**	GR18D5110 GR18D5111 GR18D5112	1.Network Security 2.CPLD and FPGA Architectures and Applications 3.Internet of Things(IoT)	3	0	0	3	3	30	70	100
5	Core	GR18D5113	Embedded C Lab	0	0	4	4	2	30	70	100
6	Core	GR18D5114	Digital Signal Processors Lab	0	0	4	4	2	30	70	100
7	Core	GR18D5190	Mini-Projects	2	0	0	2	2	30	70	100
		Total		**14**	**0**	**8**	**22**	**18**	**210**	**490**	**700**
8	Audit		Audit course – 2	2	0	0	2	2	30	70	100

II YEAR - I SEMESTER

Sl. No	Group	Subject code	Subject	Hours			Total hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	**PE V**	GR18D5114 GR18D5116 GR18D5117	1. Artificial Neural Networks and Fuzzy Systems 2. Sensor Networks 3. Multimedia Signal Coding	3	0	0	3	3	30	70	100
2	**Open Elective**	GR18D5201 GR18D5202 GR18D5203 GR18D5204 GR18D5205 GR18D5206	1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy	3	0	0	3	3	30	70	100
3	Dissertation	GR18D5191	Dissertation (Phase – I)	0	0	20	20	10	30	70	100
Total				**6**	**0**	**20**	**26**	**16**	**90**	**210**	**300**

II YEAR - II SEMESTER

Sl. No	Group	Subject Code	Subject	Hours			Total hours	Credits	Int. Marks	Ext. Marks	Total Marks
				L	T	P					
1	Dissertation	GR18D5192	Dissertation(Phase – II)	0	0	32	32	16	30	70	100
		Total		**0**	**0**	**32**	**32**	**16**	**30**	**70**	**100**

Audit course 1 & 2

1. English for Research Paper Writing (GR18D5207)
2. Disaster Management (GR18D5208)
3. Sanskrit for Technical Knowledge (GR18D5209)
4. Value Education (GR18D5210)
5. Indian Constitution(GR18D5211)
6. Pedagogy Studies (GR18D5212)
7. Stress Management by Yoga (GR18D5213)
8. Personality Development through Life Enlightenment Skills. (GR18D5214)

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GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED SYSTEM DESIGN

Course Code: GR18D5099 **L/T/P/C: 3/0/0/3**

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

- Differentiate 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.
- Apply modern engineering tools necessary for integrating software and hardware components in embedded system designs.
- Analyze Embedded Firmware Design Approaches and Development Languages..
- Demonstrate which operating system/real time operating system is best suitable for the decided embedded application

Unit I: INTRODUCTION TO EMBEDDED SYSTEMS

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

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: On-board 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.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROCONTROLLERS FOR EMBEDDED SYSTEM DESIGN

Course Code: GR18D5100 **L/T/P/C: 3/0/0/3**

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

- 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 interpret the functions of Memory Management Unit (MMU).
- An ability to compare the performance of various ARM families of Microcontrollers.

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 BranchInstructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions.

Unit IV: ARM PROGRAMMING

Simple C Programs using Function Calls, Pointers, Structures, Integer andFloating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

Unit V: MEMORY MANAGEMENT

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

Text Books

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.

Reference Books

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED REAL TIME OPERATING SYSTEMS

Course Code: GR18D5101 **L/T/P/C: 3/0/0/3**

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.

Course outcomes

- Students will be able to operate on a Unix/Linux operating system for embedded system application code development.
- Students will be skillful to perform some basic level system programming.
- Students will be equipped with the coding techniques to establish synchronization in embedded systems involving multiprocessing.
- 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: EXCEPTIONS, INTERRUPTS AND TIMERS

Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

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

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

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.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VLSI TECHNOLOGY AND DESIGN

Course Code: GR18D5083 **L/T/P/C: 3/0/0/3**

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 behaviour of MOS, CMOS and Bi CMOS circuits.
- 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, BiCMOSTechnology, Basic Electrical Properties of MOS, CMOS &BiCMOS Circuits: Ids – Vds relationships, Threshold Voltage Vt, gm, gds and ωo, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zp.u/Zp.d, MOS Transistor circuit model, Latch-up in CMOS circuits.

Unit II: LAYOUT DESIGN AND TOOLS

Transistor structures, Wires and Vias, Scalable Design rules, LayoutDesign tools.**Logic Gates & Layouts:** Static Complementary Gates, Switch Logic, Alternative Gate circuits,Low power gates, Resistive and Inductive interconnect delays.

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

1.Essentials of VLSI Circuits and Systems, K. EshraghianEshraghian. D, A. Pucknell, 2005, PHI.

2.Modern VLSI Design – Wayne Wolf, 3rd Ed., 1997, Pearson Education.

Reference Books

1.Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.

2.Principals of CMOS VLSI Design – N.H.E Weste, K. Eshraghian, 2nd Ed., Addison Wesley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED COMPUTING

Course Code: GR18D5102 **L/T/P/C: 3/0/0/3**

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 explain the basics of networking
- To summarize IA32 Instruction set and explain the students to work with simulation and debugging tools.

Course outcomes

- 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

Unit I: PROGRAMMING ON LINUX PLATFORM

System Calls, Scheduling, Memory Allocation, Timers,Embedded Linux, Root File System, Busy Box. Operating System Overview: Processes, Tasks, Threads, Multi-Threading, Semaphore,Message Queue.

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 moduleinterfacing 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

1. Modern Embedded Computing - Peter Barry and Patrick Crowley, 1st Ed., Elsevier/Morgan Kaufmann, 2012.
2. Linux Application Development - Michael K. Johnson, Erik W. Troan, Adission Wesley, 1998.
3. Assembly Language for x86 Processors by Kip R. Irvine
4. Intel® 64 and IA-32 Architectures Software Developer Manuals

Reference Books

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin and Greg Gagne.
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

Course Code: GR18D5078 **L/T/P/C: 3/0/0/3**

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

- Create understanding of the design techniques of sequential Machines.
- Create understanding of the fundamental concepts of PLD's, design of FPGA's.
- Develop skills in modelling Sequential circuits in terms of reliability, availability and safety.
- Develop skills in modelling fault detection experiments of sequential circuits.
- Develop skills in modelling combinational circuits in terms of reliability, availability and safety.

Unit I: MINIMIZATION AND TRANSFORMATION OF SEQUENTIAL MACHINES

The Finite State Model – Capabilities and limitations of FSM – State equivalence and machine minimization – Simplification of incompletely specified machines. Fundamental mode model – Flow table – State reduction – Minimal closed covers – Races, Cyclesand Hazards.

