### ELECTRONICS & INSTRUMENTATION ENGINEERING

#### B.Tech III-I Semester (EIE)

<table>
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<tr>
<th>S. No.</th>
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*Either by MOOCS manner or Conventional manner*
### B.Tech III-II Semester (EIE)

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B.Tech IV-II Semester (EIE)

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2 Theory + 1 Comprehensive Viva voce + 1 Technical Seminar + 1 Project work
*Either by MOOCS manner or Self study or Conventional manner*
Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I:
INTRODUCTION TO MANAGERIAL ECONOMICS

UNIT II:
THEORY OF PRODUCTION AND COST ANALYSIS

UNIT III:
INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

UNIT IV:
INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS
UNIT V: CAPITAL AND CAPITAL BUDGETING

Course Outcome: After completion of this course, the student will able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

REFERENCES
Course Objectives:
- Design of OPAMPS, Classification of OPAMPS.
- To study and design various linear applications of OPAMPS.
- To study and design various non linear applications of OPAMPS.

Course Outcomes:
- Understand the basic building blocks of linear integrated circuits and its characteristics.
- Analyze the linear, non-linear and specialized applications of operational amplifiers.
- Understand the theory of ADC and DAC.
- Realize the importance of Operational Amplifier.

UNIT – I
**Differential Amplifiers:** Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level Translator.

**Operational amplifiers:** Introduction, Block diagram, Ideal op-amp, Equivalent Circuit, Voltage Transfer curve, open loop op-amp configurations. Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT-II
Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.

**Frequency response:** Introduction, compensating networks, frequency response of internally compensated op-amps and non compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, closed loop frequency response, circuit stability, slew rate.

UNIT-III
DC and AC amplifiers, peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas biquad filter.
UNIT-IV
Oscillators, Phase shift and wein bridge oscillators, Square, triangular and sawtooth wave generators, Comparators, zero crossing detector, Schmitt trigger, characteristics and limitations.
Specialized applications: 555 timer IC (monostable&astable operation) & its applications, PLL, operating principles, Monolithic PLL, applications, analog multiplier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V

TEXT BOOKS:

REFERENCES:
UNIT I
CMOS LOGIC & BIPOLAR LOGIC AND INTERFACING: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families. Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT II
THE VHDL HARDWARE DESCRIPTION LANGUAGE: Design flow, program structure, types and constants, functions and procedures, libraries and packages.
THE VHDL DESIGN ELEMENTS: Structural design elements, data flow design elements, behavioral design elements, Time dimension and simulation synthesis.

UNIT III
COMBINATIONAL LOGIC DESIGN: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers, VHDL modes for the above ICs. Design examples (using VHDL) - Barrel shifter, comparators, floating-point encoder, dual parity encoder.

UNIT IV
SEQUENTIAL LOGIC DESIGN: Latches and flip-flops, PLDs, counters, shift register, and their VHDL models, synchronous design methodology, impediments to synchronous design.

UNIT V:
Memory Design using VHDL
ROMs: Internal structure, 2D-decoding commercial types, timing and applications.
Static RAM: Internal structure, SRAM timing, standard SRAMS, synchronous SRAMS.
Dynamic RAM: Internal structure, timing, synchronous DRAMS, Familiarity with Component Data Sheets – Cypress CY6116, CY7C1006, Specifications.
TEXT BOOKS:

REFERENCES:
Course Objective:
1. To understand what is Virtual instrumentation and to realize the architecture of VI.
2. To familiarize with the VI software and learn programming in VI.
3. To study various Instrument Interfacing and data acquisition methods.
4. To understand various analysis tools and develop programs for Process control applications.

Course Outcome:
Enable students to understand basics, programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

UNIT I
REVIEW OF VIRTUAL INSTRUMENTATION

UNIT II
PROGRAMMING TECHNIQUES: VI’s and sub-VI’s – Loops and charts – Arrays – Clusters – Graphs – Case & sequence structures – Formula nodes – Local and global variable – String & file input.

UNIT III

UNIT IV
UNIT V

TEXT BOOKS

REFERENCES
Course Objective: To provide the knowledge required to understand and analyze the Instruments used for measurement of various electrical parameters.

Course Outcome: The student is expected to apply the knowledge that they acquired during their course in EDC, ECA and PDC to study and design electronic instruments.

UNIT 1
SINE-WAVE, SQUARE-WAVE AND PULSE TESTING OF LINEAR SYSTEMS

UNIT II
DIRECT-CURRENT INSTRUMENT AMPLIFIERS
Direct-current Amplifier Considerations, Direct-current Amplifier with Automatic Reset, Differential Amplifiers, Chopper Amplifiers.

UNIT III
VOLTAGE AND CURRENT MEASUREMENTS
Introduction to DVMs, Non-integrating Types of DVMs, Digital Voltmeters with Counting Circuitry, Normal-mode Rejection, Common-mode Rejection, Principles of AC Voltage Measurements, Average-responding Detectors, Peak-responding Detectors, Peak-to-peak Detection, Root-mean-square— responding Detectors, Other Detection Methods, Sampling Voltmeters, Synchronous Detection, Direct-current Probes, Alternating-current Probe.

UNIT IV
IMPEDANCE MEASUREMENT
UNIT V
BRIDGES, TRANSMITTERS AND RECEIVERS
Low-frequency Bridges- General, Classification of Four-arm Bridges, Bridges with Inductively Coupled Ratio Arms, Special-purpose Bridges, Automatic and Semiautomatic Bridges, Radio-frequency Impedance Measurements, Problems at Radio Frequency, Radio-frequency Bridges, T Networks, Resonance Methods, The RF Meter Methods, Precision Measurements- Standardization of Impedance Unit, Methods of Precision Measurements.