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: FAULT MODELING & TEST PATTERN GENERATION

Logic Fault model – Fault detection & Redundancy-Fault equivalence and fault location – Fault dominance – Single stuck at fault model – Multiple stuck at fault models –Bridging fault model. Fault diagnosis of combinational circuits by conventional methods – Path sensitization techniques, Boolean Difference method – Kohavi algorithm – Test algorithms – D algorithm, PODEM, Random testing, Transition count testing, Signature analysis and test bridging faults.

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

1.Fundamentals of Logic Design – Charles H. Roth, 5th Ed., Cengage Learning.

2.Digital Systems Testing and Testable Design – MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

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

Reference Books

1.Switching and Finite Automata Theory – Z. Kohavi , 2nd Ed., 2001, TMH

2.Digital Design – Morris Mano, M.D.Ciletti, 4th Edition, PHI.

3.Digital Circuits and Logic Design – Samuel C. Lee, PHI.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SOFT COMPUTING TECHNIQUES

Course Code: GR18D5103 **L/T/P/C: 3/0/0/3**

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.

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.

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, Self organizing 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: APPLICATIONS

GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems

Text books

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

Reference books

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SENSORS AND ACTUATORS

Course Code: GR18D5104 **L/T/P/C: 3/0/0/3**

Course objectives

- Describe the criteria for selecting a sensor for a particular measurement.
- Determine characteristics of various types of mechanical sensors.
- Interpret physical principles applied in sensors and actuators.
- Identify various types of sensors including thermal, mechanical, electrical, electro mechanical and optical sensors.
- Apply the acquired knowledge to specific Sensors and Actuators related problems and projects at work.

Course outcomes

- Relate about the working principles and architecture of a large number ofsensors and their elements
- Classify the use sensors and equipmentfor measuring mechanical quantitiesand temperature.
- Apply the architecture and working principles of the most common electrical motor types.
- Identify and discriminate various electrical drives and actuators.
- Analyze and interpret in an active way with the specialists in these areas.

Unit I: SENSORS / TRANSDUCERS

Principles – Classification – Parameters – Characteristics –Environmental Parameters (EP) – Characterization

Mechanical and Electromechanical Sensors: Introduction – Resistive Potentiometer – StrainGauge – Resistance Strain Gauge – Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor –Types-Capacitive Sensors:– Electrostatic Transducer– Force/Stress Sensors Using Quartz Resonators – Ultrasonic Sensors.

Unit II: THERMAL SENSORS

Introduction – Gas thermometric Sensors – Thermal Expansion TypeThermometric Sensors – Acoustic Temperature Sensor – Dielectric Constant and Refractive Index thermosensors – Helium Low Temperature Thermometer – Nuclear Thermometer – Magnetic Thermometer – Resistance Change Type Thermometric Sensors –Thermoemf Sensors– JunctionSemiconductor Types– Thermal Radiation Sensors –Quartz Crystal Thermoelectric Sensors – NQR Thermometry – Spectroscopic Thermometry – Noise Thermometry – Heat Flux Sensors Magnetic sensors: Introduction – Sensors and the Principles Behind – Magneto-resistive Sensors –Anisotropic Magnetoresistive Sensing – Semiconductor Magnetoresistors–

Hall Effect and Sensors –Inductance and Eddy Current Sensors– Angular/Rotary Movement Transducers – Synchros –Synchro-resolvers - Eddy Current Sensors – Electromagnetic Flowmeter – Switching Magnetic Sensors SQUID Sensors

Unit III: RADIATION SENSORS

Introduction – Basic Characteristics – Types of Photosensistors/Photodetectors– X-ray and Nuclear Radiation Sensors– Fiber Optic Sensors Electro analytical Sensors: Introduction – The Electrochemical Cell – The Cell Potential – Standard Hydrogen Electrode (SHE) – Liquid Junction and Other Potentials – Polarization – Concentration Polarization-– Reference Electrodes - Sensor Electrodes – Electro ceramics in Gas Media .

Unit IV: SMART SENSORS

Introduction – Primary Sensors – Excitation – Amplification – Filters – Converters– Compensation– Information Coding/Processing - Data Communication – Standards for Smart Sensor Interface – The Automation Sensors–Applications: Introduction – On-board Automobile Sensors (Automotive Sensors)– Home Appliance Sensors – Aerospace Sensors – – Sensors for Manufacturing –Sensors for environmental Monitoring.

Unit V: ACTUATORS

Pneumatic and Hydraulic Actuation Systems- Actuation systems – Pneumatic andhydraulic systems - Directional Control valves – Presure control valves – Cylinders - Servo and proportional control valves – Process control valves – Rotary actuators Mechanical Actuation Systems- Types of motion – Kinematic chains – Cams – Gears – Ratchet and pawl – Belt and chain drives – Bearings – Mechanical aspects of motor selection Electrical Actuation Systems-Electrical systems -Mechanical switches – Solid-state switches Solenoids – D.C. Motors – A.C. motors – Stepper motors

Text Books

1. D. Patranabis – “Sensors and Transducers” –PHI Learning Private Limited.
2. W. Bolton – “Mechatronics” –Pearson Education Limited.

Reference Books

1. Sensors and Actuators – D. Patranabis – 2nd Ed., PHI, 2013.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED SYSTEM DESIGN LAB

Course Code: GR18D5105 **L/T/P/C: 0/0/4/2**

Course objectives

- To impart the knowledge on TivaC Launchpad Board &its programming
- To extract the features of ARM processor and interfacing with different peripherals.
- To understand the use of RTOS with ARM processor on Energia IDE.
- To understand concept of SPI and I2C protocols.
- To develop an application with ARM processor.

Course outcomes: The students will be able to

- Acquire the knowledge on Tiva C launchpad board &its programming.
- Work on TIVA C launch pad board.
- Interface different peripherals with TIVA C launchpad.
- Develop various applications using SPI and I2C Protocols.
- Define and Design a project on the exposure with ARM processor.

Task1

Program to configure and control General Purpose Input/output (GPIO)Port pins of TIVA C Launchpad.

Task2

Program to interface Analog signals with ARM.

Task3

Program to Sample the sound using a microphone and display the sound levels.

Task4

Program to interface EEPROM with ARM using I2C protocol.

Task5

Program to interface I2C Temperature sensor with ARM.

Task6

Program to interface Accelerometer with ARM.

Task7

Program to interface 128x32 pixel OLED display with ARM.

Task8

Program to demonstrate external interrupt handling.

Task9

Program to interface Real Time Clock with ARM.

Task10

Program to interface GSM Module with ARM board for sending SMS.

Task11

Program to interface Biomedical sensor with ARM.

Task12

Program to Port RTOS on to ARM development board.

Note

- Minimum of 10 experiments have to be conducted.
- The following programs have to be tested on TIVA C Launchpad(ARM Cortex-M4-based microcontroller)/equivalent using Embedded C Language on Energia IDE or Equivalent.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MICROCONTROLLERS LAB

Course Code: GR18D5106 **L/T/P/C: 0/0/4/2**

Course objectives

- To impart the knowledge of ARM processor architecture &its programming
- To extract the features of ARM processor and interfacing with different peripherals.
- To understand the concept of Embedded C and ARM programming.
- To understand the concept of Embedded web server
- To develop wireless based applications using ARM.

Course outcomes: The students will be able to

- Acquire the knowledge of ARM Processor architecture &its programming.
- Develop an application in Arduino IDE using ARM.
- Interface ARM Processor with different peripherals.
- Implement Ethernet based server using ARM.
- Implement a wireless based appliance control system.

Task1

Program to configure and control General Purpose Input/output (GPIO)port pins of ARM.

Task2

Program for UART-Echo test.

Task3

Program to get analog input from Temperature sensor and display the temperature value on PC.

Task4

Program to interface LCD with ARM for displaying a message on it.

Task5

Program to implement RFID based access control system.

Task6

Program to Develop Bluetooth based monitoring and appliance control System.

Task7

Program for wireless based data transfer using Zigbee.

Task8

Program for generation of PWM signal.

Task9

Program to implement the Embedded Web Server using Ethernet module.

Task10

Program for reading and writing of a file on SD card.

Task11

Program to Interface SD card module with ARM to produce Audio output on speaker.

Task12

Program to interface USB based mouse/keyboard with ARM.

Note:

- Minimum of 10 experiments have to be conducted.
- Experiments to be carried out on ARM based board (Arduino Due-ATMEL SAM3X8E ARM Cortex –M3 CPU) or equivalent using Embedded C Language on Arduino IDE or Equivalent.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

RESEARCH METHODOLOGY AND IPR

Course Code: GR18D5012 **L/T/P/C: 2/0/0/2**

Course objectives:

- To familiarise students with the different aspects of research.
- To provide an idea of good scientific writing and proper presentation skills.
- To provide an understanding of philosophical questions behind scientific research.
- To provide a brief background on the historical legacy of science.
- To provide an insight of nature of Intellectual Property and new developments in IPR.

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

- Understand research problem formulation.
- Analyze research related information and 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 emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering.
- Understand the nature of Intellectual Property and IPR in International scenario.

Unit I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit II

Effective literature studies approaches, analysis Plagiarism, Research ethics,

Unit III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases.Geographical Indications.

Reference Books

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’”
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
3. Ranjit Kumar, 2nd Edition , “Research Methodology: A Step by Step Guide for beginners”
4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
5. Mayall , “Industrial Design”, McGraw Hill, 1992.
6. Niebel , “Product Design”, McGraw Hill, 1974.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED NETWORKING

Course Code: GR18D5107 **L/T/P/C: 3/0/0/3**

Course objectives

- To study various embedded communication protocols.
- To learn USB and CAN bus protocols.
- To know the basics of Ethernet module.
- To understand the concept of embedded web server.
- To familiarize about wireless sensor networks.

Course outcomes

- Differentiate serial and parallel communication protocols.
- Design and develop an application using USB and CAN Protocols
- Demonstrate working principle of Ethernet module.
- Write a HTML code for creating webpages.
- Develop an application for serving webpages with dynamic data.

Unit I: EMBEDDED COMMUNICATION PROTOCOLS

Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming - ISA/PCI Bus protocols – Fire wire.

Unit II: USB AND CAN BUS

USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

Unit III: ETHERNET BASICS

Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components –Ethernet Controllers –Using the internet in local and internet communications – Inside the Internet protocol.

Unit IV: EMBEDDED ETHERNET

Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure.

Unit V: WIRELESS EMBEDDED NETWORKING

Wireless sensor networks – Introduction – Applications – Network Topology – Localization – Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing –Data Centric routing.

Text Books

1. Embedded Systems Design: A Unified Hardware/Software Introduction - Frank Vahid, Tony Givargis, John & Wiley Publications, 2002
2. Parallel Port Complete: Programming, interfacing and using the PCs parallel printer port - Jan Axelson, Penram Publications, 1996.

Reference Books

1. Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series - Dogan Ibrahim, Elsevier 2008.
2. Embedded Ethernet and Internet Complete - Jan Axelson, Penram publications, 2003.
3. Networking Wireless Sensors - BhaskarKrishnamachari, Cambridge press 2005.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SIGNAL PROCESSORS

Course Code: GR18D5108 **L/T/P/C: 3/0/0/3**

Course objectives

- To provide sound foundation of digital signal processing (DSP) architectures for designing efficient VLSI architectures for DSP systems.
- To analyze general purpose digital signal processors.
- To understand pipelining, parallel processing and retiming.
- To illustrate the features of on-chip peripheral devices and its interfacing along with its programming details.
- To analyze DSP architectures.

Course outcomes

- An ability to design analog and digital filters for signal-processing applications.
- An ability to learn the architecture details and instruction sets of fixed and floating point DSPs.
- An ability to analyze and learn to implement the signal processing algorithms in DSPs.
- An ability to learn the DSP programming tools and use them for applications.
- An ability to design and implement signal processing modules in DSPs.

Unit I: INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Introduction, a Digital signal-processing system, thesampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.Computational Accuracy in DSP Implementations:Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Unit II: ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES

Basic Architectural features, DSPComputational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Unit III: PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial Digital signal-processing Devices, DataAddressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX Instructions and

Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

Unit IV: ANALOG DEVICES FAMILY OF DSP DEVICES

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

Unit V: INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Text Books

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach To Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the Micro Signal Architecture: Woon-Seng Gan, Sen M.Kuo, Wiley-IEEE Press, 2007

Reference Books

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing – Jonatham Stein, 2005, John Wiley.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

HARDWARE SOFTWARE CO-DESIGN

Course Code: GR18D5093 **L/T/P/C: 3/0/0/3**

Course objectives

- Describe an embedded system design flow from specification to physical realization
- Describe structural behavior of systems.
- Master complex systems.
- Devise new theories, techniques, and tools in design, implementation and testing.
- Master contemporary development techniques.

Course outcomes

- Gain knowledge of contemporary issues and algorithms used.
- Know the interfacing components, different verification techniques and tools.
- Demonstrate practical skills in the construction of prototypes.
- Understand the use of modern hardware and software tools for building prototypes of embedded systems.
- Apply embedded software techniques to satisfy functional and response time requirements.

Unit I: CO- DESIGN ISSUES

Co- Design Models, Architectures, Languages, A Generic Co-design Methodology.