General-performance Characteristics, Basic Measurements, Special System Measurements, Measurements on Receiving Systems, Sensitivity, Modulation-acceptance Bandwidth, Correlation of Sensitivity with Noise Figure, Automatic-gain-control Characteristics, Measurements on Transmitting Systems, Radio Equipment Specifications, Microwave Transistor Oscillators, Solid-state Microwave Amplifiers, Other Solid-state Microwave Sources.

Text Books:
1. Electronic Measurement and Instrumentation – Oliver and Cage – TMH.

Reference Books:
3. Electrical and Electronic Measurements by Shawney, Khanna Publ.
Course Objectives:
- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To understand the techniques that computers use to communicate with I/O devices.
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors.

Course Outcomes:
- Ability to use memory and I/O devices effectively.
- Able to explore the hardware requirements for cache memory and virtual memory.
- Ability to design algorithms to exploit pipelining and multiprocessors.

Unit I:
Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

Unit II:
Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multiprogrammed Control.

Unit III:
The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.
Unit IV:

Unit V:
Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Textbook:

Reference Textbooks:
Course Objective:
- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications.

Course Outcome:
- Able to use operating systems effectively.
- Write System and application programs to exploit operating system functionality.
- Add functionality to the exiting operating systems
- Design new operating systems

UNIT I
Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Computing Environments, Open- Source Operating Systems
System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

UNIT II
Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.
CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.
UNIT III

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

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

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

UNIT IV

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

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

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

UNIT V

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


Text Books:

Reference Books:
1. Operating systems by A K Sharma, Universities Press,
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
Course Objective:
To provide exposure to the student about use of Linear and Digital Integrated Circuits

Course Outcome:
The student will be able to use Linear and Digital Integrated Circuits for different practical applications

Minimum Twelve Experiments to be conducted:

Part A (IC Application Lab):

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order).
3. Function Generator using OP AMPs.
4. IC 555 Timer – Monostable and Astable Operation Circuit.
5. IC 566 – VCO Applications.
6. Voltage Regulator using IC 723.
7. 4 bit DAC using OP AMP.

Part B (ECAD Lab):

Simulate the internal structure of the following Digital ICs using VHDL / VERILOG and verify the operations of the Digital ICs (Hardware) in the Laboratory

1. Logic Gates- 74XX.
3. 3-8 Decoder -74138 & 8-3 Encoder- 74X148
4. 8 x 1 Multiplexer -74X151 and 2x4 Demultiplexer-74X155.
5. 4 bit Comparator-74X85.
6. D Flip-Flop 74X74.
7. JK Flip-Flop 74X109.
8. Decade counter-74X90.
Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components: - IC741, IC555, IC566, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

For Software Simulation

1. Computer Systems
2. LAN Connections (Optional)
3. Operating Systems
4. VHDL/VERILOG
5. FPGAS/CPLDS (Download Tools)
15A10505  VIRTUAL INSTRUMENTATION LABORATORY

Course Objective:

1. To familiarize with the VI software and learn programming in VI.
2. To experiment various functions available in LabVIEW.
3. To practice various Instrument Interfacing and data acquisition methods.

Course Outcome:

To get practical knowledge in programming techniques, data acquisition and interfacing techniques of virtual instrumentation and to use VI for different applications.

Experiments are to be performed using LAB VIEW Software
(Minimum TEN experiments should be performed)

LIST OF EXPERIMENTS

1. Verification of Arithmetic Operations.
2. Verification of Half Adder and Full adder.
3. Program to find Addition of First n natural numbers using for and while loop.
4. Implementation of Array functions.
5. Program for implementing Seven segment display.
6. Program to perform Traffic light control.
7. Calculation of BMI using cluster.
8. Program to control Temperature by using RTD and DAQ.
9. Program to control Temperature by using Thermocouple and DAQ
10. Program to control Temperature by using Thermister and DAQ
11. Program for controlling the Flow of water using DAQ.
12. Program for controlling the Level of water using DAQ.
13. Program for Pressure control using DAQ.
14. Program for controlling the speed of a DC motor using PID tool box
UNIT - I
Introduction and Basic Concepts of Society: Family and Society: Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.


UNIT – II
Activities of NSS, NCC, NYK:
Citizenship: Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.
Youth and Crime: Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

Social Harmony and National Integration: Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

UNIT – III
Environment Issues: Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).
Health, Hygiene & Sanitation: Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.
Disaster Management: Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.
Civil/ Self Defense: Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,
UNIT – IV

**Gender Sensitization:** Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiates of NGOs – Awareness, Movements;

UNIT - V

**Physical Education** : Games & Sports: Health and Recreation – Biological basis of Physical activity – benefits of exercise – Physical, Psychological, Social; Physiology of Muscular Activity, Respiration, Blood Circulation.


**TEXT BOOKS:**

1. NSS MANUAL
3. INDIAN SOCIAL PROBLEM: G.R.Madan, Asian Publisher House
4. INDIAN SOCIAL PROBLEM: Ram Ahuja, Rawat Publications
5. HUMAN SOCIETY: Kingsley Davis, Macmillan
6. SOCIETY: Mac Iver D Page, Macmillan
7. SOCIOLOGY – THEMES AND PERSPECTIVES: Michael Honalambos, Oxford University Press
10. TOWARDS A WORLD OF EQUALS: A.Suneetha, Uma Bhrugudanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu
Course Objective:
Provide a solid background in the fundamental concepts and methods of spectroscopy, chromatography & environmental pollution and an appreciation of issues in each of these fields in current research.