Co- Synthesis algorithms

Hardware software synthesis algorithms: hardware – software partitioning distributed system co-synthesis.

Unit II: PROTOTYPING AND EMULATION

Prototyping and emulation techniques, prototyping and emulation environments, future developments in emulation and prototyping architecture specialization techniques, system communication infrastructure

Target architectures

Architecture Specialization techniques, System Communication infrastructure, Target Architecture and Application System classes, Architecture for control dominated systems (8051-Architectures for High performance control), Architecture for Data dominated systems (ADSP21060, TMS320C60), Mixed Systems.

Unit III: COMPILATION TECHNIQUES AND TOOLS FOR EMBEDDED PROCESSOR ARCHITECTURES

Modern embedded architectures, embedded software development needs, compilation technologies, practical consideration in a compiler development environment.

Unit IV: DESIGN SPECIFICATION AND VERIFICATION

Design, co-design, the co-design computational model, concurrency coordinating concurrent computations, interfacing components, design verification, implementation verification, verification tools, interface verification.

Unit V

Languages For System – Level Specification And Design-I

System – level specification, design representation for system level synthesis, system level specification languages,

Languages for system – level specification and design-II

Heterogeneous specifications and multi language co-simulation, the cosyma system and lycos system.

Text Books

1. Hardware / Software Co- Design Principles and Practice – Jorgen Staunstrup, Wayne Wolf –2009, Springer.
2. Hardware / Software Co- Design - Giovanni De Micheli, Mariagiovanna Sami, 2002, Kluwer Academic Publishers

Reference Books

1. A Practical Introduction to Hardware/Software Co-design -Patrick R. Schaumont - 2010 –Springer

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SYSTEM ON CHIP ARCHITECTURE

Course Code: GR18D5089 **L/T/P/C: 3/0/0/3**

Course objectives

- To describe the system design approach with respect to the hardware and software.
- To apply the techniques for reducing the delays in program execution.
- To categorize and compare different processor types for their selection into a System on Chip.
- To compare different memory designs and their purposes.
- To interpret the architectures and applications of various buses.

Course outcomes

- Identify and formulate a given problem in the framework of SOC based design approaches.
- Design SOC based system for engineering applications.
- Realize impact of SOC on electronic design philosophy and Macro-electronics.
- Incline towards entrepreneurship & skill development.
- To analyze and choose from different reconfigurable devices for a system on chip.

Unit I: INTRODUCTION TO THE SYSTEM APPROACH

System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

Unit II: PROCESSORS

Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

Unit III: MEMORY DESIGN FOR SOC

Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

Unit IV: INTERCONNECT CUSTOMIZATION AND CONFIGURATION

Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance-Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

Unit V: APPLICATION STUDIES / CASE STUDIES

SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

Text Books

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

Reference Books

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques –Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ADVANCED OPERATING SYSTEM

Course Code: GR18D5109 **L/T/P/C: 3/0/0/3**

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.

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Course outcomes

- 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 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 operation

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.
Communication in Distributed Systems: Layered protocols, ATM networks, Client – Server model, Remote procedure call and Group Communication.

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.
3. The Complete reference LINUX – Richard Peterson, 4th Ed., McGraw – Hill.

Reference Books

1. Operating Systems: Internal and Design Principles - Stallings, 6th Ed., PE.
2. Modern Operating Systems, Andrew S Tanenbaum, 3rd Ed., PE.
3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Ed., John Wiley
4. UNIX User Guide – Ritchie & Yates.
5. UNIX Network Programming - W.Richard Stevens, 1998, PHI

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

NETWORK SECURITY

Course Code: GR18D5110 **L/T/P/C: 3/0/0/3**

Course objective

- To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
- To study various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
- To know Digital Signature Standard and provide solutions for their issues.
- To be familiar with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel;
- To verification of the authenticity of the source of a message.

Course outcome

- To outline the different OSI layers and their functionalities.
- To impart knowledge on Encryption techniques, Design Principles and Modes of Operation.
- To design a security solution for a given application
- To understand the Key Management techniques and Number Theory.
- To create an understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.

Unit I: INTRODUCTION

Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Unit II: MODERN TECHNIQUES

Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2,Characteristics of Advanced Symmetric blockcifers.

Conventional encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Public key cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Unit III: NUMBER THEORY

Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler'stheorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

Message authentication and hash functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Unit IV: HASH AND MAC ALGORITHMS

MD File, Message digest Algorithm, Secure Hash Algorithm,RIPEMD-160, HMAC. Digital signatures and Authentication Protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication applications: Kerberos, X.509 directory Authentication service .Electronic Mail Security: Pretty Good Privacy, S/MIME.

Unit V: IP SECURITY

Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management.

Web security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders'

Viruses and worms: Intruders, Viruses and Related threats. Fire Walls: Fire wall Design Principles, Trusted systems.

Text Books

1.Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.

2.Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

Reference Books

1.Fundamentals of Network Security by Eric Maiwald (Dreamtech press)

2.Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

CPLD AND FPGA ARCHITECTURES AND APPLICATIONS

Course Code: GR18D5081 **L/T/P/C: 3/0/0/3**

Course objectives

- To understand the concept of Programmable Logic Device architectures and technologies.
- Underlying FPGA architectures and technologies in detail.
- To understand the difference between CPLDs and FPGAs
- To provide knowledge about SRAM Programmable FPGA Device architecture.
- To comprehend knowledge about Anti-Fuse Programmable FPGA Device architecture.

Course outcomes

- To know the concept of programmable architectures.
- Perceiving CPLD and FPGA technologies
- Study and compare the different architectures of CPLDs and FPGAs
- An ability to know the SRAM Technology based FPGAs
- Design and impose applications using FPGAs.

Unit I: INTRODUCTION TO PROGRAMMABLE LOGIC DEVICES

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

Unit II: FIELD PROGRAMMABLE GATE ARRAYS

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

Unit III: SRAM PROGRAMMABLE FPGAS

Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

Unit IV: ANTI-FUSE PROGRAMMED FPGAS

Introduction, Programming Technology, Device Architecture, The Actel ACT1, ACT2 and ACT3 Architectures.

Unit V: DESIGN APPLICATIONS

General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

Text Books

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design - Charles H. Roth Jr, Lizy Kurian John, Cengage Learning.

Reference Books

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.
2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/SamihaMourad, Pearson Low Price Edition.
3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.
4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INTERNET OF THINGS

Course Code: GR18D5112 **L/T/P/C: 3/0/0/3**

Course objectives

- To introduce the terminology, technology and its applications.
- Understand the concepts of Internet of Things
- Analyze basic protocols in wireless sensor network
- To introduce the implementation of web based services on IOT devices ,
- To Apply IOT to different applications

Course outcomes

- Understand the new computing technologies
- Able to apply the latest computing technologies like cloud computing technology and Big Data
- Ability to introduce the concept of M2M (machine to machine) with necessary protocols
- Gets the skill to program using python scripting language which is used in many IOT devices.
- Design IOT applications in different domain and be able to analyze their performance

Unit I: INTRODUCTION TO INTERNET OF THINGS

Definition and Characteristics of IOT, Physical Design of IOT – IOT Protocols, IOT Communication Models, IOT Communication APIs IOT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IOT Levels and Templates Domain Specific IOTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle

Unit II: IOT AND M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IOT Basics of IOT System Management with NETCOZF, YANGNETCONF, YANG, SNMP NETOPEER

Unit III: INTRODUCTION TO PYTHON

Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

Unit IV: IOT PHYSICAL DEVICES AND ENDPOINTS

Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Unit V: IOT PHYSICAL SERVERS AND CLOUD OFFERINGS

Introduction to Cloud Storage models and communication APIs Web server – Web server for IOT, Cloud for IOT, Python web application framework Designing a REST ful web API Text Books: 1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547 2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

References Books

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012

2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)

3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

EMBEDDED C LAB

Course Code: GR18D5113 **L/T/P/C: 0/0/4/2**

Course objectives

- To impart the knowledge on WiFi based Board &its programming
- To extract the features of WiFi based Board and interfacing with different peripherals.
- To learn the concepts of IOT.
- To learn different protocols used in IOT.
- To Apply IOT to different applications

Course outcomes: The students will be able to

- Programming on NODE MCU /WiFi based board.
- Implement WiFi based web server.
- Understand the concepts of Internet of Things
- Analyze basic protocols in wireless sensor network
- Design IOT applications in different domain and be able to analyze their performance

Task1

Program to Interface sensors (DHT11 and LDR) with WiFi based board and display the sensor values on PC.

Task2

Program to control the appliances using Relay module.

Task3

Program to implement WiFi based Web Server.

Task4

Program to send sensors data to cloud using WiFi module.

Task5

Program to implement IOT based appliance control system.

Task6

Program to sends alert using internet when sensor readings are abnormal.

Task7

Program to demonstrate mobile app Development.

Task8

Program to implement IoT based motion detector using WiFi module and android app.

Task9

Program to implement GISMO as Zigbee to WiFi Gateway.

Task10

Program to implement GISMO as Bluetooth toWiFi Gateway.

Task11

Program to implement IOT based Scrolling Display.

Task12

Program to implement IOT based health care monitoring and alert system

Note:

- Minimum of 10 experiments have to be conducted.
- The following programs have to be tested on GISMO IV (GRIET IoT Sensor Module) Board or NODE MCU (WiFi based board)/equivalent using Embedded C Language on Arduino IDE or equivalent.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DIGITAL SIGNAL PROCESSORS LAB

Course Code: GR18D5114 **L/T/P/C: 0/0/4/2**

Course objectives

- To analyze the basic signal processing operations for DSP systems.
- To learn the frequency response of filters.
- To understand the architecture of TMS32054xx processor.
- To comprehend the programming of TMS32054xx processor.
- To familiarize the different addressing modes of TMS32054xx processor.

Course outcomes

- To design analog and digital filters.
- To perform decimation and interpolation.
- To analyze the spectral characteristics of digital signals.
- To design and implement signal processing modules using
- To generate various signals on TMS32054xx processor TMS32054xx processor.

Task1

Discrete and Fast Fourier transform (DFT, FFT) representation for a given sequence.

Task2
Frequency response and time-domain simulation of FIR low pass and high pass filters.
Task3
Frequency response and time-domain simulation of IIR low pass and high pass filters.
Task4
Implementation of Decimation Process.
Task5
Implementation of Interpolation Process.
Task6
Estimation of Power Spectral Density.
Task7
Basic programs on TMS32054xx processor for familiarizing the arithmetic instructions.
Task8
Waveform/Signal generation on TMS32054xx processor using look up tables.
Task9
Programs on different addressing modes of TMS32054xx processor.
Task10
FIR and IIR filter implementation using TMS32054xx processor.
Task11
Programs on TMS32054xx processor for processing real time signals.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS

Course Code: GR18D5115 **L/T/P/C: 3/0/0/3**

Course objective

- To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
- To know about feedback networks.
- To learn about the concept of fuzziness involved in various systems
- To understand the concept of adequate knowledge about fuzzy set theory.
- To learn about comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm

Course outcomes

- To Expose the students to the concepts of feed forward neural networks
- To provide adequate knowledge about feedback networks.
- To teach about the concept of fuzziness involved in various systems.
- To provide adequate knowledge about fuzzy set theory.
- To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.

Unit I: INTRODUCTION TO NEURAL NETWORKS

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

Unit II: ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

Feed forward neural networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications.

Unit III: MULTILAYER FEED FORWARD NEURAL NETWORKS

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

Associative memories: Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory (Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory), Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem

Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

Unit IV: SELF-ORGANIZING MAPS (SOM) AND ADAPTIVE RESONANCE THEORY (ART)

Introduction, Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability-Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2, Applications. **Classical& Fuzzy Sets** Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

Unit V: FUZZY LOGIC SYSTEM COMPONENTS

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods. **Applications**

Neural network applications: Process identification, Function Approximation, control and Process Monitoring, fault diagnosis and load forecasting. **Fuzzy logic applications:** Fuzzy logic control and Fuzzy classification.

Text Books

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.

Reference Books

1. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. Yadaiah and S. Bapi Raju, Pearson Education

2. Neural Networks – James A Freeman and Davis Skapura, Pearson, 2002.
3. Neural Networks – Simon Hykins , Pearson Education
4. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
5. Neural Networks and Fuzzy Logic System by Bork Kosko, PHI Publications.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SENSOR NETWORKS

Course Code: GR18D5116 **L/T/P/C: 3/0/0/3**

Course objective

- To develop an understanding of sensor network architectures from a design and performance perspective.
- To understand the layered approach in sensor networks starting from physical layer to application layer.
- To study the WSN protocols.
- To study TinyOS and Contiki.
- To get adequate exposure to emerging technologies and their potential impact.

Course outcomes

- Differentiate MAC layer protocols
- Identify different issues in wireless ad hoc and sensor networks
- Know about routing in WSN.
- To analyze protocols developed for ad hoc and sensor networks
- To identify and understand security issues in ad hoc and sensor networks

Unit I: MAC & ROUTING IN AD HOC NETWORKS

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple-Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols.

Unit II: TRANSPORT & QOS IN AD HOC NETWORKS

TCP‟s challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model.