Course Outcome:
On successful completion of the module students will be able to:

- Acquire knowledge about the interaction of electromagnetic radiations with matter and apply analytical techniques to accurately determine the elements present in the given sample.
- Select Instrument for a particular analysis with some idea of its merits, demerits and limitations
- Learn specific technique employed for monitoring different pollutants in air and water.
- They can understand the applications and usage of chromatography in real time industrial environments

UNIT I

UNIT II
Molecular spectra – electronic, vibrational and rotational energies and spectra characteristic bands of radicals, OH, CH, CO, etc., - IR absorption - spectroscopy – single and double beam spectrophotometers - instrumentation techniques for analyzing solid, liquid and gaseous samples – sample handling techniques.

UNIT III
Microwave spectroscopy – NMR, ESR and EPR spectroscopy – basic principles – instrumentation techniques and applications - principles of ion optics – ion sources – single focusing and double focusing mass spectrometers – principles and application
UNIT IV

UNIT V

Text Books:

Reference Books:
Course Objectives:
• To understand the architecture of 8086 MICROPROCESSOR.
• To learn various 8086 Instruction set and Assembler Directives.
• To learn 8051 assembly Language programming

Course Outcomes:
After completion of this subject the students will be able to:

1. Do programming with 8086 microprocessors
2. Understand concepts of Intel x86 series of processors
3. Program MSP 430 for designing any basic Embedded System
4. Design and implement some specific real time applications Using MSP 430 low power microcontroller.

UNIT I
Introduction-8086 Architecture-Block Diagram, Register Organization, Flag Register, Pin Diagram, Timing and Control Signals, System Timing Diagrams, Memory Segmentation, Interrupt structure of 8086 and Interrupt Vector Table. Memory organization and memory banks accessing.

UNIT II
Instruction Formats -Addressing Modes-Instruction Set of 8086, Assembler Directives-Macros and Procedures.- Sorting, Multiplication, Division and multi byte arithmetic code conversion. String Manipulation instructions-Simple ALPs.

UNIT III
Low power RISC MSP430 – block diagram, features and architecture, Variants of the MSP430 family viz. MSP430x2x, MSP430x4x, MSP430x5x and their targeted applications, MSP430x5x series block diagram, Addressing modes, Instruction set Memory address space, on-chip peripherals (analog and digital), and Register sets. Sample embedded system on MSP430 microcontroller.

UNIT-IV
I/O ports pull up/down resistors concepts, Interrupts and interrupt programming. Watchdog timer. System clocks. Low Power aspects of MSP430: low power modes, Active vs Standby current consumption, FRAM vs Flash for low power & reliability.
Timer & Real Time Clock (RTC), PWM control, timing generation and measurements. Analog interfacing and data acquisition: ADC and Comparator in MSP430, data transfer using DMA.

UNIT-V:
Serial communication basics, Synchronous/Asynchronous interfaces (like UART, USB, SPI, and I2C). UART protocol, I2C protocol, SPI protocol. Implementing and programming UART, I2C, SPI interface using MSP430, Interfacing external devices. Implementing Embedded Wi-Fi using CC3100

Text Books:
Course Objective:
To provide the students with the knowledge on process characteristics and different control schemes for different processes.

Course Outcome:
- To study the characteristics of various process characteristics
- To understand the functions of process Control elements
- To study the Characteristics of PID controller, Automatic transfer and tuning methods.
- To study the various control schemes.
- To understand the Multivariable Control

UNIT I

UNIT II
PROCESS CONTROL ELEMENTS: Signal conversion - I/P, P/I Converters, Pneumatic and Electric actuators, Valve Positioner-Control Valve – Characteristics of Control Valves-Types of control valves-control valve sizing- cavitation and flashing. Dynamics of batch and Continuous process.

UNIT III

CONTROLLER TUNING: – Zeigler and Nichols open and Closed loop methods, Performance indices–Based on evaluation criteria – ISE, IAE, ITAE.
UNIT IV
VARIOUS CONTROL SYSTEMS: Feed Forward Control, Cascade control, Ratio control, Over ride control, Split range control, Selective control, Adaptive control, Inferential control.

UNIT V

Text Books:
2. Singh, ‖ Process Control‖ PHI Learning, 2009

Reference Books:
Course Objective:
Able to introduce various methods of power generation and specially provide the knowledge of instrumentation and control in thermal power plants.

Course Outcome:
Upon completion of this course the student shall be able to apply his knowledge and understand how instrumentation system designed for a power plant.

UNIT I
OVERVIEW OF POWER GENERATION

Brief survey of methods of power generation-Hydro, thermal, nuclear, solar, wind, ocean etc. Importance of Instrumentation and control in power generation, piping and instrumentation diagram, Cogeneration of power, Control Rooms.

UNIT II
BOILER MANAGEMENT SYSTEM

Building block for boiler, boiler feed water circulation, measurements in water circuits, boiler drum level control, superheated steam temperature control, steam pressure control, feed water treatment, air-fuel circuit, measurement of pressure temperature flow level in air fuel circuit, combustion control, furnace draft control, deaerator control.

UNIT III
TURBO SUPERVISORY SYSTEM

Principles of steam turbine and gas turbine, condenser vacuum control, inlet and outlet measurements, governors, gland steam exhaust pressure control, speed vibration shell temperature monitoring and control, lubricating oil temperature control, generator cooling.

UNIT IV
POWER PLANT MANAGEMENT

UNIT V
ANALYZERS IN POWER PLANTS
Impurities in raw water, fuel analyzers, pH meter, conductivity meter, chromatography, oxygen measurement in flue gas, measurement of exhaust gas temperature, carbon dioxide measurement, combustion analyzer, infrared flue gas analyzer, smoke detector, dust monitor, pollution monitoring instruments.

Text Books:

Reference Books:
Course Objective:
To study the various parameter like vacuum, pressure, temperature, flow, level, force, torque, velocity torque, nuclear radiation, used in process industry, power plants manufacturing and automation plants.