Unit III: MAC & ROUTING IN WIRELESS SENSOR NETWORKS

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zig bee – Topology Control – Routing Protocols.

Unit IV: TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless Sensor Networks – Congestion Control – In-network processing – Operating systems for wireless sensor networks – Examples.

Unit V: SECURITY IN AD HOC AND SENSOR NETWORKS

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Antitamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS.

Text Books

1.KazemSohraby, Daniel Minoli and TaiebZnati, " Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2007.
2.Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Ltd, 2005.

Reference Books

1. C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2004.
2. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, "Ad Hoc Mobile Wireless Networks", Auerbach Publications, 2008.
3. ErdalÇayırcı ,ChunmingRong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009.
4. Carlos De MoraisCordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition)", World Scientific Publishing, 2011.
5. WaltenegusDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010
6. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

MULTIMEDIA SIGNAL CODING

Course Code: GR18D5117 **L/T/P/C: 3/0/0/3**

Course objectives

- To introduce the fundamental principles and techniques in multimedia signal processing and Compression
- Overview of current multimedia standards and technologies
- To understand and differentiate text, image, video & audio
- understand the basics of analog and digital video: video representation and transmission
- Analyse analog and digital video signals and systems

Course outcomes

- Understand the fundamentals behind multimedia signal processing and compression
- Understand the basic principles behind existing multimedia compression and communication
- differentiate multimedia and non-multimedia
- differentiate text, image, video &audio
- design and develop multimedia systems according to the requirements of multimedia applications

Unit I: INTRODUCTION TO MULTIMEDIA

Multimedia, World Wide Web, Overview of Multimedia Tools, Multimedia Authoring, Graphics/ Image Data Types, and File Formats.

Color in image and video: Color Science – Image Formation, Camera Systems, Gamma Correction, Color Matching Functions, CIE Chromaticity Diagram, Color Monitor Specifications, Outof- Gamut Colors, White Point Correction, XYZ to RGB Transform, Transform with Gamma Correction, L*A*B* Color Model. Color Models in Images – RGB Color Model for CRT Displays, Subtractive Color: CMY Color Model, Transformation from RGB to CMY, Under Color Removal:

CMYK System, Printer Gamuts, Color Models in Video – Video Color Transforms, YUV Color Model, YIQ Color Model, YcbcrColor Model.

Unit II: VIDEO CONCEPTS

Types of Video Signals, Analog Video, Digital Video. Audio Concepts: Digitization of Sound, Quantization and Transmission of Audio.

Unit III: COMPRESSION ALGORITHMS

Lossless Compression Algorithms: Run Length Coding, Variable Length Coding, Arithmetic Coding, Lossless JPEG, Image Compression.
Lossy Image Compression Algorithms: Transform Coding: KLT And DCT Coding, Wavelet Based Coding.
Image Compression Standards: JPEG and JPEG2000.

Unit IV: VIDEO COMPRESSION TECHNIQUES

Introduction to Video Compression, Video Compression Basedon Motion Compensation, Search for Motion Vectors, H.261- Intra-Frame and Inter-Frame Coding, Quantization, Encoder and Decoder, Overview of MPEG1 and MPEG2.

Unit V: AUDIO COMPRESSION TECHNIQUES

ADPCM in Speech Coding, G.726 ADPCM, Vocoders – PhaseInsensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP, Hybrid Excitation Vocoders, MPEG Audio – MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithms, MPEG-2 AAC, MPEG-4 Audio.

Text Books

1. Fundamentals of Multimedia – Ze- Nian Li, Mark S. Drew, PHI, 2010.
2. Multimedia Signals & Systems – Mrinal Kr. Mandal Springer International Edition 1st Edition,2009

Reference Books

1. Multimedia Communication Systems – Techniques, Stds&Netwroks K.R. Rao, Zorans. Bojkoric, DragoradA.Milovanovic, 1st Edition, 2002.
2. Fundamentals of Multimedia Ze- Nian Li, Mark S.Drew, Pearson Education (LPE), 1st Edition, 2009.
3. Multimedia Systems John F. KoegelBufond Pearson Education (LPE), 1st Edition, 2003.
4. Digital Video Processing – A. Murat Tekalp, PHI, 1996.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

BUSINESS ANALYTICS

Course Code: GR18D5201 **L/T/P/C: 3/0/0/3**

Course objectives

- Understand the role of business analytics and statistical tools used within an organization.
- Discuss Trendiness and Regression Analysis and different visualization techniques to explore data.
- Describe the organization structure and different type of business analytics.
- Know Forecasting Techniques, Monte Carlo Simulation and Risk Analysis.
- Understanding decision analysis and recent trends in business intelligence.

Course outcomes

- Demonstrate business analytics process and use statistical tools for implementation of business process.
- Design relationships and trends to explore and visualize the data.
- Examine the organization structure of business analytics and categorize types of analytics.
- Apply forecasting techniques, monte carlo simulation and risk analysis.
- Formulate decision analysis and summarize recent trends in business intelligence.

Unit I: BUSINESS ANALYTICS

Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

Unit II: TRENDINESS AND REGRESSION ANALYSIS

Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Unit III: ORGANIZATION STRUCTURES OF BUSINESS ANALYTICS TEAM MANAGEMENT

Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.

Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Unit IV: FORECASTING TECHNIQUES

Qualitative and Judgmental Forecasting, Statistical Forecasting models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models .Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT V: DECISION ANALYSIS

Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Reference Books

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FTPress.

2. Business Analytics by James Evans, persons Education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDUSTRIAL SAFETY

Course Code: GR18D5202 **L/T/P/C: 3/0/0/3**

Course objectives

- To understand the importance of maintaining a safe workplace.
- To maintain safety standards in compliance with regulatory requirements and within engineering limits understand personal safety and industrial safety.
- To create a job safety analysis (JSA) for a given work project.
- To follow safety recordkeeping and management, and the role of the safety manager.
- To utilize personal proactive equipment.

Course outcomes: After successful completion of the course the student will be able to

- Understanding of safety principles.
- Analyze different types of exposure and biological effects, exposure guidelines and basic workplace monitoring ability to do hazard analysis.
- Demonstrate an understanding of workplace injury prevention, risk management, and incident investigations.
- Understand the acute and chronic health effects of exposure to chemical, physical and biological agents in the workplace.
- Demonstrate knowledge of the types of hazards, planning, organization and training needed to work safely with hazardous materials.