Course Outcome:
Upon completion of the subject, the students shall be able to understand how the various process parameters are measured.

UNIT I
PRESSURE AND TEMPERATURE MEASUREMENT
Vacuum and low pressure measurement using Monometer, McLeod Gage, Knudsen Gage, Ionization Gases, Thermal conductivity. Pressure measurement using bourdon gages, capsule gages, bellows, pressure transmitter, dead weight tester, force balance, vibration cylinder, dual gage techniques, and calibration.

Temperature standards, fixed points, filled system thermometers, bimetallic thermometer, types of thermocouple, laws of thermocouples, cold junction compensation, RTD, 2wire, 3wire, 4wire connections, thermistor and linearization, IC sensors, optical and radiation pyrometers, calibration.

UNIT II
FLOW AND LEVEL MEASUREMENT
Solid flow measurement, Flow equation, flow measurement in pipelines, liquid and gas rotameter, head type, positive displacement, vortex type, hotwire anemometer, electromagnetic type, ultrasonic type, laser Doppler velocimeter, mass flow meter, gas flow meter, selection criteria, calibration.

Solid level measurement, visual technique, float operated devices, displacer devices, pressure gage method, diaphragm type, differential pressure method, boiler drum level, electrical methods, conductive sensor, capacitive sensor, ultrasonic type, purging techniques.
UNIT III
FORCE AND TORQUE MEASUREMENT
Force measurement, different methods, gyroscopic method, vibrating wire sensor, strain gage type, calibration. Definition of torque, different methods, dynamometer, gyroscope, calibration.

UNIT IV
VELOCITY AND ACCELERATION MEASUREMENT
Relative velocity, translational and rotational velocity measurement, velocity of rotating machinery, speed measurement using tachometer, electrical and magnetic types, revolution counter, proximity type, photo electric type, stroboscope. Acceleration-accelerometer- different types-measurement in rotating machinery- calibration.

UNIT V
OTHER MEASUREMENTS
Nuclear radiation fundamentals, radiation detector, sound level meter, microphone, hydrophone, humidity and moisture measurement, overview of density measurement, measurement of chemical composition, smoke measurement, pollution measurement, clean room and measurement of particles.

Text Books:

Reference Books:
Course Objectives:
- Program a DSP chip to filter signals using either assembly language or a C compiler for the chip.
- Use Z transforms and discrete time Fourier transforms to analyze a digital system.

Course Outcomes:
At the end of the course, the student should be able to:
- Formulate engineering problems in terms of DSP tasks.
- Apply engineering problems solving strategies to DSP problems.
- Design and test DSP algorithms.
- Analyze digital and analog signals and systems.
- Analyze and compare different signal processing strategies.

UNIT-I

Discrete Fourier Transform: Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

UNIT-II
Efficient computation of the DFT – Direct computation of DFT, Divide and conquer approach to computation of DFT, Radix-2, Radix-4, and Split radix FFT algorithms, Implementation of FFT algorithms, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, A linear filtering approach to computation of the DFT- the Goertzel, and the Chirp-z transform algorithms, Quantization errors in the computation of DFT.

UNIT-III
Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel
form and Lattice structures, Conversion from Lattice structure to direct form, lattice – Ladder structure.

UNIT-IV

UNIT-V
Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

TEXT BOOKS:

REFERENCES:
Course Objective:
1. It is to provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
2. Learn the process of collecting information/ data through PC from real world sources.
3. Learn remote and networked data acquisition and operating system.
4. Learn programmable logic controllers, and its application.

UNIT –I
Introduction to Computer Instrument Communication:

UNIT –II
Programmable logic controller (PLC) basics:
Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators.

Basic PLC programming:
Programming On-Off inputs/ outputs. Creating Ladder diagrams, Basic PLC functions, PLC Basic Functions, register basics, timer functions, counter functions.

UNIT – III
PLC intermediate and advanced functions:
Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions. PLC Advanced functions: Analog PLC operation, Networking of PLC

UNIT –IV
Application of PLC:
Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating.
UNIT – V
Related Topics:
Alternate programming languages. Auxiliary commands and functions. PLC installation, troubleshooting and maintenance. Field bus: Introduction, concept. HART protocol: Method of operation, structure, and applications. Smart transmitters, smart valves and smart actuators.

Text Books

References
1. PC Based Instrumentation and Control Third Edition by Mike Tooley ; Elsevier.
2. PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control. By Kevin James; Elsevier.
3. Practical Data Acquisition for Instrumentation and Control Systems by John Park and Steve Mackay.
Course Objective:
To make the students to understand the basic principle of conventional automobile and its replacement by modern electronic system.

Course Outcome:
The students understand how the conventional automotive subsystems are replaced by modern electronic systems, their relative advantages and comfort.

UNIT I
INTRODUCTION TO AUTOMOTIVE INDUSTRY AND MODERN AUTOMOTIVE SYSTEMS
Vehicle classifications and specifications, Introduction to modern automotive systems and need for electronics in automobiles, Application areas of electronics in the automobiles, Sensors and actuators, Possibilities and challenges in the automotive industry, Enabling technologies and industry trends

UNIT II
SPARK AND COMPRESSION IGNITION ENGINES
Ignition systems, Fuel delivery systems, Engine control functions, Fuel control, Calculation of injector pulse width and injection strategies, Ignition timing control, Lambda control, Engine control modes, Engine control diagnostics

UNIT III
TRANSMISSION CONTROL, BRAKING AND ELECTRONIC STABILITY CONTROL
Automotive transmissions- Transmission fundamentals- Types- Components, Introduction to electronic transmission control- Shift point control- Lockup control-torque converter clutch- Engine torque control during shifting, Safety and diagnostic functions, Improvement of shift quality, vehicle braking fundamentals, Vehicle dynamics during braking, brake system components, introduction to antilock braking systems, components and control logic, electronic stability and other technologies

UNIT IV
STEERING CONTROL:
Steering system basics, fundamentals of electronically controlled power steering types, electronically controlled hydraulic system, electric power steering
UNIT V
AUTOMOTIVE ELECTRONICS FOR PASSENGER SAFETY AND CONVENIENCE
Air bag and seat belt pretension systems- sensor functions, distributed front air bag sensing systems-single-point sensing systems- side-impact sensing- future occupant protection systems, tire pressure monitoring systems, configuration of systems such as power seats-power windows-remote keyless entry systems, types of hybrid vehicles-configurations- main components of hybrid Vehicles.