Unit I: INDUSTRIAL SAFETY

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit II: FUNDAMENTALS OF MAINTENANCE ENGINEERING

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit III: WEAR AND CORROSION AND THEIR PREVENTION

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit IV: FAULT TRACING

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one Machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit V: PERIODIC AND PREVENTIVE MAINTENANCE

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference Books

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

OPERATIONS RESEARCH

Course Code: GR18D5203 **L/T/P/C: 3/0/0/3**

Course objectives

- To define and formulate linear and non-linear programming problems and appreciate their limitations arising from a wide range of applications.
- To perform sensitivity analysis to determine the direction and magnitude of change of a model s optimal solution as the data change.
- To distinguish various inventory models and develop proper inventory policies.
- To solve the scheduling and sequencing models.
- To understand how to model and solve problems using dynamic programming, game theory.

Course outcomes

- The student will formulate and solve problems as networks and graphs for optimal allocation of limited resources such as machine, material and money.
- The student will able to carry out sensitivity analysis.
- The student will solve network models like the shortest path, minimum spanning tree, And maximum flow problems.
- The student will able to distinguish various inventory models and develop proper inventory policies.
- The student will also propose the best strategy using decision making methods under uncertainty and game theory.

Unit I

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

Unit II

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming.

Unit III

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit IV

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit V

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.

Reference Books

1. H.A. Taha, Operations Research, An Introduction, PHI,2008
2. Wagner, Principles of Operations Research, PHI, Delhi,1982.
3. J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi,2008
4. Hitler Libermann Operations Research: McGraw Hill Pub.2009
5. Pannerselvam, Operations Research: Prentice Hall of India2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India2010

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COST MANAGEMENT OF ENGINEERING PROJECTS

Course Code: GR18D5204 **L/T/P/C: 3/0/0/3**

Course objectives

- To provide the student with a clear understanding of strategic cost management process.
- To describe the various stages of project execution.
- To prepare the project schedule by bar charts and network diagram.
- To conduct breakeven and cost-volume-profit analysis.
- To make students various budgets and quantitative techniques used for cost management.

Course outcomes

- The student will be able to explain the various cost concepts used in decision making.
- To be able to identify and demonstrate various stages of project execution.
- The students will be able to prepare the project schedule by bar charts and network diagrams.
- The student will be to differentiate absorption costing and marginal costing, also conduct breakeven and cost-volume-profit analysis.
- The student wiil be able to prepare various budgets and quantitative techniques used for cost management.

Unit I

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and OpportUnity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit II

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit III

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.

Unit IV

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit V

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Reference Books

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi.
2. Charles T. Horngren and George Foster, Advanced Management Accounting.
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting.
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher.
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co.Ltd.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

COMPOSITE MATERIALS

Course Code: GR18D5205 **L/T/P/C: 3/0/0/3**

Course objectives: The objectives of this course is to provide the students,

- To understand the concepts of fundamental science and engineering principles relevant to materials engineering.
- To expose the various methods to test mechanical properties on materials.
- To categorize the various equilibrium diagrams and describe the changes which occurs on metals.
- To explain the concepts on various heat treatment operations.
- To explain the various ferrous and non-ferrous metals with their properties and applications.

Course outcomes: At the end of the course, students will be able to

- Relate crystal structures and identify the relation between different materials.
- Test the various mechanical properties of metal by suitable method.
- Relate the equilibrium transformation diagram for various ferrous and non-ferrous metals.
- Utilize appropriate techniques in treating with proper heat treatment operation.
- Evaluate the behavior of material when it subjected to heat treatment process.

Unit I: INTRODUCTION

Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix.Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

Unit II: REINFORCEMENTS

Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrainand Isostress conditions.

Unit III: MANUFACTURING OF METAL MATRIX COMPOSITES

Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

Unit IV: MANUFACTURING OF POLYMER MATRIX COMPOSITES

Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

Unit V: STRENGTH

Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

Text Books

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, WestGermany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition,2007.

Reference Books

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials –K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L.Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W.Tasi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

WASTE TO ENERGY

Course Code: GR18D5206 **L/T/P/C: 3/0/0/3**

Course objectives

- To find or recall the non-hazardous secondary materials from waste.
- To compare precisely to overcome the cost and most economically attractive course of action for CH4 emission.
- To demonstrate the techno-economic feasibility of replacing.
- To extend the students for possible future activity in a biomass plant.
- To utilization in spark-ignited internal combustion engine.

Course outcomes

- Students are able to make use of energy installation and the small of household bio-waste incineration.
- To develop actual dimension must of course, fit requirement of the masonry block.
- To become capable of analyze and design of energy conversion system.
- Students are to estimate the possibility of invest in biomass generation.
- Students will be able to explain the biogas its uses and benefits.

Unit I: INTRODUCTION TO ENERGY FROM WASTE

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit II: BIOMASS PYROLYSIS

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit III: BIOMASS GASIFICATION

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit IV: BIOMASS COMBUSTION

Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit V: BIOGAS

Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Reference Books

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd.,1990.

2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd.,1983.

3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd.,1991.

4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH FOR RESEARCH PAPER WRITING

Course Code: GR18D5207 **L/T/P/C: 2/0/0/2**

Course objectives

- To state how to put research on paper
- To demonstrate how to write an abstract
- To apply the process of research
- To appraise the key skills involved in writing the title, abstract, introduction and review of literature
- To compose a paper which is good and has the qualities of acceptance and publication

Course outcomes

- Will be able to understand how to write a research paper
- Will outline the drafting of an abstract
- Will acquire the skills of various elements of research
- Will be in a position to write a good paper
- Will result in increasing the chance of publication

Unit I

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and RemovingRedundancy, Avoiding Ambiguity and Vagueness.

Unit II

Clarifying Who DidWhat, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction.

Unit III

Review of the Literature, Methods, Results, Discussion, Conclusions, TheFinal Check.

Unit IV

Key skills are needed when writing a Title, key skills are needed whenwriting an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

Unit V

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusion.

Reference Books

1. Goldbort R (2006) Writing for Science, Yale University Press (available on GoogleBooks)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge UniversityPress
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Ian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

DISASTER MANAGEMENT

Course Code: GR18D5208 **L/T/P/C: 2/0/0/2**

Course objectives

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches,
- Planning and programming in different countries, particularly their home country or the countries they work in.

Course outcomes

- Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
- Capacity to describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
- Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
- Capacity to manage the Public Health aspects of the disasters.
- Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

Unit I: INTRODUCTION

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Typesand Magnitude.

Unit II: REPERCUSSIONS OF DISASTERS AND HAZARDS

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. **Natural Disasters**: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts andFamines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

Unit III: DISASTER PRONE AREAS IN INDIA

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

Unit IV: DISASTER PREPAREDNESS AND MANAGEMENT

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And CommUnity Preparedness.

Unit V: RISK ASSESSMENT

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Reference Books

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal bookCompany

2. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, NewDelhi.