Text Books:

Reference Books:
COURSE OBJECTIVE:
This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations.

UNIT – I

UNIT – II
Trade Marks: Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III

UNIT – IV

UNIT – V
TEXT BOOKS & REFERENCES:

Course Outcomes:

On completion of this course, the student will have an understanding of the following:

a) Intellectual Property Rights and what they mean
b) Trade Marks and Patents and how to register them
c) Laws Protecting the Trade Marks and Patents
d) Copy Right and laws related to it.
Course Objective:
To understand practical aspect of process industries

Course Outcome:
Students can understand the closed loop control of various processes
Modeling of single capacity level process from experimental Reactive curve.

Obtain PID Tuning parameters from the model.

1. Modeling of single capacity level process from experimental Reactive curve. Obtain PID Tuning parameters from the model.
2. Modeling of Two capacity level process.
4. Modeling of Thermal process from reaction curve and obtain tuning parameters from the model.
5. Modeling of Thermal process.
6. Closed loop control of flow process.
7. Closed loop control of level process.
9. Closed loop control of Pressure process.
10. Inherent and Installed characteristic study of linear, equal percentage and quick opening valves.
Course Objectives:

1. Students will be introduced to modern analytical instruments with the goal of providing them with the tools.
2. The emphasis will be a "hands-on" approach with sample preparation, application, method development, data analysis and interpretation being key elements.
3. Interpret data derived from any analytical instruments.

Course Outcomes:

1. Apply basic lab safety rules while working in analytical instrumentation laboratories
2. Apply basic analytical processes and sampling procedures and perform them in the lab
3. Apply the basic principles of spectroscopy and work in real time with it.
4. Perform simple analytical procedures on given samples using Ultraviolet or Infrared Spectrophotometers leading to applied research.

(Minimum 10 experiments should be completed)

1. Gas analyzers.
2. Gas and liquid chromatography.
3. Spectrometer: UV and VIS spectrometer.
4. Spectrometer: IR and FT IR Spectrometer.
5. Flame photometer.
8. pH measurement.
9. Interfacing of ADC to PC and observe the data.
10. Interfacing of DAC to PC and generate various types of signals.
11. Serial communication through RS-232C between μCs / PCs.
12. Data transfer through IEEE-1394 (fireware) interface.
13. Data Acquisition System
15. Water Purity meter
16. Digital Conductivity meter
17. Digital Turbidity meter
1. INTRODUCTION

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:

- Gathering ideas and information and to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Taking part in social and professional communication.

2. COURSE OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.
3. SYLLABUS
The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

UNIT-I: COMMUNICATION SKILLS
1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

UNIT-II: WRITING SKILLS
1. Report writing
2. Resume Preparation
3. E-mail Writing

UNIT-III: PRESENTATION SKILLS
1. Oral presentation
2. Power point presentation
3. Poster presentation

UNIT-IV: GETTING READY FOR JOB
1. Debates
2. Group discussions
3. Job Interviews

UNIT-V: INTERPERSONAL SKILL
1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

4. LEARNING OUTCOMES:
   • Accomplishment of sound vocabulary and its proper use contextually
   • Flair in Writing and felicity in written expression.
   • Enhanced job prospects.
   • Effective Speaking Abilities

5. MINIMUM REQUIREMENT:
The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 students in the lab:
   • Spacious room with appropriate acoustics.
   • Round Tables with movable chairs
   • Audio-visual aids
   • LCD Projector
   • Public Address system
• P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
• T. V, a digital stereo & Camcorder
• Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and G
1. Walden Infotech: Advanced English Communication Skills Lab
2. K-VAN SOLUTIONS-Advanced English Language Communication Skills Lab
3. DELTA’s key to the Next Generation TOEFL Test: Advanced Skills Practice.
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. Train2success.com

7. BOOKS RECOMMENDED:
6. Campus to Corporate, Gangadhar Joshi, Sage Publications, 2015
Course Objective: The objective of the course is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.

UNIT – I

UNIT – II
Operations Management: Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control-EOQ & ABC Analysis (Simple Problems)
Marketing Management:

UNIT – III

UNIT – IV
UNIT-V


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

TEXT BOOKS:

REFERENCE BOOKS:
**Course Objective:**
1. To study the fundamentals of Data Acquisition system
2. To teach the concept of PLC and the Programming using Ladder Diagram
3. To understand the basics of SCADA and communication standards

**Course Outcome:**
1. Students will have the knowledge of data acquisition System
2. Students will be able to write Programs using ladder diagrams
3. Students will have the knowledge of SCADA, communication standards and various network protocol

**UNIT-I**
**INTRODUCTION TO PLC**
Definition & History of PLC, Overall PLC system, PLC Input and Output modules, CPU & Programmer/Monitors, Solid state memory, the processor, Input Module (Interfaces), Power supplies, PLC advantages & disadvantages, selection criteria for PLC.