3. Goel S. L., Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., NewDelhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Code: GR18D5209 **L/T/P/C: 2/0/0/2**

Course objectives

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world.
- Learning of Sanskrit to improve brain functioning.
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects.
- Enhancing the memory power.
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.

Course outcomes

- Understanding basic Sanskrit alphabets and Understand tenses in Sanskrit Language.
- Enable students to understand roots of Sanskrit language.
- Students learn engineering fundamentals in Sanskrit.
- Students can attempt writing sentences in Sanskrit.
- Ancient Sanskrit literature about science & technology can be understood.

Unit I

Alphabets in Sanskrit, Past/Present/FutureTense, Simple Sentences

Unit II

Order, Introduction of roots, Technical information about Sanskrit Literature

Unit III

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Reference Books

1. “Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, NewDelhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, RashtriyaSanskrit Sansthanam, New DelhiPublication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., NewDelhi.

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GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

VALUE EDUCATION

Course Code: GR18D5210 **L/T/P/C: 2/0/0/2**

Course objectives

- Understand value of education and self-development.
- Imbibe good values in students.
- Let the should know about the importance of character.
- To understand the significance of human conduct and self-development.
- To enable students to imbibe and internalize the value and Ethical behavior in personal and professional lives.

Course outcomes

- Knowledge of self-development.
- Learn the importance of Human values.
- Developing the overall personality.
- Student will be able to realize the significance of ethical human conduct and self-development.
- Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.

Unit I

Values and self-development –Social values and individual attitudes, Work ethics, Indian vision ohumanism, Moral and non- moral valuation, Standards andprinciples, Value judgement.

Unit II

Importance of cultivation ofvalues, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

Unit III

Personality and Behavior Development - Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love andKindness, Avoid faultThinking, Free from

anger, Dignity oflabour, Universal brotherhood and religioustolerance, True friendship, Happiness vs suffering, love fortruth, Aware of self-destructive habits, Association andCooperation, Doing best for savingnature.

Unit IV

Character and Competence –Holy books vs Blindfaith. Self-management and Goodhealth.Science ofreincarnation.Equality, Nonviolence, Humility, Role ofWomen. All religions and same message. Mind your Mind,Self-control. Honesty, Studyingeffectively

Reference Books

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

INDIAN CONSTITUTION

Course Code: GR18D5211 **L/T/P/C: 2/0/0/2**

Course objectives

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals constitutional
- Role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
- To understand the role and functioning of Election Commission of India.

Course outcomes

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution inIndia.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the IndianConstitution.
- Discuss the passage of the Hindu Code Bill of1956.
- Discuss the significance of Election Commission of India.

Unit I: HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History Drafting Committee, (Composition & Working).

Unit II: PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble Salient Features.

Unit III: CONTOURS OF CONSTITUTIONAL RIGHTS &DUTIES

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Unit IV: ORGANS OF GOVERNANCE

Parliament-Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

Unit V: LOCAL ADMINISTRATION

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

ElectionCommission: Election Commission: Role andFunctioning, Chief Election Commissioner and ElectionCommissioners, State Election Commission: Role andFunctioning, Institute and Bodies for the welfare of SC/ST/OBC andwomen.

Reference Books

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition,2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis,2015.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PEDAGOGY STUDIES

Course Code: GR18D5212 **L/T/P/C: 2/0/0/2**

Course objectives

- Review existing evidence on the review topic to inform Programme design and policy making
- Undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.
- Establishing coordination among people in order to execute pedagogy methods.
- To study pedagogy as a separate discipline.

Course outcomes

- What pedagogical practices are being used by teachers in formal classrooms in developing countries?
- What pedagogical practices are being used by teachers in informal classrooms in developing countries?
- Synergy from the work force.
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Unit I: INTRODUCTION AND METHODOLOGY

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions**.** Overview of methodology and Searching.

Unit II: THEMATIC OVERVIEW

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit III: EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICALPRACTICES

Methodology for the in-depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit IV: PROFESSIONAL DEVELOPMENT

Alignment with classroom practices and follow- up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large classsizes.

Unit V: RESEARCH GAPS AND FUTURE DIRECTIONS

Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Reference Books

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.

2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3):361-379.

3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London:DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3):272–282.

5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston:Blackwell.

6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read'campaign.

7. www.pratham.org/images/resource%20working%20paper%202.pdf.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

STRESS MANAGEMENT BY YOGA

Course Code: GR18D5213 **L/T/P/C: 2/0/0/2**

Course objectives

- To achieve overall Good Health of Body and Mind.
- To lower blood pressure and improve heart health.
- To become non-violent and truthfulness.
- To increase the levels of happiness.
- To eliminate all types of body pains.

Course outcomes

- Develop healthy mind in a healthy body thus improving social health also improve efficiently.
- Develop body awareness. Learn how to use their bodies in a healthy way. Perform well in sports and academics.
- *Will balance, flexibility*, and stamina, strengthen *muscles* and connective tissues enabling good *posture*.
- Manage stress through breathing, awareness, meditation and healthy movement.
- Build concentration, confidence and positive self-image.

UnitI

Definitions of Eight parts of yog. (Ashtanga)

Unit II

Yam and Niyam. Do`s and Don't's inlife. Ahinsa, satya, astheya, bramhacharya andaparigrahaShaucha, santosh, tapa, swadhyay,ishwarpranidhan

Unit III

Asan andPranayam, Various yog poses and their benefits for mind & body. Regulaization of breathing techniques and its effects-Types of pranayam

Reference Books

1. ‘Yogic Asanas for Group Tarining-Part-I” : Janardan Swami Yogabhyasi Mandal,Nagpur

2. “Rajayoga or conquering the Internal Nature” by SwamiVivekananda, AdvaitaAshrama(Publication Department),Kolkata

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Code: GR18D5214 **L/T/P/C: 2/0/0/2**

Course objectives

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students
- To differentiate three types of happiness (Sukham)
- To describe the character traits of a spiritual devotee

Course outcomes

- Study of Shrimad- Bhagwad-Gita wiil help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- To develop self-developing attitude towards work without self-aggrandizement
- To develop tranquil attitude in all favorable and unfavorable situations
- To develop high spiritual intelligence

Unit I: Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride &heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

Unit II: Approach to day to day work andduties.

- Shrimad BhagwadGeeta : Chapter 2-Verses 41,47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23,35,
- Chapter 18-Verses 45, 46,48.

UnitIII: Statements of basicknowledge.

- Shrimad BhagwadGeeta: Chapter2-Verses 56, 62,68

- Chapter 12 -Verses 13, 14, 15, 16,17,18
- Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses36,37,42,
- Chapter 4-Verses 18,38,39
- Chapter18 – Verses37,38,63

Reference Books

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department),Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, NewDelhi.