**UNIT-II**
**PROGRAMMING OF PLC**
Programming equipments, Proper construction of PLC ladder diagram, Basic components & their symbols in ladder diagram, Fundamentals of ladder diagram, Boolean logic & relay logic, and analysis of rungs. Input ON/OFF switching devices, Input analog devices, Output ON/OFF devices, Output analog devices, Programming ON/OFF Inputs to produce ON/OFF outputs. PLC timer function-PLC counter functions.

**UNIT-III**
**INTRODUCTION TO SCADA**
Introduction and brief history of SCADA, Fundamental principles of modern SCADA systems, SCADA hardware, SCADA software, Landlines for SCADA, Modern use in SCADA system, computer sites and troubleshooting, system implementation.

**UNIT-IV**
**SCADA SYSTEM, HARDWARE AND FIRMWARE**
Comparison of terms SCADA, Distributed Control Systems (DCS), PLC and smart instrument, considerations and benefits of SCADA system, Remote Terminal Units (RTUs): Control Processor, Analog input & output module, Digital input & output.
module, communication Interfaces, Power supply module for RTU, Application program, PLC used as RTUs, Master station, System reliability and availability, communication architecture and philosophies.

UNIT-V
THE EVOLUTION OF SCADA PROTOCOLS

TEXT BOOKS

REFERENCES
2. John R. Hackworth, FredrickD, Hackworth Jr., “Programmable Logic Controllers: Programming Methods and applications”
Course Objectives:
- To understand the fundamental concepts of Embedded systems.
- To learn the kernel of RTOS, architecture of ARM processor.

Course Outcomes:
After completion the students will be able to

- Design of embedded systems leading to 32-bit application development.
- Understand hardware-interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.
- Review and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world.
- Understand Embedded Networking and IoT concepts based upon connected MCUs

UNIT-I
Introduction to Embedded Systems
Embedded system introduction, host and target concept, embedded applications, features and architecture considerations for embedded systems- ROM, RAM, timers; data and address bus concept, Embedded Processor and their types, Memory types, overview of design process of embedded systems, programming languages and tools for embedded design

UNIT-II
Embedded processor architecture
CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture. Introduction to ARM architecture and Cortex – M series, Introduction to the TM4C family viz. TM4C123x & TM4C129x and its targeted applications. TM4C block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

UNIT- III
Overview of Microcontroller and Embedded Systems
Embedded hardware and various building blocks, Processor Selection for an Embedded System, Interfacing Processor, Memories and I/O Devices, I/O Devices and
I/O interfacing concepts, Timer and Counting Devices, Serial Communication and Advanced I/O, Buses between the Networked Multiple Devices.

Embedded System Design and Co-design Issues in System Development Process, Design Cycle in the Development Phase for an Embedded System, Uses of Target System or its Emulator and In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System

Design metrics of embedded systems - low power, high performance, engineering cost, time-to-market.

UNIT-IV

Microcontroller fundamentals for basic programming
I/O pin multiplexing, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer, need of low power for embedded systems, System Clocks and control, Hibernation Module on TM4C, Active vs Standby current consumption. Introduction to Interrupts, Interrupt vector table, interrupt programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

Unit-V

Embedded communications protocols and Internet of things
Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, Implementing and programming UART, SPI and I2C, SPI interface using TM4C. Case Study: Tiva based embedded system application using the interface protocols for communication with external devices “Sensor Hub BoosterPack”
Embedded Networking fundamentals, IoT overview and architecture, Overview of wireless sensor networks and design examples. Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless and Networking applications Building IoT applications using CC3100 user API.
Case Study: Tiva based Embedded Networking Application: “Smart Plug with Remote Disconnect and Wi-Fi Connectivity”

Text Books:
References:

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-I Sem. (EIE)  
L T P C  
3 1 0 3  
15A10702 BIOMEDICAL INSTRUMENTATION

Course Objective: To learn the physiology of the human body and the Instrumentation related to Biomedical Systems.

Course Outcome: On successful completion of the module students will be able to:  
To introduce the concepts of physiology and the Electrical Components of a Biomedical System. To discuss the measurement of physiological parameters.  
To understand the concepts of Imaging System and Telemetry ad the various Therapeutic Equipments used in Medicine.

UNIT I  

UNIT II  

UNIT III  

UNIT IV  

UNIT V  
Text Books:

Reference Books:
Course Objectives:
- To understand VLSI circuit design processes.
- To understand basic circuit concepts and designing Arithmetic Building Blocks.
- To have an overview of Low power VLSI.

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

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

Basic Electrical Properties of MOS and BiCMOS Circuits: Working of MOS transistors – threshold voltage; MOS design equations: \( I_{ds} - V_{ds} \) relationships, Threshold Voltage, Body effect, Channel length modulation, \( g_m, g_{ds} \), figure of merit \( \omega_0 \); Pass transistor, NMOS Inverter, CMOS Inverter analysis and design, Various pull ups loads, Bi-CMOS Inverters.

UNIT-II

UNIT-III
Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.
Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing

UNIT-IV
Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High Density Memory Elements.
VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

TEXT BOOKS:

REFERENCES:
Course Objective:
To make the students understand the application of Opto Electronics and Lasers in instrumentation industries.

Course Outcome:
Upon completion of this course the student shall be able to apply his instrumentation knowledge and understand how light and LASER can be used for measurements.

UNIT I
OPTICAL FIBERS AND THEIR PROPERTIES
Introduction to optical fiber, fiber characteristics, principles of light propagation through a fiber, Different types of fibers and their properties, Losses in the optical fiber, Dispersion, advantages and limitations of optical fibers

UNIT II
OPTO-ELECTRONIC COMPONENTS
Optical sources- LED- LD, Optical detectors- PIN- APD, Electro-optic, Magneto optic and Acousto-optic Modulators.

UNIT III
INDUSTRIAL APPLICATIONS OF OPTICAL FIBERS
Interferometer method of measurement of length – Moire fringes – Measurement of pressure, Temperature, Current, Voltage, Liquid level and strain - fiber optic Gyroscope – Polarization maintaining fibers – Applications

UNIT IV
LASER FUNDAMENTALS
Introduction to lasers - Laser characteristics – Laser configuration – Three level and four level lasers – Q-switching – Mode locking – Types of lasers: Gas lasers, Solid lasers, Liquid lasers and Semiconductor lasers

UNIT V
INDUSTRIAL APPLICATIONS OF LASER
Text Books:

Reference Books:
1. Understanding Fiber Optics, 4th or 5th edition; Jeff Hecht; Prentice Hall publishers
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-I Sem. (EIE)  

15A10704 DIGITAL CONTROL SYSTEMS  
(CBCC-II)

Course Objectives:
1. To equip the students with the basic knowledge of A/D and D/A conversion
2. To understand the basics of Z- Transform
3. To study the stability analysis of digital control system
4. To equip the basic knowledge of digital process control design

UNIT-I
Z-PLANE Analysis of Discrete-Time Control System

UNIT – II
State Space Analysis
State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it’s Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations

UNIT – III
Controllability and Observability
Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT – IV
Design of Discrete Time Control System by Conventional Methods
UNIT – V State Feedback Controllers and Observers
Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman’s formula. State Observers – Full order, minimum order and Reduced order observers.

Text Books:
2. Digital Control and State Variable Methods by M.Gopal, TMH

References:
2. Digital Control Engineering, M.Gopal
Course Objective:
To understand the importance of industrial safety

Course Outcome:
Students will acquire knowledge on the Industrial safety and management

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Safety codes and standards – general safety considerations in power plants, pressure vessels and pressurized pipe lines – operation and inspection of extinguishers – preventing the spread of fire – emergency exit facilities.


Text Books:

Reference Books:
Course Objective:
- To introduce system design concepts to students using microcontrollers with foundational concepts of microcontroller architecture and programming.
- To introduce hardware and software integration for real time systems using microcontrollers and thereby imparting real time system design knowledge to students.

Course Outcome:
- Foundational knowledge in activating and using a generic microcontroller. Preliminary design considerations for system level implementation.
- Knowledge of 8051 Microcontroller hardware features and internal peripherals.
- Programming knowledge of 8051 microcontrollers.
- Knowledge of PIC Microcontroller hardware features and internal peripherals.
- Programming knowledge of PIC microcontrollers.
- Software design techniques to be followed for embedded system designing.
- Using real time operating systems for embedded systems.

UNIT I

UNIT II
MCS51 MICROCONTROLLER AND INTERFACING: Intel MCS51 Architecture – Derivatives - Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing ,Introduction to 16 bit Microcontroller
UNIT III
PIC MICROCONTROLLER AND INTERFACING: Introduction, CPU architecture, registers, instruction sets addressing modes Loop timing, timers, Interrupts, Interrupt timing, I/O Expansion, I 2C Bus Operation Serial EEPROM, Analog to digital converter, UART-Baud Rate-Data Handling-Initialization, Special Features - serial Programming-Parallel Slave Port.

UNIT IV

UNIT V

Content beyond the Syllabus:
Introduction to ARM processors and programming NXP LPC2148 microcontroller.

Text Books:

Reference Books:
Course Objective:
- The subject Telemetry and Telecontrol enables the students to understand how various process parameters in the industry are transmitted and controlled from remote place.

Course Outcome:
- The students shall apply the knowledge of transducers, communications, optical communications and satellite communication in understanding the subject. The students understand how process industry and automation plants are controlled from remote place.

UNIT I
TELEMETRY PRINCIPLES
Introduction, Functional blocks of telemetry, Classification of telemetry, design factors considered in selection of telemetry, cable telemetry-2 wire-3 wire-4 wire, pneumatic telemetry, hydraulic telemetry, mechanical telemetry, distance considerations, limitations, telemetry through power line carrier.

UNIT II
WIRELESS TELEMETRY

UNIT III
SATELLITE TELEMETRY
Principle of satellite telemetry, block diagram, selection of frequency, telemetry tracking and command system, noise consideration, ship to shore telemetry using satellite, analog and digital transmission. Example of satellite telemetry system.
UNIT IV
OPTICAL TELEMETRY
Principle of optical telemetry, block diagram, advantages, optical fiber cable, types of fiber cables, light transmission, sources and detector, transmission and receiving circuits, coherent optical fiber communication, power and link budget, losses, Case study.

UNIT V
TELECONTROL
Principle of Telecontrol, block diagram, design aspects, telecontrol instruments, analog and digital techniques in telecontrol, telecontrol using information theory. Remote adjustments, guidance and regulation. Example of Telecontrol system.

Text Books:
1. Telemetry principles by D. Patranabis, TMH.

Reference Books:
Course Objective:
- Students can understand the importance of computerization of process industries

Course Outcome
- Students can capable to use computers and PLC’s in process systems

1. Programming a PLC to demonstrate control of a device using one push button, Generating square wave etc.
2. Programming a PLC to demonstrate an operation of Batch process.
3. Configuring and Implementation of programmable PID controllers.
4. Control of a process using dead beat algorithm using simulation.
5. Control of a process using Dahlings algorithm using simulation.
6. PC based control of flow process.
7. PC based control of level process.
8. PC based control of pressure process.
9. PC based control of Thermal process.
10. Online Identification of process parameters from experimental data by least square estimate method.
Course Objective:
To provide practical knowledge of Microcontrollers and concept Embedded Systems

Course Outcome:
Student shall be able to design and implement any Electronic Circuit with Micro Controller
1. Embedded systems lab Experiments using 8051
2. To develop program for basic mathematical operations.
3. To develop a program for block operations
4. To develop a program to generate square wave over port pins.
5. To develop a program to read keyboard and code
6. To develop a program to drive stepper motor
7. To develop a program for temperature indicator using ADC

Experiments using PIC Microcontroller
1) Asynchronous serial communication
2) Pulse Width Modulation (PWM) using CCP module
3) DC motor control

Microprocessors & Embedded Systems Lab Experiments
Phase 1:
Normal programming

Phase 2:
Interfacing
Phase 1:
1. Design an assembly language program to perform the different arithmetic operations on the operands
2. Design a program for conversion of binded data to un-binded data.
3. Write a program which accepts input from key board and perform the factorial of the given input using interrupts.
4. Design a program which defines locality of the operands.
5. Write a program to reverse a given string.
6. Write a program to search a character in the given string.
Phase 2:
1) Write an ALP to generate Sinusoidal Wave Using 8255
2) Interface 8251 (USART) with 8086.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech IV-II Sem. (EIE)

15A10801 DIGITAL IMAGE PROCESSING (MOOCS-II)

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

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

UNIT–II

UNIT–III
Background enhancement by point processing Histogram processing, Spatial filtering, Enhancement in frequency Domain, Image smoothing, Image sharpening, Colour image Enhancement

UNIT–IV

UNIT–V
Redundancies in Images - Compression models, Information theoretic perspective - Fundamental coding theorem. Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Transform coding, Image Formats and compression standards.
Text Books:

References:
Course Objectives:
- To study about fabrication processes involved in different types of sensors.
- To study about characteristics of different MEMS materials.
- To get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Course Outcomes:
After completion of this course the students will be able to
- Understand different steps involved in fabrication processes of different types of sensors.
- Understand characteristics of different MEMS materials.
- Get complete knowledge regarding working of MEMS Switches, relays, Inductors, Capacitors and Packing techniques associated with MEMS.

Unit-I:
MEMS Fabrication processes & Sensors:

Unit-II:
MEMS Materials and Fabrication techniques: Metals, semiconductors, thin films for MEMS and their deposition techniques, materials for polymer MEMS, Bulk micromachining for silicon based MEMS, Silicon surface micromachining, Micro-stereo-lithography for polymer MEMS.
Unit-III:
**MEMS Switches and Micro relays**: Switch parameters, basics of switching, Switches for RF and microwave applications, actuation mechanisms for MEMS devices, bistable micro relays and micro-actuators, dynamics of switch operation, MEMS switch design considerations, modeling and evaluation.

Unit- IV:
**MEMS Inductors and Capacitors**: MEMS Micro-machined passive elements: pros and cons, MEMS Inductors: self and mutual inductance, micro-machined inductors, reduction of stray capacitance, improvement of quality factor, folded inductors, modeling and design issues of planar inductors, variable inductor and polymer based inductor. MEMS Capacitors: MEMS gap tuning capacitor, MEMS area tuning capacitor, Dielectric Tunable capacitors.

Unit-V:
**MEMS packaging & MEMS RF Applications**: MEMS packaging: Role of MEMS packaging, Types of MEMS packaging, flip-chip and multichip Unit packaging, RF MEMS packaging issues. MEMS RF applications: Micro-machined transmission line and components, micro-machined RF Filters, Micro-machined Phase shifters, and Micro-machined antenna, Gyros and Bio-MEMS.

References:
COURSE OBJECTIVE:

➢ To understand the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical and Electronic Systems.

UNIT I

MECHATRONICS, SENSORS AND TRANSDUCERS

UNIT II

ACTUATION SYSTEMS

UNIT III

SYSTEM MODELS AND CONTROLLERS

UNIT IV

PROGRAMMING LOGIC CONTROLLERS
Programmable Logic Controllers– Basic Structure – Input / Output Processing – Programming –
UNIT V
DESIGN OF MECHATRONICS SYSTEM

TEXT BOOKS:

REFERENCES:
7. Company Ltd, 2003
Course Objective:
- Study the syntax, semantics and features of Java Programming Language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

Course Outcome:
- Ability to solve problems using object oriented approach and implement them using Java
- Ability to write Efficient programs with multitasking ability and handle exceptions
- Create user friendly interface

UNIT I
Introduction to Java: The key attributes of object oriented programming, Simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

UNIT II
Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.
Packages – Defining, Finding, Member Access, Importing.

UNIT III
Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, Subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

I/O: Byte streams and Classes, Character streams and Classes, Predefined streams, Using byte streams, Reading and Writing files using byte streams, Reading and writing binary data, Random-access files, File I/O using character streams, Wrappers.
UNIT IV
Multithreading: Fundamentals, Thread class, Runnable interface, Creating multiple threads, Life cycle of thread, Thread priorities, Synchronization, Thread communication, Suspending, Resuming and Stopping threads. Applets: Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

Networking: Basics, Networking classes and interfaces, InetAddress, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI class, Cookies, TCP/IP Server sockets, Datagrams.

UNIT V
Swings: The origin and design philosophy of swing, Components and containers, Layout managers, Event handling, Using a push button, JTextField, JLabel and image icon, The swing buttons, Trees, An overview of Jmenubar, Jmenu and Jmenutitem, Creating a main menu, Add mnemonics and accelerators to Menu items, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, Create a modeless dialog.

Text Books:
1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien,

Reference Books:
2. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
6. "Head First Java", Kathy Sierra, Bert Bates, O”Reilly
8. "Java in Nutshell", David Flanagan, O”Reilly

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